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Coláiste na Tríonóide, Baile Átha Cliath  
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Trinity College Dublin, The University of Dublin  
Bachelor of Arts in Economics

# Still the Opium of the Masses? Investigating the Causal Effect of Religion on Happiness

**Author:** Robert Mulligan

**Date:** April 2024

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## **Abstract**

This paper found that religiosity, measured by a factor analysis of multiple religious questions on the General Social Survey (GSS), had a statistically significant positive correlation with happiness. The empirical approach used a discrete choice model (DCM). The DCM was estimated using a linear probability model (LPM). This model found that an increase in religiosity increased the average marginal probability that a respondent would choose happy over unhappy on a survey by 4.7 percentage points. This approach furthered the state of the literature by using church scandals as a novel instrument to account for the simultaneity bias between happiness and religiosity. The instrument was relevant and acceptably exogenous. There was a clear downward bias from the IV on the non-instrumented OLS results. However, the IV did not satisfy the exclusion restriction. This limitation meant that this approach could not identify a causal link, and the results were biased. The internal validity of the study is conditional on the limited instrument. The external validity is lacking due to the US being a special case of a highly advanced economy with a disproportionately high religious population as opposed to other highly advanced economies that are secular.

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# **1 Introduction**

## **1.1 The Research Question:**

This paper aims to investigate the effect of religion on happiness using a discrete choice model (DCM) estimated by a LPM. The problem of endogeneity is widespread in the happiness literature and must be dealt with to identify a causal relationship (Frey and Stutzer 2002). Endogeneity can arise for three reasons: omitted variable bias, measurement bias, and simultaneity bias (Wooldridge 2016). To deal with omitted variable bias, this paper takes advantage of the DCM framework as it assumes the error term (i.e., unobserved variables) is white noise and does not introduce sufficient bias into the results (Train 2009). Measurement bias is a ubiquitous problem in the effect of religion literature, as many studies only use a single variable to measure religiosity in their specifications (Lewis and Cruise 2006). The empirical approach here uses a factor analysis approach to combine multiple questions on religion into a single robust measure of religiosity (Paldam and Gundlach 2013). Thirdly, this paper uses a novel IV in church scandals to address simultaneity bias.

## **1.2 Why this Question is Relevant to Economics:**

There is an ever-increasing body of literature identifying happiness as a vitally important component of economics research (Frey and Stutzer 2000). Additionally, religion has played a central role in many of the world's economies at least as far back as the Protestant Reformation (Becker, Rubin, and Woessmann 2020). Taking happiness first, there have been many studies identifying happiness's role in modern labour markets. Firstly, DiMaria, Peroni, and Sarracino (2020) found that happiness is an input, not an output, of total factor productivity. This finding lends support to the large literature on the Happy-Worker hypothesis. For example, Pavot and Diener (2004) found that happier workers are more productive and more satisfied with their work. These effects, in turn, increase good organisational citizenship, cause better relationships with coworkers, and reduce workplace conflicts. On a macroeconomic scale, happier employees earn significantly higher monetary returns for their companies than those in the lowest quartile of employee well-being (Harter and Schmidt 2000; Harter, Schmidt, and Keyes 2003). From



the consumer side, businesses with happier employees report increased customer satisfaction, loyalty, greater profitability and lower turnover rates (Keyes, Hysom, and Lupo 2000; Harter, Schmidt, and Keyes 2003). This finding has also been shown experimentally by Oswald, Proto, and Sgroi (2015), who show that individuals who experience an exogenous increase in happiness display significantly higher output compared to a control group.

The study of religion has similar contributions to the economics literature. Religion affects individuals, groups, and whole countries by its ability to foster values, norms and actions that impact the economy (Iannaccone 1998). On the individual level, Guiso, Sapienza, and Zingales (2003) found that parents who were raised religiously were more likely to teach their kids the importance of hard work and thrift. Becker, Rubin, and Woessmann (2024) expanded on this by showing that religion's ability to foster norms impacts all factors of the production function i.e., physical capital, human capital, population, and technology.

Physical capital is affected by the mechanism identified by Guiso, Sapienza, and Zingales (2003). The attitudes religion promotes of saving and thrift play a vital role in determining the accumulation of capital. Moreover, Guiso, Sapienza, and Zingales (2003) found that religious people tend to trust more. With increased trust leading to increases in lending and investment (Zak and Knack 2001).

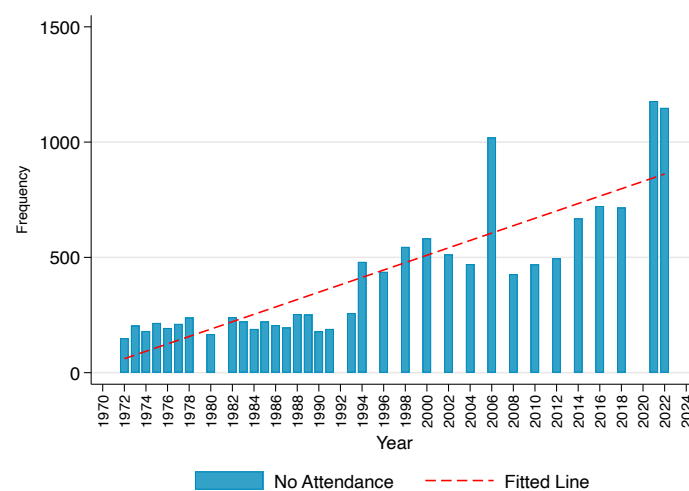
The direction of the effect of religion on population, and therefore labour inputs, is contested. Becker and Woessmann (2010) find that the increased investment in child quality, measured as an increased focus on education, helped 19th-century Prussia move from high to low birth and death rates. This demographic transition is a necessary component of long-term growth (Galor 2011). However, Blanc (2023) found that secularisation was the key driver of the demographic transition in France. Despite the differing directions, religion has historically been a key driver in the demographic transition, which is an essential condition for continued growth (Becker, Rubin, and Woessmann 2024).

Human capital and technology are impacted mainly by religion's long-standing role as an education provider. This human capital effect from education is identified as a principal factor in generating economic prosperity in Protestant economies during the late 19th century (Becker and Woessmann 2009). Education and investment in human capital also improve the

innovative capacity of an economy, leading to new technologies which positively shift total factor productivity.

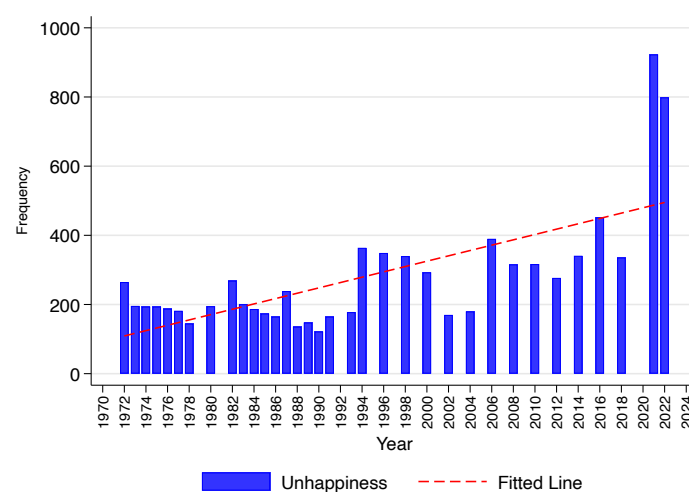
Despite the benefits of religion and happiness to the economy, there has been a simultaneous decrease in religious affiliation and subjective well-being in the US since the 1990s (Jones 2021; Helliwell et al. 2021). Whilst the empirical puzzle of decreasing happiness in the US has many determinants (Case and Deaton 2021; Deaton and Stone 2013), religion may be a placating factor.

Figure 1: Increase in Church Non-Attendance 1972-2022



Data: [https://gss.norc.org/us/en/gss/get-the-data.html](https://gss.norc.umd.edu/us/en/gss/get-the-data.html)

Figure 2: Increase in Unhappiness 1972-2022



Data: [https://gss.norc.org/us/en/gss/get-the-data.html](https://gss.norc.umd.edu/us/en/gss/get-the-data.html)

Understanding the link between religion and happiness is crucial, as their simultaneous decline may have significant economic repercussions. The research highlights the economic benefits of subjective well-being, from increased worker productivity to higher firm profitability and economic growth. Likewise, religion has historically shaped values and institutions that drive savings, human capital accumulation, and technological progress.

