On the causal effect of religion on life satisfaction using a propensity score matching technique

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Abstract

Using the British Household Panel Survey (BHPS) data set, we investigate the effect of religion on subjective well-being (SWB), specifically taking into account the implication of selection effects explaining religious influence. In order to measure the level of religious involvement, we construct different indices on the base of individual religious belonging, participation and beliefs. By applying a Propensity Score Matching (PSM) estimator, we find evidence that the causal effect of religion on SWB is better captured than through typical regression methodologies focusing on the mean effects of the explanatory variables. Our results show that religious active participation plays a relevant role among the different aspects of religiosity; moreover, having a strong religious identity such as, at the same time, belonging to any religion, attending religious services once a week or more and believing that religion makes a great difference in life, has a high causal impact on subjective well-being. Our findings are robust to different aspects of life satisfaction.

Keywords: Subjective well-being; Religion; Propensity score technique

JEL-Codes: C21; C40; I31; Z12

1. Introduction

The economic analysis of individual subjective well-being has become increasingly popular and indicators such as happiness, life satisfaction, and quality of life are considered important economic outcomes and proxies for individual utility (Lelkes, 2006a; Frey and Stutzer, 2002). Several are the factors associated with subjective well-being (SWB) which can be divided, according to Frey and Stutzer (2002), into economic (i.e. income, unemployment, inflation and inequality) and non-economic (i.e. personality, socio-demographic and institutional factors). Among the economic determinants, the empirical evidence suggests that individually self-reported happiness increases with individual income[1] (Clark et al. 2008) and that unemployment and inflation reduce people happiness, consistently with welfare theory (Clark and Oswald, 1994; Oswald, 1997)[2]. Moreover, there is some evidence that inequality is negatively related with happiness (Alesina et al. 2004)[3]. On the other hand, among the non-economic determinants, it has been found that happiness depends on personal relationships (quantity and quality of social relations[4]). The greater is the level of social capital, the higher is the well-being (Helliwell and Putham, 2004; Powdtharee, 2008). Poor health is also negatively associated with subjective well-being (for instance, according to Shields and Wheatley, 2005, specific conditions, such as heart attacks and strokes reduce well-being)[5]. Socio-demographic variables are important, too. There is evidence that family influences life satisfaction such as married people have a higher subjective well-being than singles, divorced, separated or widowed (Frey and Stutzer, 2002). Regarding age, evidence that happiness is U-shaped through the life cycle, has been found[6] (Blanchflower and Oswald, 2008; Helliwell, 2006). Level of education (Orepoulos and Salvanes, 2011) and political institutions of democracy (Frey and Stutzer, 2000) have a positive impact on subjective well-being, too.

Among the many aspects of life which have been considered in the literature, also religion, as a determinant of happiness, has been explored. Indeed, it hastypically been found that religious activities (Clark and Lelkes, 2005; Hayo, 2004; Gruber, 2005; Myers, 2000; Swinnyard et al.2001) and beliefs (Helliwell, 2003, 2006; Dehejia et al.2007) are positively correlated with subjective well-being. In other words, religious involvement contributes positively to individuals' self-reported satisfaction (Lelkes, 2006b). Specifically, church attendance and its frequency have been found among the main correlate of subjective well-being (Ferriss, 2002; Helliwell, 2003; Lim and Putnam, 2010)[7]. Smith et al. (2003) report evidence that, apart from church attendance, also intrinsic religiousness has a positive impact on subjective well-being. One explanation which might justify these findings is related to the strong social networks and support that religious organizations offer (Clark and Lelkes, 2005; Ellison, 1991)[8]; according to Krause and Wulff (2005), friendships build through church attendance encourage a sense of belonging and consequently help the building of better physical and mental health (see also

[1] Even though Easterlin (1974) found that aggregate national happiness over time was essentially flat, seemingly irresponsive to sustained increases in GDP per capita. This finding is often known as the Easterlin Paradox, in that growth in per capita income is not reflected in increasing happiness (for a review and a debate, see Clark et al. 2008).

[2] Being unemployed is related to lower subjective well-being than being employed (Easterlin, 2003)

[3] Specifically, they found that there is a large, negative and significant effect of inequality on happiness in Europe but not in the U.S. They also find that the distaste for inequality is concentrated in some groups in Europe, mainly the left and poor. In the United States inequality generated unhappiness is only for a sub-group of rich, left-wing people.

[4] For an evidence on a social aspect such as volunteering see Fiorillo (2012) and Binder and Freytag (2013).

[5] Interestingly, it has been found that disabled are found to experience lower life satisfaction, but there is adaptability (partial). Results show that within 3 years 50% of the effect for moderate and 30% of the effect for severe disabilities disappear (Oswald and Powdtharee, 2008).

[6] High amongst the young, reaching a minimum at around 30 or mid 40s (depending on the study) and then lifts back up again.

[7] According to Bettendorf and Dijkgraaf (2010), church membership is also found to have a positive effect on income for high income countries and a negative effect for low income countries.

[8] See Durkheim (1951)for the social dimension of religion.

Krause, 2008 for more empirical evidence on building friendship with church friends). Thus, religious participation plays an important role, leading to higher levels of education and income, lower levels of welfare receipt and disability, higher levels of marriage, and lower levels of divorce (Gruber, 2005) and perhaps to a better reported well-being.