If there is a causal link between religiosity and happiness, its decline could exacerbate the broader trend of decreasing well-being, potentially leading to lower labour market efficiency, weakened social cohesion, and potentially reduced economic growth. Moreover, the decrease in religiosity could add further strain to the current mental health crisis. Investigating this relationship is essential for understanding the determinants of happiness. And for assessing the long-term economic consequences of secularisation.

### **1.3 How the Dissertation is Related to the Literature:**

This study is related to three strands of literature. First, it relates to the determinants of happiness literature, which tries to establish causal links between socioeconomic factors and overall subjective well-being. Establishing a causal link is difficult due to persistent endogeneity in the literature (Frey and Stutzer 2002). Differently from those studies, this paper attempts to identify a link between latent religiosity and happiness while still stressing the role of socioeconomic factors as important controls. In this respect, this paper complements the determinants of happiness literature by potentially identifying a key control - latent religiosity.

Second, this paper contributes to a broad literature which investigates religion's impact on individual well-being. Previous studies have found that religion can improve ageing and mental health outcomes, and that it is positively correlated with happiness (Ellison 1991; Koenig 2012; Chen, Kim, and VanderWeele 2020). This paper hopes to further isolate the effect of religion on happiness using a novel instrument.

Concerning the instrumental variable strategy, this study is related to several others. All these papers are of the view that there is endogeneity present when estimating the effect of religion on various outcome variables such as crime (Heaton 2006), economic growth (Campante and Yanagizawa-Drott 2015), and depression (Denny 2011).

## 1.4 The Methodology:

The empirical approach to this paper has three components: factor analysis, an IV strategy, and a DCM.

The first component is the factor analysis. A problem in the literature investigating the effect of religion on happiness is that there is no systematic way of measuring individuals' religiosity (Lewis and Cruise 2006). Many papers use a single proxy variable, such as prayer frequency or church attendance (Steiner, Leinert, and Frey 2020; Whittington and Scher 2010). However, religiosity is made up of more than a person's behaviours; it also comprises beliefs and attitudes. This paper overcomes this problem by using a factor analysis of 8 questions answered on the GSS which asks about different aspects of the respondents' religiosity. Factor analysis is a statistical technique used to derive the latent factors from a group of variables. Polychoric correlations are computed due to the ordinal nature of this data. Maximum likelihood (ML) is used to factorise the correlations to fit the most parsimonious model. The model uses the factor with the highest factor loading to represent the latent religiosity in the specification. This approach has been used in the literature before and yielded consistent estimates (Poloma and Pendleton 1991; Paldam and Gundlach 2013).

Secondly, this paper employs a Discrete Choice Model (DCM) framework. A DCM is a statistical technique which helps understand why a respondent would choose A over B from a discrete number of choices. The independent variable is the choice variable and, the regressors are what helps the respondent make their choice. A DCM takes a deterministic output, but the choice probabilities must be calculated because not every variable can be observed. In this study, this calculation is done by OLS due to the binary nature of the independent variable. The DCM also assumes that the error term is a white noise process, given the model is specified correctly (Train 2009). The DCM also allows for a causal interpretation, as the coefficient size is understood as the sample average marginal effect on the probability that a respondent chooses happy over not happy on the survey.

Thirdly, is the IV strategy used to combat simultaneity bias which is a pervasive problem in the determinants of happiness literature at large (Frey and Stutzer 2002). This paper implements a new IV which is church scandals, measured as the number of credibly accused priests per

census division. A priest is deemed credibly accused if their name is listed on a report of sexual abuse by their diocese. An IV approach is being used to capture people who may have left their religion due to the scandals, but are still happy. By combating the simultaneity bias, this paper can more accurately assess if it is a person's religiosity that is pushing the needle on their choice of choosing happy on the GSS.

## **1.5 The Data:**

The data for this project comes from the US General Social Survey (GSS). This survey is a nationally representative survey constructed as an independently pooled cross-section. The survey takes place almost every two years. This project cannot take advantage of all waves available from 1972 – 2022, which is due to some control questions (e.g., subjective health) only being asked recently in the survey's history. Therefore, the sample size reduces against the inclusion of controls. However, the smallest sample size is 24,000. This survey captures the respondent's happiness, many aspects of religious beliefs, socioeconomic factors (income, education, and employment status), and individual characteristics (age, marital status, race, and gender).

## **1.6 The Results:**

This paper found that religiosity does have a statistically significant impact on a respondent's average probability of choosing happy over not happy at the 1% level. This result was robust against the inclusion of the standard socioeconomic factors, individual characteristics, and time-fixed effects. The economic significance, however, was small and decreased with the inclusion of added determinants. The IV exhibited a statistically significant negative impact on religiosity in the first stage at the 1% level. The statistical significance remained against the inclusion of controls and time fixed effects. This downward bias of church scandals was also evident when compared against the non-instrumented OLS results. In all three models, the magnitude of the coefficient was larger when church scandals were not instrumented for. Despite these results, this paper could not identify a causal link between the variables. This is due to the inability of the specification to control for personality which has a profound impact on an individual's

happiness.

## **1.7 Outline of the Paper:**

The rest of the paper is organised as follows, Section 2 provides a literature review. Section 3 describes the data and descriptive statistics. Section 4 explains the empirical approach. Section 5 presents the results and limitations. Section 6 provides potential policy implications. Finally, section 7 concludes the paper.

# **2 Literature Review**

## **2.1 Religion as a Determinant of Happiness**

There is a large amount of literature recording the positive effect of religion on many outcomes of well-being, such as happiness, mental health, and aging (G. Koenig and Larson 2001). This research can be traced back to Durkheim (2005)’s seminal book *On Suicide* [1897], where he identified differing suicide rates between Catholics and Protestants. Despite the prevalence of religion, the study of its effects was confined to other fields, such as sociology and psychology, until the 1950s (Iannaccone 1998).

Throughout the literature, it is increasingly apparent that religion is and has historically been a major determinant of economic outcomes through its ability to shape norms and foster values and behaviours (Becker, Rubin, and Woessmann 2024; McCleary and Barro 2006; Guiso, Sapienza, and Zingales 2003). However, the question remains contested whether religion is a determinant of happiness. Moreover, the literature is plagued with contradictory results; the ambiguity stems from studies suffering from measurement bias, data constraints, and reverse causality bias (Lewis and Cruise 2006).

### **2.1.1 Negative and Weak Associations:**

Many papers have found negative associations between religion and subjective well-being. Studies from the 1950s and 60s find that more religious college students had worse well-being, more stress, and were less well-adjusted (Dreger 1952; Cowen 1954; Dunn 1965). However,

these studies used non-random convenience sampling, cross-sectional data, and a comparison of means as their econometric approach, which caused invalid results (G. Koenig and Larson 2001).

More recent studies that use more sophisticated techniques tend to find little to no relationship between religiosity and happiness. For example, Gartner, Larson, and Allen (1991) found mixed results between religion and various outcome variables when comparing 200 studies but noted this stems from religion's multifaceted nature as a variable. Diener, Tay, and Myers (2011) found that the relationship between religion and happiness disappears when economic circumstances are controlled for. Hackney and Sanders (2003) sum up this pattern of weak and negative associations as being 'numerous' but always near zero or insignificant.

### **2.1.2 Positive Associations:**

In the literature, it is more commonly found that religion has a positive effect on happiness, mental health, and other subjective well-being measures. Hackney and Sanders (2003) and G. Koenig and Larson (2001) conducted meta-analyses, finding over 80% of papers on the topic find a positive relationship. While the results seem cut and dry, methodological concerns remain.

### **2.1.3 Methodological Concerns:**

Religion is still commonly measured by a single proxy variable, such as church attendance (Steiner, Leinert, and Frey 2020) or prayer frequency (Whittington and Scher 2010). This approach has been placated by using factor analysis, which combines answers to many questions on religion to try to measure latent religiosity (Poloma and Pendleton 1991; Gundlach and Paldam 2009). Secondly, there is still a lack of panel data available to truly measure a cause-and-effect relationship (except Willits and Crider 1988). This problem is circumvented by using long-standing independently pooled cross-sectional surveys like the General Social Survey (Ellison 1991) or the World Value Survey (Aslam, Ali, and Ghouse 2024). The effect of religion on happiness is typically estimated by probability models such as logit (Greene and Yoon 2004) or an LPM (Abdel-Khalek 2006) due to the prevalent use of ordinal survey data. One problem

prevalent in the determinants of happiness literature is simultaneity bias (Frey and Stutzer 2002). While some papers use Structural Equation Modelling (Krause 2003; Levin, Markides, and Ray 1996), an instrumental variable approach has seen very little empirical use. Identifying this gap, this paper seeks to use the previous literature by utilising factor analysis, survey data, and an LPM, but also advance the state-of-the-art by using a novel IV in church scandals. The aim is to further isolate the effect of religion on happiness whilst accounting for simultaneity bias.