It appears to be clear the positive relationship between religion and subjective well-being, even though most of the evidence comes from correlational studies and there are implications of selection effects to be taken into account. Indeed, as Regnerus and Smith (2005) very well underlined, the observed association may be the result of alternative possible processes involving different relationships and directions of causal influences. Self-selection is likely to happen and religious individuals who report to be happy may be more likely to stay religious; moreover, poorly measured differences between those involved in religion activities and the non-religious may play an important role. In other words, the casual relationship between religion and subjective well-being is still not very clear and more evidence is needed to analyse how religion really shapes life satisfaction.

In this paper, three components of being religious are taken into account and their relationship with different life satisfaction indices is assessed. Specifically, we consider three distinct measures of religiosity such as religious belonging (whether an individual belongs to any religion), church or religious service attendance (attendance categories are: never, only at weddings, funerals, at least once a year, at least once a month, once a week or more) and finally the self-reported importance of religion in the respondent's life (religious salience categories are: no difference, a little difference, some difference, and a great difference). Using the British Household Panel Survey (BHPS), we thus focus on the relationship between religiosity and overall life satisfaction; firstly and differently from the main literature, we initially use these three variables separately in order to check whether different measures of being religious affect the estimates. Moreover, we construct three other indices of religiosity; according to how involved into religion is the individual, we identify different degrees of religiousness such as belonging to any religion and also think that religious beliefs make a great difference in life (low level of religiosity), belonging to any religion and attend religious services once a week or more (medium level of religiosity), and finally belonging to any religion, attend religious services once a week or more and think that religious beliefs make a great difference in life (high level of religiosity). This will help us to check whether the higher is the level of religiosity of the individuals the stronger is the relationship with subjective well-being. Secondly, we offer an econometric account of the causal impact of different aspects of religiosity on subjective well-being by making use of propensity score matching estimators (Rubin, 1975; Imbens, 2004; Caliendo and Kopeinig, 2008). Propensity score matching is a methodology which rests upon the claim that all the most important factors relevant to the outcome variable (i.e. SWB) are observed for participants (i.e. religious individuals) and non-participants (i.e. non-religious individuals). Once these factors are controlled for in the analysis, the selection bias term must be zero by definition and thus the mean causal effect can be retrieved. Thirdly, as robustness checks, we also take into account how satisfied are individuals with their social life.

We find that the causal effect of belonging to any religion, attending religious services once a week or more and think that religious beliefs make a great difference in life do not seem to be well captured by typical regression methodologies focusing on the mean effects of the explanatory variables. Indeed, once the potential selection effects influencing the association between religion and subjective well-being have been taken into account, the results show that religious active participation plays a very important role on SWB. Moreover, having a stronger religious identity (i.e. those individuals who belong to any a religion, attend religious services once a week or more and that also believe that religion makes a great difference in life) is related to a strong causal impact on subjective well-being.

The rest of the paper is organized as follows. Section 2 describes the data, the identification strategy and illustrates the research design, Section 3 describes the empirical results, Section 4 provides some robustness checks and finally Section 5 concludes.

2. Data and identification strategy

2.1. Data

We base our investigation on data from the British Household Panel Survey (BHPS)[9]. It is a longitudinal survey of private households in Great Britain and it aims to track social and economic changes in a representative sample of the British population. The sample used in the paper consists of about 12,000 individuals. The data contains information on various domains of the respondentslives, ranging from income to jobs, household consumption, education, health, but also social and political values. We have specifically used the 18th wave (2008). The descriptive statistics for our data set can be found in Table 1 in Appendix.

2.2. How we model religion and subject well-being

In our empirical investigation, we use three key religious variables. The first one picks up whether an individual belongs to any religion (*Religious*). Respondents are asked:Do you regard yourself as belonging to any particular religion?, with the following possible replies: No religion; Church of England/Anglican; Roman Catholic; Church of Scotland; Free Church or Free Presbyterian Church of Scotland; Episcopalian; Methodist; Baptist; Congregational/United; Reform/URC; Other Christian; Christian; Muslim/Islam; Hindu; Jewish; Sikh.A binary variable has been created, being 1 whether an individual belongs to any religion and 0 otherwise. The second one measures church attendance (*Attendance*). Respondents are asked:How often, if at all, do you attend religious services or meetings?, with the possible replies: Once a week or more; Less often but at least once a month; Less often but at least once a year; Never or practically never; Only at weddings, funerals etc. (scaled from 1 to 4).A binary variable has been created, being 1 whether an individual goes once a week or more to services or meetings and 0 otherwise. Finally, the third one, aims to measure individual religious beliefs (*Beliefs*). Respondents, indeed, are asked:How much difference would you say religious beliefs make to your life?, with the possible replies: A little difference, Some difference, A great difference, or No difference. A binary variable has been created, being 1 whether an individual thinks that religious beliefs make a great difference in his/her life and 0 otherwise.

We initially use these three variables separately in order to check how different measures of being religious affect the estimates. In other words, we want to verify whether subjective well-being is associated more with the frequency of attendance at religious services rather than just belonging to any religion; moreover, we also examine how religion actually shapes life satisfaction taking into account what individuals think about religion and its importance in their life (i.e. religious beliefs). For robustness, we construct three other indices of religiosity. An individual has been considered religious at low level when he/she belongs to any religion and also think that religious beliefs make a great difference in life (*Religious*Beliefs*), religious at medium level when he/she does belongs to any religion and attend religious services once a

[9] University of Essex. Institute for Social and Economic Research and National Centre for Social Research, British Household Panel Survey: Waves 1-18, 1991-2009. Colchester, Essex: UK Data Archive [distributor], Wave 18 - 1 September 2008 to 9 April 2009. SN: 5151, http://dx.doi.org/10.5255/UKDA-SN-5151-1

week or more (*Religious*Attendence*)[10], and finally religious at high level when he/she belongs to any religion, attend religious services once a week or more and think that religious beliefs make a great difference in life (*CompleteReligious*).We use overall life satisfaction as a measure of the individual subjective well-being. This is measured as follows:All things considered, how satisfied are you with your life overall?. Answers are on a 1 to 7 scale, where 1means not satisfied at all and 7 means completely satisfied. For robustness, we also use another measure of life satisfaction which is specifically related to the social life satisfaction. It is measured as follows: All things considered, how satisfied are you with your social life?. Again, answers are on a 1 to 7 scale, where 1 means not satisfied at all and 7 means completely satisfied[11].

2.3. Identification strategy

As already stated in the introduction, most of the empirical evidence which has been found in the literature on the relationship between religion and subjective well-being is debated on the account that it is based on correlational studies. In other words, the casual interpretation of this association and the direction of cause and effect between religion and life satisfaction is not easy to be measured. As Regnerus and Smith (2005) very well underlined, the possible endogeneity problem related to the religious concept may raise through several channels. Indeed, there is a selection effect to take into account due to the fact that individuals choose how important is religion in their life; thus, they might tend to consider themselves as less or more religious for different reasons, including several that have nothing to do with the content of the religion itself. Such reasons might include personality type, age, race or ethnicity, and cultural surroundings (Regnerus and Smith, 2005). If those reasons also affect the reported well-being, then we end up with attributing to religion what, instead, might have nothing to do with it. Moreover, self-selection might arise if happy people may take up religion to pursue spiritual well-being and, people who find happiness in religion may be more likely to stay religious than those who do not (Lim and Putnam, 2010). This is related to what Regnerus and Smith (2005) call the religious strategy explanation. In other words, individuals might use religion as a strategy for achieving a desired outcome such as being married or staying healthy (i.e. if an individual has already an aptitude for being married, then he/she could choose of being involved in religion activities as a strategy for achieving that result). Finally, there is also the possibility that a person self-selects out of religion such that the apparent association between religion and well-being is largely the product of reverse causation; this creates "observed (but not real) associations between religion or religiosity and particular outcomes among the population of individuals that did not decrease their religious involvement or did not alter their religious beliefs or attitudes" (see again Regnerus and Smith, 2005).

We estimate the following model of latent subjective well-being (SWB*):

$$SWB_i = \beta REL_i + \delta X_i + \varepsilon_i \quad (1)$$

[10]We consider the level of religiosity of those who belong to any religion and also attend religious services once a week or more (medium level) higher than the level of those who belong to any religion and think that religion makes a great difference in life (low level) on the base of the fact that religious active participation is considered one of the main detector of religious involvement.

[11] The overall life satisfaction and the social life satisfaction have been used both as continuous variables and as dummy variables. In the latter case, we created a dummy variable equal to 1 if the individual is satisfied, corresponding to the values 5 (Somewhat satisfied), 6 (Mostly satisfied) and 7 (Completely satisfied) and 0 otherwise, corresponding to the values 1 (Completely dissatisfied), 2 (Mostly dissatisfied), 3 (Somewhat dissatisfied) and 4 (Neither satisfied nor dissatisfied).

where SWB_imeasures the individual subjective well-being; REL_icaptures whether an individual belongs to any religion, attend religious services or meetings and his/her religious beliefs;$X_i$is a vector of other explanatory variables including gender, marital status, age, health and economic variables; $\varepsilon_i$is an error term.

Considering the reported level of life satisfaction as an ordinal measure, we firstly estimate Eq. (1) using an ordered logit estimator. Vector $X_i$contains the following control variables. We firstly include *Gender*(a dummy variable equal to one if the individual is a man), *Age*, Age^2, *Married*(a dummy variable equal to one if the individual is married)[12]. We then control for some human capital variables. Indeed, we include *Employed* (a dummy variable equal to 1 if the individual is currently employed), *Education* (we measure education according to the International Standard Classification of Education levels such as primary; lower secondary; upper secondary; higher vocational; first stage of tertiary; second stage of tertiary), *Financial Situation*(a five point scale variable indicating whether the individual finds living very difficult, quite difficult, whether he/she is just able to getting by, does alright or lives comfortably). We control for the individual health status, through *Health Situation* (measuring, on a five point scale whether the individual health situation is very poor, poor, fair, good and excellent), and *Disability*, a dummy which takes the value of 1 if the individual has health limits in daily activities (it is a proxy for controlling that the individual might suffer from any disability). In addition, we control for *Stress*, a dummy which measures a stressful event taking a value of one in the case that a negative event, such as a divorce occurred to the individual. This should greatly reduce any bias that may derive from contingent circumstances, which are considered particularly important in defining the reliability of happiness scores (see Carrieriand De Paola, 2012). Moreover, according to Regnerus and Smith (2005), one of the most plausible claims of unmeasured selection effects (i.e. not demographic differences) appear to involve concepts like being conformist, risk aversive, and strategic personality types. That is, religiosity may be in part the result of hard-wired personality differences. Safe or risk-aversive people are more likely to both display greater religiosity and to exhibit positive health practices, lifestyles, and generally pro-social behaviour. In order to control for this issue, we include *Risks* in the analysis which is a variable taking the value of 1 to 10 scale where 1 means not taking risk and 10 means taking risks. Furthermore, in order to control for the fact the religious organizations may influence individuals' beliefs, attitudes and values, we also include two dummies (*Voluntary* and *Homosexual*) which, respectively, take value of 1 if the individual is involved in any volunteering and if he/she thinks that homosexual relationships are wrong. Finally, we also take into account regional fixed effects including a dummy taking the value of one if the individual lives in England (*England*).