## **2.2 Previous Determinants of Happiness:**

To avoid another source of endogeneity, namely omitted variable bias, this paper includes previously established determinants of happiness from the literature.

### **2.2.1 Socioeconomic Controls:**

Income has been recognised as a key determinant of happiness, though its effect appears to diminish beyond a certain threshold (Easterlin 2003a; Powdthavee 2010). The relationship between religion and income, however, remains contested. Azzi and Ehrenberg (1975), employing a neoclassical labour-leisure framework, argue that greater religiosity is associated with lower income due to the opportunity cost of time spent on religious activities. In contrast, McCleary and Barro (2006) suggest that religion may function as an income-generating mechanism by generating social capital. Despite the differing hypotheses, income is included as a control variable to isolate its independent effect on happiness. Education, too, is well-documented as a driver of happiness, influencing well-being through both direct channels (e.g., employment prospects) and indirect mechanisms (e.g., increased self-esteem) (Cuñado and De Gracia 2012). While the secularisation hypothesis suggests an inverse relationship between education and religiosity, empirical evidence suggests otherwise. Iannaccone (1998) finds a positive correlation between educational attainment and religious engagement, challenging the secularisation hypothesis, that increased education necessarily erodes faith. Employment status is another critical determinant of happiness, with unemployment exerting a clear negative effect (Dolan, Peasgood, and White 2008; Tella, MacCulloch, and Oswald 2003; Frey and Stutzer 2000; Helliwell 2003). Religion's impact on employment outcomes is often examined through the lens of



income, yet Lehrer (1995) documented that religiosity, particularly among women, can depress labour force participation. Finally, marital status is a well-established predictor of happiness, with married individuals consistently reporting higher life satisfaction than their single counterparts. Widowhood and divorce are also strongly associated with lower well-being (Lucas and Clark 2006; Easterlin 2003a). Given these findings, marital status is controlled to ensure a more precise estimation of religion's effect on happiness.

### **2.2.2 Individual Controls:**

Age has been identified as having a U-shape relationship with happiness i.e. young and older people are happier than their mid-life counterparts (Frey and Stutzer 2002). Older people are also more religious than younger people (Deaton 2009). Health has been identified more recently as being an important determinant of happiness (Sabatini 2014; Easterlin 2003a). An individual's health can also impact many other determinants of happiness, such as their employment status, compounding the effect. Sex has been included as it is regularly reported that women are happier than men and that women are more religious than men (Easterlin 2003b; Deaton 2009). Race is controlled for as, on average, white people report higher subjective well-being than black people. However, the literature also shows that black people have higher religious participation than white people. These relationships may reflect structural inequalities and the role of religious institutions in marginalised communities (Easterlin 2003a; Levin, Markides, and Ray 1996).

## **2.3 In Sum:**

The literature sees mainly a positive association between religion and happiness despite major methodological concerns. This paper builds upon the empirical approaches of previous papers and uses a novel instrument to account for simultaneity bias. The empirical approach of this paper also takes advantage of previously established determinants of happiness for proper model specification and to avoid omitted variable bias.

## 3 Context and Data

### 3.1 Data Description

The data for this project come from the GSS, which provides data on the necessary variables from 1972 to 2022. The surveys are conducted at uneven intervals but are typically collected every two years. The GSS is a large, nationally representative sample of households in the USA. Most respondents are interviewed in person (approximately 71%), while the remainder participate via web or over-the-phone interviews. There are roughly 2,200 observations per year. However, due to data constraints, this paper must discard waves in which some questions were unasked. As a result, the sample size decreases when additional controls are included. The sample size for the regressions ranges from 24,862 to 41,315 observations. Notably, the GSS is constructed as an independently pooled cross-section, meaning fixed effects cannot be accounted for.

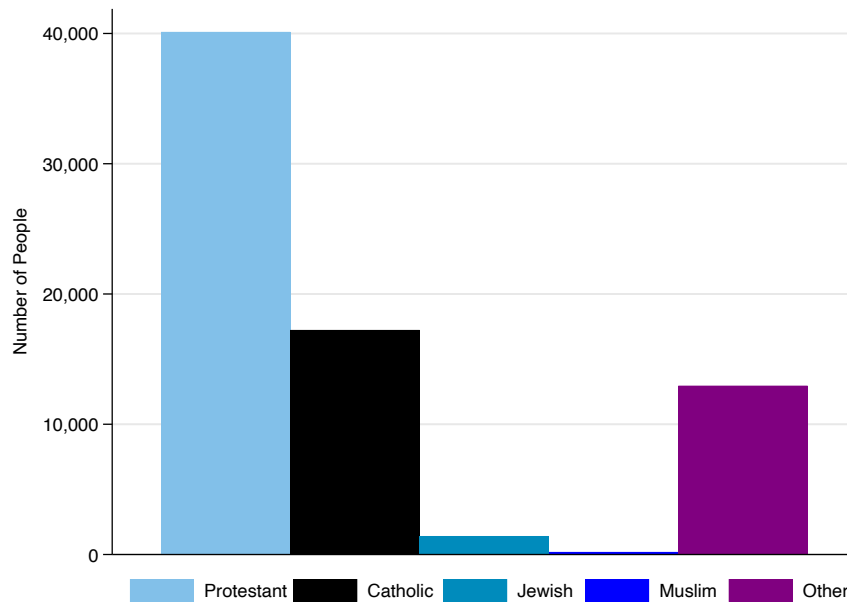
A US survey was chosen because it represents a unique case. The US is a highly advanced yet highly religious country. This aspect means that if Barro and McCleary (2003) and Diener, Tay, and Myers (2011) are correct, that after controlling for economic circumstances there should be no relationship between religiosity and happiness. Moreover, the US is a highly educated country. Therefore, if the secularisation hypothesis is true, the relationship between the two variables should be made more insignificant. Furthermore, the US is also the focus of many empirical happiness puzzles such as the Easterlin Paradox (Easterlin 1974) and more recently Deaton and Stone (2013). The uniqueness of the setting is also a weakness as it reduces the external validity of the results.

There are a number of limitations with the data, including an overrepresentation of white Christians as opposed to minorities and other religions e.g., Judaism or Islam see Figure 3. The results of this study are conditional on these limitations.

Table 1: Descriptive Statistics

Variable	N	Mean	SD	Min	Max
Happiness	72390	0.282	0.450	0	1
Religiosity	41315	3.826	2.606	-0.019	8.035
Church Scandals	72390	503.855	271.287	33	1350
Total Household Income	63439	10.196	2.788	1	12
Education	72127	13.035	3.182	0	20
Marital Status	72339	3.939	1.387	1	5
Employment Status	72354	6.267	2.066	1	8
Subjective Health	55154	2.979	0.837	1	4
Age <sup>2</sup>	71621	2477.23	1784.118	324	7921
Race	72283	1.263	0.562	1	3
Sex	72278	1.558	0.497	1	2
Census Division	72390	4.954	2.455	1	9

Figure 3: Distribution of World Religions in the GSS



Data: <https://gss.norc.berkeley.edu/en/gss/get-the-data.html>

### 3.2 Happiness Variable:

The GSS collects data on subjective well-being through the following question: “Taken all together, would you say that you are very happy, pretty happy, or not too happy?”. This is coded on an ordinal scale with higher numbers meaning higher happiness. This has been recoded to accommodate the binary specification. Now, happy = 1 if the respondent chose very happy, and = 0 otherwise.

### 3.3 Religious Variables:

The GSS also collects data on multiple variables measuring religious attitudes, beliefs and behaviours. These questions are going to undergo a factor analysis to obtain a robust average measure of religiosity for each respondent. Due to some questions only being introduced later in the survey’s history, this constricts the data size. Namely item no.5 constricts the total data size to 47,381 observations.

Table 2: The 8 Religiosity Questions: Definitions and Count

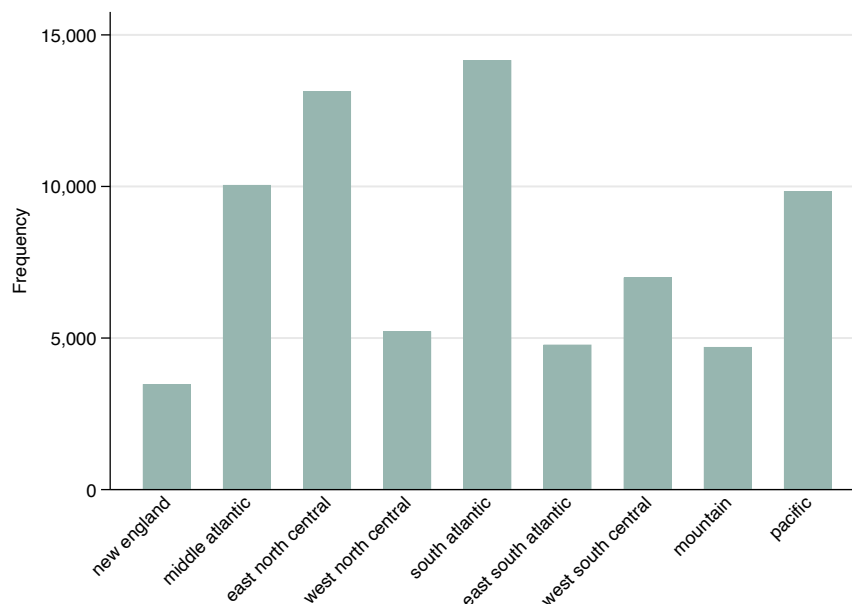
Content of item	Count	Avg. Score
1. How often do you attend church services (outside of holidays)?	71690	3.65
2. How often do you pray?	71885	2.51
3. Do you believe in the afterlife?	68358	1.16
4. How do you feel about the Bible?	67479	1.74
5. How much trust, if any, do you have in religious organizations?	47381	2.04
6. What religion were you raised in?	68788	1.73
7. How strongly religious are you?	66378	2.80
8. Fundamentalist / Liberal of respondent’s religion	69320	2.01

*Note: Full variable descriptions are included in the appendix.*

### 3.4 Church Scandal Variable:

This paper’s novel approach is the use of church scandals as an instrumental variable to account for simultaneity bias in the regressions. Church scandals are being measured as the number of credibly accused priests per diocese in the US. The data is sourced from ProPublica.org which is a publicly available database. The number of church scandals are aggregated to the state level, and then to the census division level to work with the location data provided by the GSS. The loss of degrees of freedom is acknowledged. Moreover, there is considerable heterogeneity in the data. Firstly, there is a large range of church scandals across the different divisions.

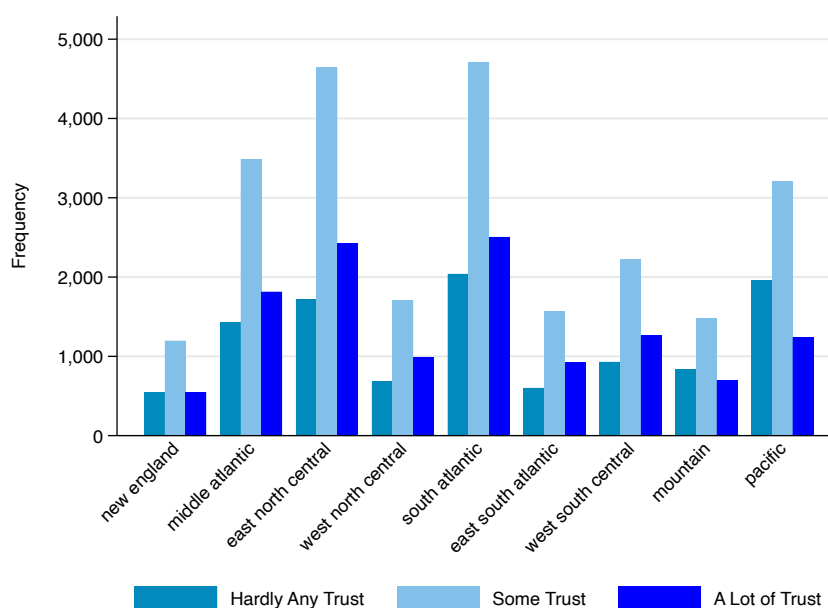
Figure 4: Spread of Church Scandals Across Census Divisions



Data: <https://projects.propublica.org/datastore/#credibly-accused-priests>

This heterogeneity is likely the result of another form, namely the varying levels of trust in religious organisations. It is not surprising that the southern regions are reporting much less scandals despite being more religious (i.e., the bible belt). If their level of trust is high, there is either not as many scandals, or the reporting or awareness of them is much lower.

Figure 5: Differing Levels of Trust Across Census Divisions

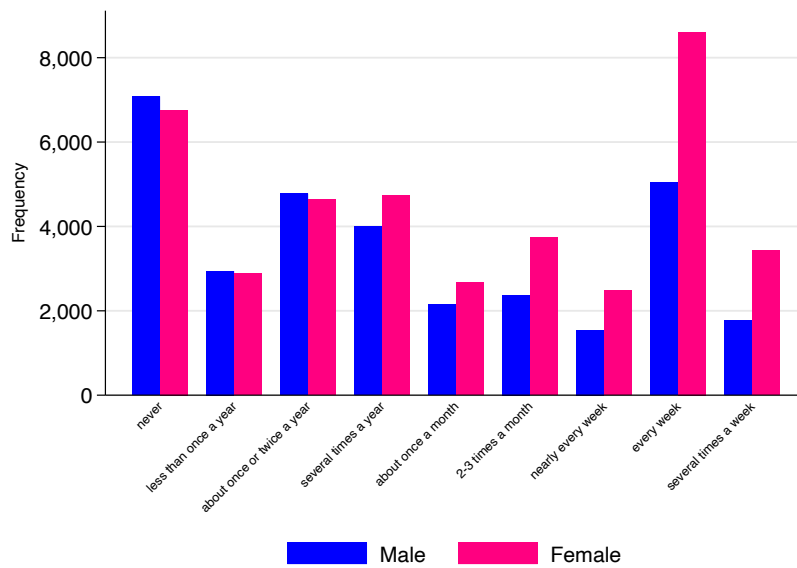


Data: <https://gss.norc.berkeley.edu/us/en/gss/get-the-data.html>

### 3.5 Socioeconomic and Individual Factors:

The GSS collects data on a multitude of socioeconomic and individual factors. As stated in the literature review, these need to be controlled for to avoid endogeneity. The GSS includes income, education, marital status, employment status etc. Income has been measured as total familial income of the household. Education is measured in years of education completed. Marital status includes whether someone is single, married, divorced, widowed, or separated. Employment status includes full-time workers, part-time workers, job seekers, recently unemployed, retirees, students, stay-at-home parents, and an “other” category. Individual character traits are also collected i.e., sex, race, and age. These are particularly important as these different groups are often heterogeneous in their levels of happiness and religiosity:

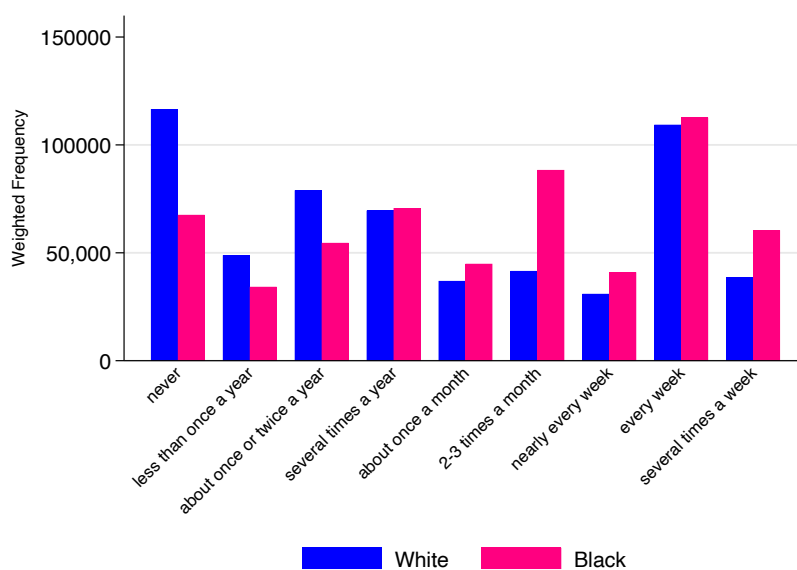
Figure 6: Religious Differences in Gender