2.4. Propensity score matching

To recover from the selection effects underlined in Section 2.3, we employ a Propensity Score Matching (PSM) technique in order to estimate the Average Treatment effect of the Treated (ATT) using different methods (for a similar approach applied to explore the relationship between volunteering and SWB, see Binder and Freytag, 2013). The PSM procedure aims to identify the average treatment effect by comparing outcomes of those individuals who claim to belong to any religion, attend religious services or meetings, and have strong religious beliefs and those who do not, having these two groups, a priori, similar probabilities of being involved into religion. The idea beyond this methodology rests upon the claim

[12] According to Frey andStutzer (2002), although socio-demographic variables might not be as relevant from an economic standpoint (they cannot be easily controlled, such as age, gender, and marriage) they have an effect on happiness and thus should be included as controls in regression analysis to avoid generating biases in the estimations.

that all the most important factors relevant to the outcome variable are observed for participants (i.e. religious individuals) and non-participants (non-religious individuals). Once these factors are controlled for in the analysis, the selection bias term must be zero by definition and thus the mean causal effect can be retrieved. In other words, we want to compare mean outcomes for religious individuals to mean outcomes for non-religious individuals net of compositional differences that can be attributed to the confounding factor X. It is the case we want to mimic, ex-post, an experiment by constructing a suitable comparison group by matching treated (i.e. religious individuals) and non-treated (non-religious individuals) in term of their observable characteristics. That is, we compare average outcomes for individual involved in religion and non-religious within strata defined by the variable X. This will allows us to study how the causal effect of belonging to any religion, attending religious services or meetings, and having strong religious beliefs vary across values of the deprivation index X. When the dimension of X is large, we can make this operational through the so called propensity score which was defined by Rosenbaum and Rubin (1983), as the probability of treatment assignment conditional on observed baseline covariates. In order to make the propensity score matching procedure work, two important properties have to be satisfied. According to the first one, the balancing property, for a given propensity score the distribution of the covariates X is, on average, the same among the two groups (i.e. religious and non-religious individuals); with regard to the second one, the two groups are equivalent with respect to$Y$ (i.e. subjective well-being) once we conditions on covariates X. In other words, all differences between treated (i.e. religious individuals) and non-treated (i.e. non-religious individuals) are captured in their observable attributes. To diagnose the quality of the resulting matched samples we test the assessment of the covariate balance in the groups, where balance is defined as the similarity of the empirical distributions of the full set of covariates in the matched treated and control groups. For each covariate, we test the equality of means and the standardized percentage bias in the two samples before and after matching and then we test the joint insignificance of all the regressors before and after matching.
We use 1 to 1 nearest neighbor matching, that selects for each treated individual i the control individual with the smallest distance from individual i[13].

3. Empirical results

Results from the ordered logistic regression[14] (see Table 2 in Appendix), confirming what has already been found in the literature, show that religious individuals are happier than non-religious; indeed, respondents who either belong to any religion, or believe that religion makes a great difference in life, or participate in religious activities and attend religious services have positive odds of life satisfaction (see Table 2 in Appendix, Colums 1, 2 and 3, respectively, OR = 0.132, 0.221 and 0.271), significant at the 1% level. Thus, among the three different measures of religiousness, we found that church attendance and its frequency has the highest positive impact on subjective well-being. We then check whether the results change when different degrees of being involved into religion are taken into account. Three different stages are considered such as a low (belonging to any religion and believing that religion makes a great difference in life), medium (belonging to any religion and attending religious services once a week or more), and high (belonging to any religion, believing that religion makes a great difference in life and attending religious services once a week or more) level of religiosity, and they are all positive and statistically significant related to life satisfaction (see Table 2 in Appendix, Colums 4, 5 and 6,

[13] We estimate Kernel matching, Local linear regression matching, Mahalanobis matching and k-Nearest neighbors matching with different k, too. Results change only slightly and are available upon request.
[14] We have also computed OLS and Fixed effects estimations using the individual subjective well-being variable both as continuous and as a dummy and, finally, a Logit estimation; results are reported in Table 6 in Appendix.

respectively, OR = 0.208, 0.331 and 0.380); the estimates show that what we consider the highest level of religiosity, such as being religious, attending religious services once a week or more and believe that religion makes a great difference in life, is associated with the largest estimated coefficient. In other words, there is evidence that individuals with a strong religious identity tend to have the greatest level of life satisfaction.

In addition, also the results related to the other determinants of happiness are consistent with those emerging from the literature (see again Table 2 in Appendix); indeed, life satisfaction is U-shaped in age, showing a negative and statistically significant relationship between subjective well-being and age while, instead, a positive and statistically significant relationship between subjective well-being and age^2 has been found. In other words, the progression of age does not lead to a linear increase in happiness. Individuals who are married report significantly higher levels of life satisfaction, while a stressful event in life such as being divorced has a negative effect on happiness. Both the financial and health status seem to play an important role, too, being economic and physical conditions positively associated with individuals self-assessed well-being. The Education variable has a negative and statistically significant coefficient. This could be due to the fact that the effects tend to drop out, especially in equations in which health status is included, for higher levels of education in more fully specified models. Education improves health and thus indirectly improves subjective well-being, but net of that effect (and of the other factors in the analysis), education appears to have a different impact on subjective well-being (on this point, see Helliwell and Putnam, 2004). See also Hungerman (2014) who finds that high levels of education lead to lower levels of religious participation later in life[15]. There is no evidence of differences in reported well-being between females and males as well as being employed and being involved into volunteering activities does not seem to be crucial in explaining happiness. Finally, there is evidence that disability has a negative impact on life satisfaction and being a less risk aversive type seem to be, instead, related to a higher level of satisfaction.

As already stated in section 2, the estimates obtained so far may be biased due to the selection effects shaping religions impact on life satisfaction. In order to take into account this issue and to attribute a casual interpretation to the association between religion and subjective well-being, we rely on matching estimators. To simplify the interpretation of the results, a dummy variable taking the value of 1 if the individual is satisfied and 0 otherwise has been used as outcome variable[16]. The results show that the causal impact of belonging to any religion, of believing that religion makes a great difference in life and of attending religious services once or more a week are, 0.0183, 0.0380 and 0.0616, respectively, almost all significant at the 1% level (see Table 3 in Appendix). These findings are again consistent with the idea that, above the individuals identification with a particular religion, is the religion active participation to be associated with higher life satisfaction. Indeed, the estimated effect for individuals who attend religious services once or more a week is an increase of the reported life satisfaction by 6.2%. Furthermore, we also check whether the results change when different degrees of being involved into religion are taken into account. The causal impact of having a low, medium and high level of religiosity on subjective well-being is 0.0227, 0.0319 and 0.0524, respectively (again, see Table 3 in Appendix). Thus, we again find evidence that having a strong religious identity (belonging to any religion, attending religious services once a week or more and believing that religion makes a great difference in life) has the strongest casual impact on individual subjective well-being. The PS

[15]Specifically, he finds that an additional year of education leads to a 4 percentage points in decline in the likelihood that an individual identifies with any religious tradition.

[16]We also estimate the PS Matching using the individual subjective well-being measured on a 1 to 7 scale as outcome. Results change only slightly and are available upon request.

test confirms these results, do not rejecting the null hypothesis of balancing in the covariates between treated group and control group, except for belonging to any religion estimation.

4. Robustness checks

In this section, we propose a sensitivity analysis to verify the robustness of our results using social life satisfaction as a proxy of subjective well-being measured as follows: All things considered, how satisfied are you with your social life overall? Answers are on a 1 to 7 scale, where 1 means not satisfied at all and 7 means completely satisfied. The results from the ordered logistic regression[17](see Table 4 in Appendix) confirm that religious individuals are happier than non-religious also considering subjective social life satisfaction. Again, we found that church attendance and its frequency is the main determinant of subjective well-being. Results are confirmed also considering the other determinants of happiness. Interestingly, differently from the analysis when the overall life satisfaction has been used, being employed and being involved into volunteering activities appear to be important in explaining social life satisfaction. In other words, there is evidence that individuals participation in the labour market and in an activity which benefits another person, group or organization, specifically affects social life satisfaction more than overall well-being.

The main evidence is also confirmed when matching estimators are considered (see Table 5 in Appendix). Firstly, we still find the presence of a causal impact of belonging to a religion, of believing that religion makes a great difference in life and of attending religious services once or more a week on social life satisfaction; moreover, the results confirm that those individuals with a strong religious identity have the highest association with social life satisfaction.

5. Concluding remarks

This study focuses the attention on the relationship between religion and individual subjective well-being. Specifically, it addresses the point that the empirical evidence already provided in the literature is mostly based on correlational studies meaning that the positive association between religion and life satisfaction may suffer from the lack of a causal interpretation; unobserved or poorly measures of differences between religious and non-religious individuals may, indeed, explain this association as well as self-selection may lead to erroneously attribute this influence to religion (i.e. the observed association may be the result of alternative possible processes).

Firstly, by using an ordered logit estimator, we demonstrate that religion is positively correlated to a better life satisfaction. Secondly and more importantly, we provide a causal interpretation to this association. Indeed, by making use of a propensity score matching technique, we estimate the casual effects of belonging to a religion, of attending religious services once or more a week and of believing that religion makes a great difference in life on both individual overall and social life satisfaction, confirming that these effects do not seem to be well captured by typical regression methodologies focusing on the mean effects of the explanatory variables. Specifically, we find evidence that church attendance and its frequency seem to better predict subjective well-being. Moreover, we provide evidence that individuals with a strong religious identity (such as those who belong to any religion, attend religious services once a week or more and at the same time believe that religion makes a great difference in life) tend to have a high level of life satisfaction.

[17]Again we have also computed OLS and Fixed effects estimations using the individual subjective well-being variable both as continuous and as a dummy and, finally, a Logit estimation; results are reported in Table 7 in Appendix.

References

Alesina, A., Di Tella, R., MacCulloch, R. (2004). Inequality and happiness: are Europeans and Americans different?*Journal of Public Economics*, 88 (9), 2009-2042.

Bettendorf, L., Dijkgraaf, E. (2010). Religion and income: Heterogeneity between countries. *Journal of Economic Behavior & Organization*, 74, (1–2), 12-29.

Binder, M., Freytag, A. (2013). Volunteering, subjective well-being and public policy.*Journal of Economic Psychology,* 34, 97-119.

Blanchflower, D.G., Oswald, A.J. (2008). Is well-being U-shaped over the life cycle? *Social science & medicine,* 66 (8), 1733-1749.

Caliendo, M., Kopeining, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, 22 (1), 31-72.

Carrieri, V. De Paola, M. (2012). Height and subjective well-being in Italy. *Economics & Human Biology,*10(3), 289-298.

Clark, A.E., Oswald, A.J. (1994). Unhappiness and unemployment.*The Economic Journal*, 648-659.