Data: <https://gss.norc.org/us/en/gss/get-the-data.html>

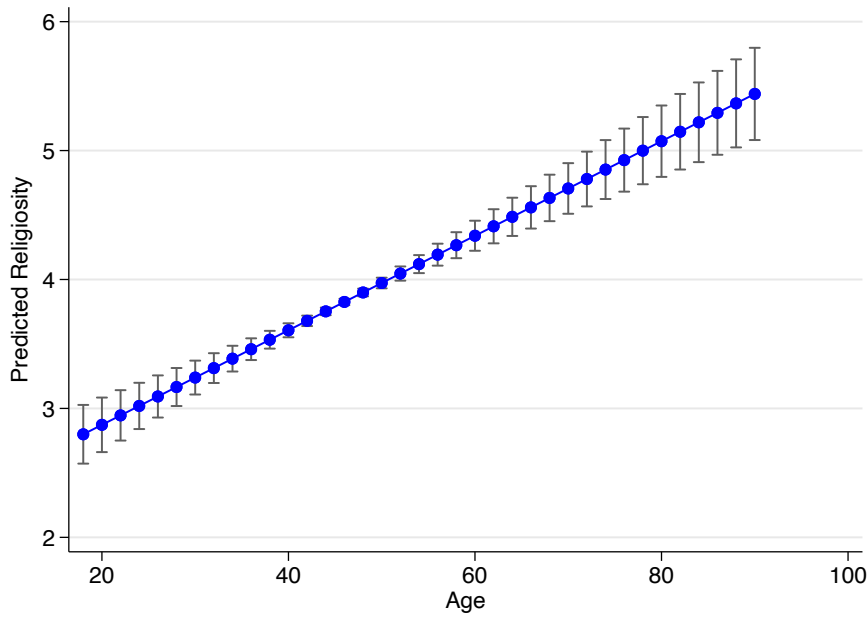
Figure 6 shows that there are more men who do not attend church service regularly and that more women attend church regularly. Figure 7 shows a similar relationship but with race. Black people attend church service more than white people. Finally, Figure 8 shows that religiosity increases with age.

Figure 7: Religious Differences in Race (Weighted)



Data: <https://gss.norc.org/us/en/gss/get-the-data.html>

Figure 8: Relationship Between Age and Religiosity



Data: <https://gss.norc.berkeley.edu/en/gss/get-the-data.html>

## 4 Empirical Approach

To estimate the relationship between religion and happiness this paper is using a DCM estimated by an LPM. In order to avoid endogeneity, this paper employs the use of factor analysis to minimise measurement error, an instrumental variable strategy to avoid reverse causality bias, and controls for known determinants of happiness to reduce omitted variable bias. It is hypothesised that religiosity has a positive correlation with happiness. With respect to the IV, it is hypothesised that it introduces a downward bias, so that the instrumented results will be smaller in magnitude than non-instrumented estimates.

### 4.1 Factor Analysis

Factor analysis is a process of extracting underlying or latent factors from the common variance of a list of similar variables (Harman 1976). In the context of this project, factor analysis is used to combine 8 questions about respondents' religiosity from the General Social Survey to create a composite measure of religiosity. Factor analysis is used because of the multifaceted nature of



religiosity. A respondent's religiousness is comprised of beliefs, behaviours, and attitudes. By using 8 answers to different questions, it is hoped that the latent factor extracted is a more robust measure than using a single proxy variable. The questions chosen had to satisfy two criteria: firstly, there needs to be a large enough sample size. As particular questions are very new, only a single wave has answered them. Such questions were discarded. Secondly, there had to be at least one question asked about a person's beliefs e.g., belief in god; behaviours e.g., church attendance; and attitudes e.g., trust in religious organisations. To complete a factor analysis on ordinal data, polychoric correlations are computed between each of the questions listed above. Polychoric correlations are used as opposed to the standard Pearson correlations due to Pearson correlations assuming the data is continuous. Polychoric correlations compute the correlations as if the data was continuous. The correlations were then imputed into a correlation matrix  $R$ , which is then factorised. Factorising refers to the decomposition of the correlation matrix into the components that explain the common variance of all the variables. This paper uses Maximum Likelihood decomposition over the traditional Principal Components method as it also accounts for unique variance. To take unique variance into account, ML assumes the variables follow a multivariate normal distribution. Although the data is ordinal, the normality assumption is considered satisfied if the sample is large and when the number of variables is greater than five (Flora and Curran 2004). ML maximises the following function:

$$X = \Lambda F + \epsilon \quad (1)$$

where  $X$  are the observed variables (survey questions),  $\Lambda$  is the factor loading matrix, and  $\epsilon$  is the unique error.

By estimating the parameters directly via ML, this model ensures that factors explain the variance in the data with the least number of parameters as possible while still maintaining a good fit. This leads to a more parsimonious model than the traditional Principal Component Analysis. ML computed four factors, of which Factor 1 was chosen as it has the highest factor loadings, i.e., the highest explanatory power of the variances. This factor is now the measure of religiosity to be used in the specification.

## 4.2 Discrete Choice Model (DCM)

This paper is utilising a DCM framework to conceptualise the effect of religiosity (defined above) on happiness. A DCM is a statistical technique which estimates the probability that a respondent will choose choice A over choice B given a discrete number of options. i.e.,

$$N^{-1} \sum_{i=1}^N P(A \text{ is selected}) \quad (2)$$

In this paper, the DCM is allowing for a causal interpretation of the probability that a respondent will choose happy over not happy on the General Social Survey given their level of religiosity. The DCM is estimated by a linear probability model. The LPM uses Ordinary Least Squares to minimise the space between the observed and predicted value.

### 4.2.1 Assumptions

Firstly a DCM requires that there are a discrete number of mutually exclusive and exhaustive choices that the respondent can choose from. This assumption is satisfied by the nature of the survey providing a limited choice set to choose from. The General Social Survey is discrete in that there are only a limited number of questions. The answers to which are all mutually exclusive (one cannot answer both happy and unhappy to the same question). And, the survey is exhaustive in that it provides all reasonable answers to the questions asked. Secondly, a DCM assumes that the model is specified well-enough so that the error term (the unobserved factors in the decision-making process) is white noise. This assumption doesn't exclude omitted variable bias, instead it means that the unobserved variables do not cause sufficient noise in the estimation. This assumption is considered satisfied by the inclusion of previously established determinants of happiness and time-dummies as controls. This assumption is particularly strong, especially since the specification cannot control for personality – a major determinant of happiness (DeNeve and Cooper 1998). The results of this paper are conditional on this assumption holding true. Thirdly, a DCM assumes that the respondents are utility maximisers. To satisfy this assumption, a Random utility model is derived as follows:

### 4.2.2 Random Utility Model

The respondent, denoted  $i$ , faces a choice on the survey to choose between happy and not happy. The respondent obtains a certain level of utility from each choice. The utility they earn from choosing Happy is  $U_{i,\text{Happy}}$  and from choosing Not Happy is  $U_{i,\text{Not Happy}}$ . The actual utility is only known to the respondent. As utility-maximisers, the respondent chooses the alternative that they derive the greatest utility from.

The model can then be specified as:  $i$  only chooses happy if, and only if,

$$U_{i,\text{Happy}} > U_{i,\text{Not Happy}} \quad (3)$$

meaning respondent  $i$  chooses "Happy" if their utility for happiness exceeds their utility for not being happy. The utility is not directly observed. Instead, the determining factors of the choice are observed, which are labeled  $\beta'X$ , i.e., the respondent's religiosity, their socioeconomic status, and their individual characteristics. This function of characteristics can be denoted as:

$$V_{i,\text{Happy}} = V(\beta'X) \quad \forall i \quad (4)$$

Because  $V_{i,\text{Happy}}$  depends on unobservable characteristics, this relationship has to be estimated, meaning

$$U_{i,\text{Happy}} \neq V_{i,\text{Happy}} \quad (5)$$

Therefore, the utility can be decomposed as:

$$U_{i,\text{Happy}} = V_{i,\text{Happy}} + \epsilon_{i,\text{Happy}} \quad (6)$$

where  $\epsilon_{i,\text{Happy}}$  captures the factors affecting utility that are not included in  $V_{i,\text{Happy}}$ .