Clark, A.E., Lelkes, O. (2005). Deliver us from evil: Religion as insurance. PSE, Paris.

Clark, A.E., Frijters, P., Shields, M.A. (2008). Relative income, happiness, and utility: An explanation for the Easterlin paradox and other puzzles. *Journal of Economic Literature* ,95-144.

Dehejia, R., DeLeire, T., Luttmer, E.F.P. (2007). Insuring consumption and happiness through religious organizations. *Journal of Public Economics*, 91 (1), 259-279.

Durkheim, E. (1951). Suicide: A Study in Sociology. Translated by John A. Spaulding and George Simpson. The Free Press.

Easterlin, R.A. (1974). Does economic growth improve the human lot? Some empirical evidence. *Nations and Households in Economic Growth,* 89, 89-125.

Easterlin, R.A. (2003). Explaining happiness. *Proceedings of the National Academy of Sciences,* 100 (19), 11176-11183.

Ellison, C.G. (1991). Religious involvement and subjective well-being. *Journal of Health and Social Behavior*, 80-99.

Ferriss, A.L. (2002). Religion and the quality of life.*Journal of Happiness Studies* 3 (3), 199-215.

Fiorillo, D.(2012). Volunteer work and domain satisfactions: evidence from Italy. *International Journal of Social Economics,*39(2), 97-124.

Frey, B.S., Stutzer, A. (2002). What can economists learn from happiness research? *Journal of Economic Literature*, 402-435.

Frey, B.S., Stutzer, A. (2000). Happiness, economy and institutions. *The Economic Journal* 110 (466), 918-938.

Gruber, J.H. (2005). Religious market structure, religious participation, and outcomes: Is religion good for you? *Advances in Economic Analysis & Policy,* 5 (1).

Hayo, B. (2004). Happiness in Eastern Europe." Mimeo, Philipps University Marburg.

Helliwell, J.F. (2003). How'slife? Combining individual and national variablesto explain subjective well-being.*Economic Modelling,* 20, 331-360.

Helliwell, J.F., Putnam, R.D. (2004). The social context of well-being. Philosophical transactions-royal society of London series B biological sciences, 1435-1446.

Helliwell, J.F. (2006). Well-Being, Social Capital and Public Policy: What's New? *The Economic Journal,* 116 (510), C34-C45.

Hungerman, D.M. (2014). The effect of education on religion: Evidence from compulsory schooling laws.*Journal of Economic Behavior & Organization*, 104, 52-63.

Imbens, G.W. (2004). Nonparametric estimation of average treatment effects under exogeneity: A review. *Review of Economics and Statistics* 86 (1), 4-29.

Krause, N.M. (2008). Aging in the church: How social relationships affect health. Templeton Foundation Press.

Krause, N.M.Wulff, K.M. (2005). Church-Based Social Ties, a Sense of Belonging in a Congregation, and Physical Health Status.*International Journal for the Psychology of Religion*, 15, 73-93.

Lim, C., Putnam, R.D. (2010). Religion, social networks, and life satisfaction.*American Sociological Review*, 75 (6), 914-933.

Lelkes, O. (2006a). Knowing what is good for you: Empirical analysis of personal preferences and the objective good.*TheJournal of Socio-Economics*, 35 (2), 285-307.

Lelkes, O. (2006b). Tasting freedom: Happiness, religion and economic transition.*Journal of Economic Behavior & Organization*, 59, (2), 173-194

Myers, D.G. (2000). The funds, friends, and faith of happy people. *American psychologist*, 55 (1), 56.

Oreopoulos, P. Salvanes, K.G. (2011). Priceless: The non-pecuniary benefits of schooling. *The Journal of Economic Perspectives,* 159-184.

Oswald, A.J. (1997). Happiness and economic performance. *The Economic Journal* 107 (445), 1815-1831.

Oswald, A.J. Powdthavee, N. (2008). Does happiness adapt? A longitudinal study of disability with implications for economists and judges.*Journal of Public Economics*, 92, (5-6), 1061-1077.

Powdthavee, N. (2008). Putting a price tag on friends, relatives, and neighbours: Using surveys of life satisfaction to value social relationships. *The Journal of Socio-Economics,* 37 (4), 1459-1480.

Regnerus, M.D., Smith, S. (2005). Selection effects in studies of religious influence. *Review of Religious Research*, 23, 50.

Rosenbaum, P.R., Rubin, D.R. (1983). The central role of the propensity score in observational studies for causal effects.*Biometrika* 70 (1), 41-55.

Rubin, J. (1975). What the" good language learner" can teach us. *TESOL quarterly*, 41-51.

Shields, M., Wheatley P.S. (2005). Exploring the economic and social determinants of psychological well-being and perceived social support in England. *Journal Royal Statistical Society* (Part 3), 513-537.

Smith, T. B., McCullough, M. E., Poll, J. (2003). Religiousness and depression: evidence for a main effect and the moderating influence of stressful life events. *Psychological Bulletin*, 129, 614-636.

APPENDIX

Table 1: Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max
Life satisfaction (1-7)	5.244	1.227	1	7
Life satisfaction (0-1)	0.781	0.413	0	1
Social Life satisfaction (1-7)	4.952	1.423	1	7
Social Life satisfaction (0-1)	0.667	0.471	0	1
Religious	0.507	0.500	0	1
Attendance	0.133	0.339	0	1
Beliefs	0.151	0.358	0	1
Religious*Attendance	0.082	0.274	0	1
Religious*Beliefs	0.105	0.307	0	1
Complete Religious	0.059	0.235	0	1
Gender	0.456	0.498	0	1
Health Situation	3.809	0.923	1	5
Financial Situation	3.839	0.978	1	5
ISCED levels	3.510	1.730	1	7
Married	0.518	0.500	0	1
Age	46753	18.943	15	101
Age Squared	2544.677	1895.224	225	10201
Employed	0.567	0.495	0	1
England	0.495	0.500	0	1
Voluntary	1.616	1.227	1	5
Homosexual	3.376	1.169	1	5
Stress	0.056	0.384	0	1
Disability	0.180	0.384	0	1
Risks	5.524	2.188	1	10
Observations	12190			

Table 2: Ordered Logit – Life Satisfaction

	(1)	(2)	(3)	(4)	(5)	(6)
Religious	0.132***					
	(0.038)					
Beliefs		0.221***				
		(0.053)				
Attendance			0.271***			
			(0.057)			
Religious*Beliefs				0.208***		
				(0.067)		
Religious*Attendance					0.331***	
					(0.070)	
Complete Religious						0.380***
						(0.081)
Gender	-0.032	-0.046	-0.048	-0.043	-0.044	-0.045
	(0.036)	(0.034)	(0.034)	(0.036)	(0.036)	(0.036)
Health Situation	0.686***	0.682***	0.680***	0.687***	0.687***	0.687***
	(0.024)	(0.023)	(0.023)	(0.024)	(0.024)	(0.024)
Financial Situation	0.490***	0.496***	0.494***	0.490***	0.488***	0.489***
	(0.021)	(0.019)	(0.019)	(0.021)	(0.021)	(0.021)
ISCED levels	-0.089***	-0.085***	-0.085***	-0.091***	-0.092***	-0.092***
	(0.012)	(0.011)	(0.011)	(0.012)	(0.012)	(0.012)
Married	0.405***	0.370***	0.369***)	0.412***	0.411***	0.409***
	(0.045)	(0.042)	(0.042))	(0.045)	(0.044)	(0.045)
Age	-0.061***	-0.060***	-0.060***	-0.059***	-0.058***	-0.058***
	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)
Age Squared	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employed	-0.008	-0.002	0.001	-0.009	-0.006	-0.008
	(0.049)	(0.045)	(0.045)	(0.049)	(0.049)	(0.049)
England	-0.047	-0.078**	-0.070**	-0.037	-0.035	-0.036
	(0.037)	(0.034)	(0.034)	(0.037)	(0.037)	(0.037)
Voluntary	0.030**	0.020	0.015	0.024	0.017	0.018
	(0.015)	(0.014)	(0.014)	(0.015)	(0.015)	(0.015)
Homosexual	0.025	0.015	0.018	0.027	0.033*	0.033*
	(0.017)	(0.016)	(0.016)	(0.018)	(0.018)	(0.018)
Stress	-0.231***	-0.224***	-0.222***	-0.230***	-0.234***	-0.233***
	(0.089)	(0.083)	(0.083)	(0.089)	(0.088)	(0.088)
Disability	-0.288***	-0.283***	-0.277***	-0.292***	-0.286***	-0.286***
	(0.059)	(0.054)	(0.054)	(0.059)	(0.059)	(0.059)
Risks	0.062***	0.054***	0.055***	0.062***	0.063***	0.062***
	(0.010)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)
Log Likelihood	-15083.132	-17276.157	-17276.354	-15083.522	-15077.701	-15077.844
Pseudo R-squared	0.0803	0.0802	0.0803	0.0802	0.0806	0.0806
Observations	10625	12154	12155	10625	10625	10625

Notes: Standard errors are robust to heteroskedasticity and autocorrelation. ***, ** and * indicate coefficients significant at the 1%, 5% and 10% levels, respectively.

Table 3: Life Satisfaction – 1-to-1 PS Matching

	Religious	Beliefs	Attendance
ATT	0.0183** (0.0082)	0.0380*** (0.0137)	0.0616*** (0.0143)
PS test	0.000***	0. 941	0.770

	Religious*Beliefs	Religious*Attendance	Complete Religious
ATT	0.0227 (0.0171)	0.0319* (0.0176)	0.0524** (0.0210)
PS test	0.995	0.985	0.987

Standard Errors in parentheses. ***, ** and * indicate coefficient significant at the 1%, 5% and 10% levels, respectively. PS test is a test on the balancing of the variablesbetween treated group and control group, distributed as chi-square under the null of balancing.