Because  $\epsilon_{i,\text{Happy}}$  is defined as the difference between the observable and unobservable utility, it is fully general, allowing for the introduction of the white noise assumption (Train 2009). The choice probabilities are estimated via a LPM which means the final specification is denoted as

follows:

$$\begin{aligned} \Pr(\text{Happy}_{it} = 1) = & a + B' \text{Religiosity}_{it} + C' \text{SocioeconomicControls}_{it} \\ & + D' \text{IndividualControls}_{it} + \sum_{t=1}^T F' \text{TimeDummies}_t \end{aligned} \quad (7)$$

Where:

- $\Pr(\text{Happy}_{it})$ : is the probability that respondent  $i$  chooses happy over not happy on the GSS.
- $a$ : is the constant.
- $B' \text{Religiosity}_{it}$ : is respondent  $i$ 's religiosity measured by factor analysis at time  $t$ .
- $C' \text{SocioeconomicControls}_{it}$ : is a vector of respondent  $i$ 's controls including income, education, and employment status at time  $t$ .
- $D' \text{IndividualControls}_{it}$ : is a vector of respondent  $i$ 's controls including race, gender, health, and age<sup>2</sup> at time  $t$ .
- $\sum_{t=1}^T F' \text{TimeDummies}_t$ : represents the years the data was collected (i.e., 1972-2022).

### 4.3 Instrumental Variable

This study employs a novel IV in church scandals to address the simultaneity bias between religiosity and happiness. Specifically, the IV looks to isolate those who have left or disassociated from the church due to the scandals but that may still be happy. In exploiting this variation in the sample, this approach attempts to estimate the effect of religiosity on happiness more precisely. To incorporate an IV into the empirical approach 2-Stage Least Squares (2SLS) is used. This approach has two stages for calculating the IV estimator.

#### 4.3.1 2-Stage Least Squares

The first stage of 2SLS regresses church scandals (with controls) on religiosity. This regression decomposes the effect of church scandals into two parts. First, the impact of church scandals on

religiosity that is correlated with the error term. Second, the effect that is not correlated with the error term.

$$\text{Religiosity}_{it} = \pi + Z_{it} + v_{it} \quad (8)$$

Where:

- $\pi$  is the constant.
- $Z_{it}$  is the number of church scandals for year  $t$  for respondent  $i$ .
- $v_{it}$  is the error term.

This process allows the second stage only to use the effect of church scandals that are assumed to be uncorrelated with the error term. However, because the first stage uses OLS, the predicted values of the first stage are used in the second stage. This aspect of the estimation can introduce noise into the second equation and usually leads to inflated standard errors (compared to non-instrumented OLS). The second stage then uses Eq. (6), where religiosity now equals:

$$\hat{\text{Religiosity}}_{it} = \hat{\pi} + \hat{Z}_{it} \quad (8)$$

#### 4.3.2 Assumptions for a Valid IV

For the instrument to be valid, it must satisfy three key conditions: relevance, exogeneity, and the exclusion restriction. The relevance condition requires that church scandals must have a statistically significant impact on the endogenous regressor (religiosity). This condition is tested by checking the significance of the first-stage results. The exogeneity condition requires that church scandals are uncorrelated with the error term in the second stage estimation. This condition is considered satisfied by the first stage of decomposing and disregarding the variation in church scandals that is correlated with the error term. Third, exclusion restriction means that church scandals must affect the dependent variable (happiness) only through its influence on the endogenous regressor (religiosity) and not through any other channels. This assumption is untestable, and the results are conditional on its holding. This assumption is taken up in

the limitations section. If all conditions are satisfied, the IV approach can provide consistent estimates free from simultaneity bias.

## 5 Results

### 5.1 First Stage Results

Table 3: First Stage Results

<b>VARIABLES</b>	(1) Religiosity	(2) Religiosity	(3) Religiosity
Church Scandals	-0.0011*** (0.0001)	-0.0013*** (0.0001)	-0.0011*** (0.0001)
Total Household Income		0.0145** (0.0068)	0.0315*** (0.0055)
Education		0.0353*** (0.0059)	0.0134*** (0.0048)
Employment Status		0.0198** (0.0083)	-0.0471*** (0.0070)
Marital Status		0.1598*** (0.0129)	0.0202* (0.0104)
Subjective Health			0.2075*** (0.0205)
Age <sup>2</sup>			0.0003*** (0.0000)
Constant	4.3486*** (0.0253)	4.1345*** (0.0743)	-0.9658*** (0.1768)
Observations	41,315	37,623	24,862
Time Dummies Included	NO	NO	YES
Controls Included	NO	YES	YES
Estimation Method	OLS	OLS	OLS

The above table displays the first stage regression results of the specification. As outlined in the empirical approach section, this first stage regresses church scandals on religiosity to determine

if it is a relevant instrument. For this instrument to be valid, it is hypothesised that church scandals would have a negative impact on religiosity.

Taking the base model, model 1 in the table, church scandals have a statistically significant negative impact on an individual's religiosity. Each church scandal causes an average 0.0011 decrease in a person's religiosity. This result has no controls or time fixed effects. Despite this, the small standard error indicates that this estimate is precisely measured.

In model 2, the standard socioeconomic controls ubiquitous in the literature are added in. In doing so, the size of the coefficient on church scandals has increased along with the standard error. The economic significance remains small, with a one standard deviation increase in church scandals leading to a 0.14 standard deviation decrease in religiosity. Income has a positive impact on religiosity which is supported by (McCleary and Barro 2006) hypothesis. Education and marital status are also positively correlated with religiosity which follows the from the literature (Iannaccone 1998; Orathinkal and Vansteenwegen 2006). Employment status is negatively associated with religiosity when time-fixed effects are not controlled for. This is likely due to the time cost religious activities impose on the individual.

In model 3, subjective health, age squared, and individual controls such as gender race and location were added. Again, against the inclusion of more controls, the size of the coefficient on church scandals has further increased to 0.0015. Employment status has now turned positive with the inclusion of individual controls. Age squared is highly significant which follows a theme in the literature that older people are more religious (Deaton 2009). Subjective health is also positively associated with more religiosity. Model 3 is the only model where the intercept is insignificant.

In model 4, time-fixed effects were included. The inclusion of time dummies has decreased the size of the church scandals coefficient, although it remains statistically significant at the 1% level. All other variables follow the same pattern from model three except for the intercept. When controlling for time-fixed effects the intercept is negative compared with very positive intercepts in models 1 and 2.

In summary, church scandals have a statistically significant impact on religiosity at the 1% level. This result is robust against the inclusion of socioeconomic and individual controls,



and time-fixed effects. The effects of each of the controls on religiosity are only correlations. The actual direction of the relationship may differ e.g., religion may cause more people to get married opposed to married people being more religious. The economic significance remains small in all models. For the second stage analysis, the instrument is known to be relevant.

## 5.2 Second Stage Results

Table 4: Does Religion Affect Happiness

VARIABLES	(1) Happiness	(2) Happiness	(3) Happiness	(1) Happiness	(2) Happiness	(3) Happiness
Religiosity	0.038*** (0.011)	0.052*** (0.012)	0.047*** (0.015)	0.023*** (0.001)	0.022*** (0.001)	0.018*** (0.001)
Total Income		0.011*** (0.001)	0.006*** (0.001)		0.011*** (0.001)	0.006*** (0.001)
Education		0.001 (0.001)	-0.004*** (0.001)		0.002* (0.001)	-0.003*** (0.001)
Employment Status		0.000 (0.001)	-0.000 (0.001)		-0.001 (0.001)	0.000 (0.001)
Marital Status		0.047*** (0.002)	0.056*** (0.003)		0.047*** (0.002)	0.060*** (0.002)
Age <sup>2</sup>			0.000*** (0.000)			0.000*** (0.000)
Subjective Health			0.107*** (0.005)			0.113*** (0.003)
Constant	0.110*** (0.033)	-0.244*** (0.034)	-0.478*** (0.039)	0.217*** (0.016)	-0.097*** (0.021)	-0.440*** (0.034)
Observations	41,315	37,623	24,862	41,315	37,623	24,862
R-squared	0.014	0.024	0.082	0.022	0.052	0.107
Time Dummies Included	YES	YES	YES	YES	YES	YES
Controls Included	NO	NO	YES	NO	NO	YES
Estimation Method	LPM	LPM	LPM	OLS	OLS	OLS

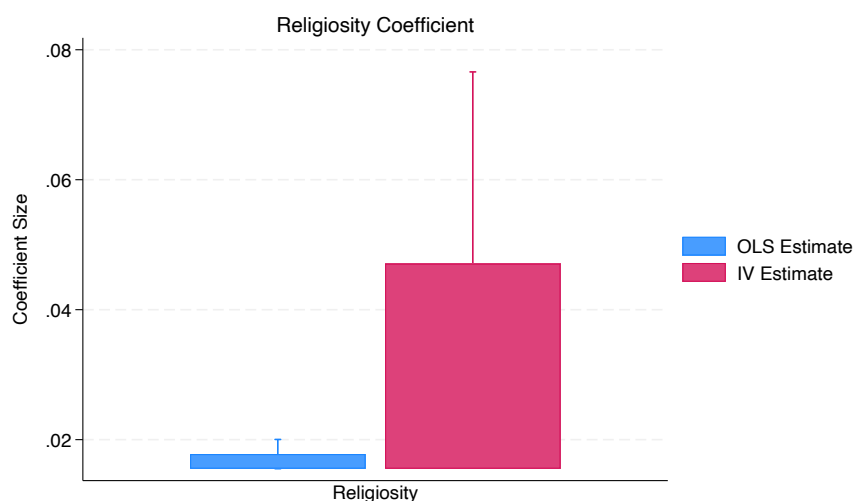
Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 4 displays the second stage results of the instrumental variable regression and the non-instrumented OLS results. Due to the discrete choice model set up and the binary dependent variable, the interpretation can be taken as the sample average marginal effect of the regressor on the probability of choosing happy over not happy on the survey. Whilst the results are not causal, the interpretation is written as so. The reader should interpret X having a significant impact on Y as more precisely estimated correlations than the previous literature. The issue of causality is taken up fully in the limitations section.

It is hypothesised that church scandals should have a negative impact on an individual's religiosity. If this hypothesis is correct, the non-instrumented results should suffer from a downward bias. This exact result is shown in Table 4. Each of the three instrumented coefficients are greater than the OLS coefficients implying that when church scandals are not instrumented for, it is introducing a negative bias into the results. The standard errors of the instrumented coefficients are greater than their OLS counterparts, but this is expected as IVs introduce greater variability into the estimation process. The positive direction of the relationship between religiosity and happiness is consistent across all models.

Figure 9: Clear Bias: Comparison of OLS and IV Estimates



The first model is the base model in which the instrumented religiosity is regressed on happiness. A percentage point increase in religiosity causes a 3.8 percentage point increase in the marginal probability that the respondent chooses happy over not happy on the survey on

average across the sample. This result is significant at the 1% level. The economic significance is small with a one standard deviation increase in religiosity leading to a 0.099 standard deviation increase in happiness.

Model 2 includes socioeconomic controls to the regression equation. The coefficient size of religiosity increases. There is now a 5.2 percentage point increase in the marginal probability that the respondent chooses happy over not happy on the survey, on average, over the sample, holding all else constant. The estimate also retains its significance at the 1% level. The economic significance increases as the size of the coefficient increased. A one standard deviation increase in religiosity now causes a 0.136 standard deviation increase in happiness. Income and marital status are associated with statistically significant increases in the average marginal probability of choosing happy over not happy on the survey, at the 1% level. Employment status, and marital status are positively associated with the average marginal probability of choosing happy over not happy on the survey, albeit insignificant.

Model 3 adds individual controls such as age, health, race, gender, and census division. The inclusion of individual controls decreases the coefficient size on religiosity from 5.2 to 4.7 percentage points. This marginally decreases the economic significance. A one standard deviation increase in religiosity would cause a 0.123 standard deviation increase in happiness. As outlined in Section 3: Context and Data Description, the effect of religiosity is heterogeneous between different groups e.g., women are more religious than men. When these individual characteristics are controlled for, this upward bias is removed, resulting in the decreased magnitude of the coefficient. Age squared and subjective health have a statistically significant impact on happiness. Against the inclusion of these individual characteristics the R-squared increased three-fold.

From the results above, it is evident that religiosity plays a statistically significant part in people choosing their happiness level of surveys, which translates into them choosing a certain level of religiosity to be happy (following the DCM framework). However, it is also evident that it plays at most, a minor role. The economic significance of religiosity never reaches above 0.136 standard deviations of happiness. Moreover, the economic significance of all the variables is small. Like most LPMs, the R-squared is very small, but this also speaks to a larger trend

in the happiness literature. Until we can correctly control for individual personality traits, the results are always going to be small in magnitude. This is an important note when interpreting these results.

Importantly, this approach has attempted to tackle all three aspects of religiosity's endogeneity, and the results are still significant at the 1% level. These results were robust against the inclusion of socioeconomic and individual controls, and the inclusion of time-fixed effects. The comparison between the instrumented and non-instrumented results also highlighted the negative bias of church scandals. In the next section, a more concrete analysis of the robustness of the model is assessed to determine the credibility of the results.

## **5.3 Limitations**

The results presented are not causal due to several limitations with the data and the empirical approach.

### **5.3.1 Data Limitations**

As touched on briefly in Chapter 3, the data has several limitations. Firstly, white Christians are overrepresented in the data, as opposed to other minorities and religions. This lack of representation reduces the external validity of the study. Moreover, due to the systemic differences in the US concerning access to education, healthcare, and equal opportunities, there is the potential for distorted regression results. Secondly, the data for the church scandals comes exclusively from Catholic church scandals. This limitation could mean that the IV is not affecting other Christian denominations or world religions. The effect of this limitation is measurement error. This limitation is particularly salient as Protestants (all denominations) are over-represented in the sample. Moreover, the data collected by Propublica.org relies heavily on self-reporting from the dioceses. This reliance on self-reporting could mean there is a large amount of under-reporting. This limitation further compounds the measurement error associated with the IV.

### **5.3.2 Empirical Approach Limitations**

The DCM framework used takes advantage of the fully general error term and assumes it is a white noise process. This assumption hinges on proper model specification. This assumption cannot be validated without the inclusion of personality. Personality is a major determinant of a respondent's happiness. The omitted variable bias resulting from the exclusion of personality as a control is clear in the low adjusted R-squared of the models. The second limitation of the approach is the exclusion restriction of the IV. The exclusion restriction states that church scandals should only affect happiness through their influence on religiosity. However, theoretically, church scandals could lead to the erosion of trust in institutions and dissolve strong community ties, which could impact a respondent's happiness. A respondent may stay religious but not be involved with their local church. This could lead to increased negative feelings and isolation. Because this assumption cannot be tested, it cannot be fully validated. Without this assumption holding, the IV is not valid, meaning it has yielded biased and inconsistent estimates. In summary, this paper did not identify a causal link between religiosity and happiness due to the measurement error in the data, the omitted variable bias from the lack of salient controls, and the invalidation of the exclusion restriction, which resulted in biased and inconsistent estimates.

## **6 Potential Policy Implications**

Despite falling short of identifying a causal link, the findings from this study and its complementary literature suggest several policy considerations for governments and businesses.

First, with the increasing trend of secularisation, policymakers should consider religiosity's role in people's well-being. If the US is to continue to secularise, the government should explore alternatives that provide the same level of social cohesion and feelings of community. These could include increased funding of community-based initiatives or civic engagement programs.

Second, businesses should consider the role of subjective well-being and religiosity when deciding their organisational culture. Given the results of this paper, firms could implement policies that allow flexible time for religious observance. Policies like this would also help foster a more inclusive environment for employees' beliefs, potentially leading to happier workers,

which could lead to higher output.

Third, the decline in religious affiliation could have the opposite generational effects found by Guiso, Sapienza, and Zingales (2003). As a result, there may be a potential decrease in focus on saving, thrift, and trust, which benefit economic growth. Policymakers should consider if these values (and their associated benefits) are eroding. And if so, whether alternative cultural institutions, such as educational institutions, could play a similar role.

Finally, although not a causal relationship, the simultaneous decrease in religious affiliation and subjective well-being poses a potent policy challenge to the US. Policymakers must investigate whether increasingly secular societies need to compensate for the social and psychological benefits historically provided by religious institutions.

## **7 Conclusion**

The current state of the effect of religiosity on happiness has many methodological concerns, the majority of which stem from one or more problems of endogeneity. This paper sought to build on the literature by taking previously established methods of solving these concerns (e.g., using factor analysis to avoid measurement bias) and ultimately further the literature by using a new instrument to control for reverse causality bias.