Table 4: Ordered Logit – Social Life Satisfaction

	(1)	(2)	(3)	(4)	(5)	(6)
Religious	0.125***					
	(0.037)					
Beliefs		0.111***				
		(0.051)				
Attendance			0.210***			
			(0.054)			
Religious*Beliefs				0.090		
				(0.067)		
Religious*Attendance					0.254***	
					(0.067)	
Complete Religious						0.224***
						(0.079)
Gender	0.029	0.006	0.007	0.015	0.018	0.015
	(0.035)	(0.033)	(0.033)	(0.035)	(0.035)	(0.035)
Health Situation	0.501***	0.500***	0.499***	0.501***	0.501***	0.500***
	(0.024)	(0.022)	(0.022)	(0.024)	(0.024)	(0.024)
Financial Situation	0.399***	0.409***	0.407***	0.399***	0.397***	0.398***
	(0.021)	(0.019)	(0.019)	(0.021)	(0.021)	(0.021)
ISCED levels	-0.098***	-0.092***	-0.093***	-0.097***	-0.100***	-0.098***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Married	0.073***	0.049	0.048	0.081*	0.078*	0.078*
	(0.044)	(0.041)	(0.041)	(0.044)	(0.044)	(0.044)
Age	-0.064***	-0.064***	-0.063***	-0.062***	-0.062***	-0.062***
	(0.007)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Age Squared	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employed	0.108**	0.124***	0.127***	0.106**	0.109**	0.107**
	(0.047)	(0.044)	(0.044)	(0.047)	(0.047)	(0.047)
England	-0.053	-0.049	-0.039	-0.043	-0.041	-0.042
	(0.036)	(0.033)	(0.033)	(0.036)	(0.036)	(0.036)
Voluntary	0.068***	0.068***	0.061***	0.068***	0.060***	0.063***
	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)	(0.015)
Homosexual	-0.009	-0.016	-0.010	-0.012	-0.006	-0.008
	(0.017)	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)
Stress	-0.282***	-0.318***	-0.316***	-0.281***	-0.284***	-0.283***
	(0.084)	(0.080)	(0.080)	(0.084)	(0.084)	(0.084)
Disability	-0.230***	-0.267***	-0.264***	-0.230***	-0.228***	-0.229***
	(0.056)	(0.051)	(0.051)	(0.056)	(0.056)	(0.056)
Risks	0.076***	0.071***	0.072***	0.075***	0.076***	0.076***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Log Likelihood	-17193.442	-19715.828	-19713.917	-17197.877	-17191.926	-17194.911
Pseudo R-squared	0.0501	0.0520	0.0522	0.0498	0.0502	0.0500
Observations	10654	12189	12190	10654	10654	10654

Notes: Standard errors are robust to heteroskedasticity and autocorrelation. ***, ** and * indicate coefficients significant at the 1%, 5% and 10% levels, respectively

Table 5: Social Life Satisfaction – 1-to-1 PS Matching

	Religion	Beliefs	Attendance
ATT	0.0359*** (0.0092)	0.0195*** (0.0157)	0.0496*** (0.0165)
PS test	0.000***	0.704	0.940
	Religious*Beliefs	Religious*Attendance	Complete Religious
ATT	0.0182 (0.0197)	0.0516** (0.0209)	0.0546** (0.0248)
PS test	0.987	0.740	0.974

Standard Errors in parentheses. ***, ** and * indicate coefficient significant at the 1%, 5% and 10% levels, respectively. PS test is a test on the balancing of the variablesbetween treated group and control group, distributed as chi-square under the null of balancing.

Table 6: Robustness –Life Satisfaction

	Satisfaction (1-7)		Satisfaction (0-1)		
	OLS	Fixed Effects	OLS	Fixed Effects	Logit
	(1)	(2)	(3)	(4)	(5)
Religious	0.071*** (0.023)	0.065* (0.037)	0.007 (0.008)	0.008 (0.014)	0.043 (0.056)
Beliefs	0.100*** (0.031)	0.045 (0.053)	0.022** (0.010)	0.028 (0.020)	0.178** (0.078)
Attendance	0.141*** (0.032)	-0.079 (0.068)	0.041*** (0.011)	-0.023 (0.023)	0.337*** (0.087)
Religious*Beliefs	0.087** (0.038)	0.020 (0.071)	0.016 (0.013)	0.015 (0.025)	0.145 (0.096)
Religious*Attendance	0.182*** (0.039)	0.056 (0.083)	0.042*** (0.013)	0.003 (0.029)	0.380*** (0.114)
Complete Religious	0.197*** (0.045)	0.093 (0.094)	0.043*** (0.015)	0.026 (0.032)	0.416*** (0.134)

Notes: Standard errors are robust to heteroskedasticity and autocorrelation. Clustered standard errors in Fixed Effects estimation are considered. ***, ** and * indicate coefficients significant at the 1%, 5% and 10% levels, respectively. Coefficients of the explanatory variables have been omitted here but are available on request. Columns 1 and 2 consider Life Satisfaction as a 1 to 7 scale value variable, columns 3, 4 and 5 consider Life Satisfaction as dummy variable.

Table 7: Robustness – Social Life Satisfaction

	Satisfaction (1-7)		Satisfaction (0-1)		
	OLS	Fixed Effects	OLS	Fixed Effects	Logit
	(1)	(2)	(3)	(4)	(5)
Religious	0.085*** (0.027)	0.094** (0.044)	0.027*** (0.009)	0.031** (0.016)	0.132*** (0.047)
Beliefs	0.063*** (0.037)	0.056 (0.063)	0.015 (0.012)	0.044** (0.022)	0.089 (0.064)
Attendance	0.138*** (0.038)	-0.052 (0.088)	0.043*** (0.013)	0.027 (0.029)	0.244*** (0.071)
Religious*Beliefs	0.052 (0.045)	0.054 (0.080)	0.007 (0.015)	0.051* (0.028)	0.051 (0.078)
Religious*Attendance	0.187*** (0.046)	0.045 (0.109)	0.057*** (0.015)	0.046 (0.038)	0.345*** (0.092)
Complete Religious	0.165*** (0.054)	-0.053 (0.119)	0.048** (0.018)	0.025 (0.040)	0.305*** (0.108)

Notes: Standard errors are robust to heteroskedasticity and autocorrelation. Clustered standard errors in Fixed Effects estimation are considered. ***, ** and * indicate coefficients significant at the 1%, 5% and 10% levels, respectively. Coefficients of the explanatory variables have been omitted here but are available on request. Columns 1 and 2 consider Social Life Satisfaction as a 1 to 7 scale value variable, columns 3, 4 and 5 consider Social Life Satisfaction as dummy variable.