This paper found a statistically significant impact on a respondent's likelihood of choosing to be happy over not happy based on their religiosity, socioeconomic factors, individual characteristics, and time-fixed effects. These results were the product of a DCM estimated by a linear probability model whilst instrumenting for endogeneity with church scandals. Despite the statistical significance, the economic significance was small. Despite the causal interpretation allowed by the DCM, this approach failed to identify a causal relationship due to several limitations.

The instrument passed the robustness checks in that it was highly relevant and sufficiently exogenous. However, it failed to satisfy the exclusion restriction adequately. Moreover, the IV data suffered from many problems. Namely, it only represented part of the sample (e.g., Catholics) and suffered from potential under-reporting as it relied on self-reports. As this

data becomes more and more available, future research will be able to identify a more causal relationship if one exists. The other controls were significant, which follows the literature except for education. However, it is common when income and education are regressed together that only one is significant. The economic significance of this question is manifold. As stated in the introduction, happier workers produce significantly more and create higher returns for their companies. Secondly, as investigated by Becker, Rubin, and Woessmann (2020, 2024), religion has played a key role in founding the economic institutions, culture, and social norms of society. With religions decreasing prevalence in the economy and people's lives, it is important to investigate the consequences. Possible extensions for this question include introducing more instruments to ensure proper identification. One example is whether the respondent was raised religiously. Another extension could involve using a more evaluative well-being question, such as the Cantrill Ladder (Cantril (1965) and applying an ordinal logit approach.

*End*

*Page Count incl. bibliography: 43*

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## 8 Appendix

Tables 5-12 fully describe the questions that were used in the factor analysis of the religiosity variable.

Table 5: Religious Service Attendance

<b>LABEL</b>	<b>VALUE</b>	<b>COUNT</b>	<b>PCT</b>
NEVER	0	1149	32.4%
LESS THAN ONCE A YEAR	1	416	11.7%
ABOUT ONCE OR TWICE A YEAR	2	464	13.1%
SEVERAL TIMES A YEAR	3	346	9.8%
ABOUT ONCE A MONTH	4	157	4.4%
2-3 TIMES A MONTH	5	201	5.7%
NEARLY EVERY WEEK	6	187	5.3%
EVERY WEEK	7	441	12.4%
SEVERAL TIMES A WEEK	8	148	4.2%
<b>SUBTOTALS:</b>		3509	99.0%
<b>RESERVED CODES:</b>			
NO ANSWER	N	24	0.7%
NOT APPLICABLE	I	2	0.1%

Table 6: Survey results for prayer frequency

<b>LABEL</b>	<b>VALUE</b>	<b>COUNT</b>	<b>PCT</b>
SEVERAL TIMES A DAY	1	1035	29.2%
ONCE A DAY	2	681	19.2%
SEVERAL TIMES A WEEK	3	412	11.6%
ONCE A WEEK	4	189	5.3%
LESS THAN ONCE A WEEK	5	453	12.8%
NEVER	6	731	20.6%
<b>SUBTOTALS:</b>		3501	98.8%
<b>RESERVED CODES:</b>			
DON'T KNOW	D	12	0.3%
NO ANSWER	N	17	0.5%
SKIPPED ON WEB	S	14	0.4%
<b>TOTALS:</b>		3544	100.0%

Table 7: Survey results for belief in life after death

<b>LABEL</b>	<b>VALUE</b>	<b>COUNT</b>	<b>PCT</b>
YES	1	1284	36.2%
NO	2	295	8.3%
<b>SUBTOTALS:</b>		1579	44.6%
<b>RESERVED CODES:</b>			
DON'T KNOW	D	256	7.2%
NO ANSWER	N	5	0.1%
NOT APPLICABLE	I	1704	48.1%
<b>TOTALS:</b>		3544	100.0%

Table 8: Variable: BIBLE - Feelings about the Bible

<b>LABEL</b>	<b>VALUE</b>	<b>COUNT</b>	<b>PCT</b>	<b>PCT Excl. Reserve Codes</b>
WORD OF GOD	1	528	14.9%	29.6%
INSPIRED WORD	2	787	22.2%	44.1%
ANCIENT BOOK	3	441	12.4%	24.7%
OTHER	4	28	0.8%	1.6%
<b>SUBTOTALS:</b>		1784	50.3%	100.0%

Table 9: Variable: CONCLERG - Confidence in Organized Religion

<b>LABEL</b>	<b>VALUE</b>	<b>COUNT</b>	<b>PCT</b>	<b>PCT Excl. Reserve Codes</b>
A GREAT DEAL	1	336	9.5%	14.6%
ONLY SOME	2	1157	32.6%	50.2%
HARDLY ANY	3	813	22.9%	35.3%
<b>SUBTOTALS:</b>		2306	65.1%	100.0%

Table 10: Variable: RELIG16 - Religion in Which You Were Raised

<b>LABEL</b>	<b>VALUE</b>	<b>COUNT</b>	<b>PCT</b>	<b>PCT Excl. Reserve Codes</b>
PROTESTANT	1	1685	47.5%	48.4%
CATHOLIC	2	1159	32.7%	33.3%
JEWISH	3	55	1.6%	1.6%
NONE	4	404	11.4%	11.6%
OTHER	5	27	0.8%	0.8%
BUDDHISM	6	17	0.5%	0.5%
HINDUISM	7	30	0.8%	0.9%
OTHER EASTERN RELIGIONS	8	2	0.1%	0.1%
MUSLIM/ISLAM	9	30	0.8%	0.9%
ORTHODOX-CHRISTIAN	10	22	0.6%	0.6%
CHRISTIAN	11	52	1.5%	1.5%
INTER-NONDENOMINATIONAL	13	1	0.0%	0.0%

Table 11: Variable: RELITEN - Strength of Religious Preference

<b>LABEL</b>	<b>VALUE</b>	<b>COUNT</b>	<b>PCT</b>	<b>PCT Excl. Reserve Codes</b>
STRONG	1	600	16.9%	34.1%
NOT VERY STRONG	2	560	15.8%	31.9%
SOMEWHAT STRONG	3	171	4.8%	9.7%
NO RELIGION	4	427	12.0%	24.3%
<b>SUBTOTALS:</b>		1758	49.6%	100.0%



Table 12: Variable: FUND - Fundamentalism/Liberalism of Respondent's Religion

<b>LABEL</b>	<b>VALUE</b>	<b>COUNT</b>	<b>PCT</b>	<b>PCT Excl. Reserve Codes</b>
FUNDAMENTALIST	1	594	16.8%	18.1%
MODERATE	2	1366	38.5%	41.6%
LIBERAL	3	1322	37.3%	40.3%
<b>SUBTOTALS:</b>		3282	92.6%	100.0%

The following tables are the robustness checks provided by STATA for my instrumental variable. Due to this paper only using a single instrumental variable, these tests are not completely accurate. For example, an F-statistic is provided but with only a single instrument, it should be a t-statistic. Also because there is one instrument for one endogenous regressor, the rank condition is satisfied. This means the identification tests are not as strong.

Table 13: First-Stage Regression Results and Identification Tests

<b>First-Stage Test Statistics</b>				
Variable	F(1, 24824)	P-value	SW $\chi^2(1)$	SW F(1, 24824)
Religiosity	128.34	0.0000	128.53	128.34

<b>Underidentification Test</b>	
Null Hypothesis:	Matrix of reduced form coefficients has rank=K1-1 (underidentified)
Alternative:	Matrix has rank=K1 (identified)
Test Statistic:	Kleibergen-Paap rk LM statistic $\chi^2(1) = 123.92$ (P-value = 0.0000)

<b>Weak Identification Tests</b>	
Cragg-Donald Wald F statistic:	134.18
Kleibergen-Paap Wald rk F statistic:	128.34

<b>Stock-Yogo Weak ID Test Critical Values</b>	
(for K1=1 and L1=1, i.i.d. errors)	
10% maximal IV size:	16.38
15% maximal IV size:	8.96
20% maximal IV size:	6.66
25% maximal IV size:	5.53

<b>Weak-Instrument-Robust Inference</b>		
Test	Statistic	P-value
Anderson-Rubin Wald test (F)	F(1,24824) = 9.99	0.0016
Anderson-Rubin Wald test ( $\chi^2$ )	$\chi^2(1) = 10.01$	0.0016
Stock-Wright LM S statistic	$\chi^2(1) = 9.99$	0.0016

Notes: All test statistics are heteroskedasticity-robust. Critical values from Stock-Yogo (2005), reproduced by permission.