Intelligence and religious disbelief in the United States

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ABSTRACT

We estimate the net effect of intelligence on the prevalence of atheists in the United States. We evaluate such an effect both at the mean and at different quantiles of the conditional distribution of the proportion of atheists using data on all fifty U.S. states. The results show that the net effect of intelligence on religious disbelief is strictly increasing. This pattern is different from that found elsewhere (Cribari-Neto and Souza, 2013) using data from over 100 countries in which the effect peaks and then weakens. We show that in the U.S. the effect is also stronger outside what we call the 'Extended Bible Belt'. Our results also point to the existence of a 'hurdle effect' that only takes place the U.S. most religious area. In that area, the effect of average intelligence on the prevalence of religious disbelievers, albeit positive, loses strength above the conditional median, i.e., where there already are more atheists. Such a loss in strength above the conditional median does not happen in the rest of the country.

1. Introduction

General intelligence relates to the ability to reason deductively or inductively, think abstractly, use analogies, synthesize information, and apply it to new domains (Kanazawa, 2010). It is usually measured by the intelligence quotient (IQ) which is a score obtained from several standardized tests designed to assess human intelligence. Average IQ scores have been computed for a large number of countries (Lynn & Meisenberg, 2010; Lynn & Vanhanen, 2002). Similar measures are available for the fifty United States (U.S.) states: Kanazawa (2006) estimated average IQ based of scores on the Scholastic Achievement Test (SAT), McDaniel (2006b) based estimates on scores of the ACT test, McDaniel (2006b) estimated average state IQ based on a composite of the SAT and ACT scores, and McDaniel (2006a) used scores on the National Assessment of Educational Progress test (NAEP), which, like the SAT and ACT, tests abilities in reading and mathematics. Both nationwide and U.S. state IQs predict many of the things that individual IQ scores do, including socio-economic status (Pesta, McDaniel, & Bertsch, 2010) and education (Lynn & Meisenberg, 2010).

The evidence suggests that intelligence correlates negatively with religious beliefs (Bertscha & Pesta, 2009; Ganzach, Ellis, & Gotlibovski, 2013; Lynn, Harvey, & Nyborg, 2009; Nyborg, 2009; Zuckerman, Silberman, & Hall, 2013); see, in particular, the meta-analysis in Zuckerman et al. (2013). Using 137 nation-level estimates of both intelligence and religiosity, Lynn et al. (2009) noted a substantial positive correlation between general intelligence and atheism. Higher levels of

IQ and education are associated with lower levels of religiosity at the national level (Ganzach et al., 2013; Lynn et al., 2009). Religiosity has also been consistently negatively associated with cognitive ability (Zuckerman et al., 2013). That is, individuals who are more religious tend to be less intelligent, albeit by only a small degree. Using data on the U.S., Pesta et al. (2010) report that state level estimates of intelligence are negatively correlated ($r = -0.55$) with a latent factor of religious belief (derived from seven items, including 'I am certain God exists' and 'Religion is very important to me'). Finley, Tang, and Schmeichel (2015) argued that the negative correlation between analytic thinking and religious belief arises when participants are put in an analytic thinking mindset prior to reporting their level of religious belief. However, Pennycook, Ross, Koehler, and Fugelsang (2016) showed that this is not the case. The authors showed that the negative association between performance on analytic thinking measures and religious belief holds even when the two measures are administered in separate surveys and concluded that there is a genuine association between analytic thinking and religious disbelief.

Webster and Duffy (2016) re-analyzed data from Zuckerman et al. (2013) and Lynn et al. (2009) to test whether the intelligence-religiosity link is moderated and mediated, and the extent to which it generalizes across time, samples, measures, and levels of analysis. The authors re-analyzed Zuckerman et al.'s meta-analysis, and showed that the negative intelligence-religiosity link declined over time. The intelligence-religiosity link was found to be non-significant among samples using men, pre-college participants, grade point average, and those collected

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after 2010. Education also partially mediated the intelligence-religiosity link. The authors also re-analyzed Lynn et al.'s data from 137 countries and found that quality of human conditions positively moderated and partially mediated the positive relation between IQ and disbelief in God; this link becomes non-significant when one controls for spatial dependence.

Based on a large cohort of adolescents (data from the National Longitudinal Study of Youth — NLSY97), Nyborg (2009) noted that atheists scored on average 1.95 IQ point higher than agnostics, 3.82 points higher than liberal persuasions, and 5.89 points higher than dogmatic persuasions. Religiosity declines between ages 12 to 17, but intelligence still modestly predicts central components of religiosity such as a sense of religious identification and private religious practice.

Using the NLSY97 data, Ganzach et al. (2013) modeled intelligence as a function of changes in religiosity and in intelligence over time and also of family characteristics. Their results suggest that even though education has an overall negative impact religiosity, the effect does not hold for individuals with strong religious backgrounds; for such individuals education has a positive impact on religiosity. In contrast, education has a clear negative effect on religiosity for those who come from secular backgrounds. Reeve and Basalik (2011) suggested that more intelligent individuals are more likely benefit more from higher levels of education, which strengthen rational thinking and enable individuals to develop ways to understand the world without reference to supernatural forces. Stoet and Geary (2017) reported that higher levels of religiosity at the national level are associated with lower educational performance in mathematics and science.

Kanazawa (2010) used large samples from the National Longitudinal Study of Adolescent Health and from the General Social Survey to show that there is a significant negative association between intelligence and religiosity. Lewis, Ritchie, and Bates (2011) considered a large sample of U.S. adults and measured six dimensions of religiosity along with a multi-scale instrument to assess general intelligence. The results indicate that lower intelligence is most strongly associated with higher levels of fundamentalism.

Yang and Lester (2016) investigated whether, at the aggregate level, the average IQ of residents of the U.S. states was associated with the states' economic performances (growth in per capita gross state product) and with negative economic indicators (foreclosure rates and credit card debt). The results showed that states with higher average IQs tend to display superior economic performance. Kanazawa (2006) found that his estimates of state IQs are moderately associated with gross state product per capita ($r = 0.32$). Using a sample of 81,000 adolescents, Damian, Su, Shanahan, Trautwein, and Roberts (2015) found a correlation of 0.18 between intelligence and later income. Additionally, U.S. states with higher average IQs are on average wealthier (Kanazawa, 2006; Strenze, 2007).

The negative (positive) relationship between intelligence and religiosity (religious disbelief) is well established at both the individual and group level. i.e., it is robust to data aggregation. For instance, using U.S. data Reeve and Basalik (2011) found that the correlation between state IQ and state religiosity is − 0.55. Their state religiosity data came Pew U.S. Religious Landscapes Survey. Lynn et al. (2009) used worldwide data (country-level, 137 nations) and found that the correlation between IQ and religious disbelief (proportion of atheists) equals 0.60. At the individual level, Ganzach and Gotlibovski (2013) used data from the 1997 cohort of the National Longitudinal Survey of Youth (NLSY97), measured religiosity at different ages based on five dichotomous items and found correlations between intelligence and religiosity that ranged from − 0.23 to − 0.30. It is also noteworthy that several different measures of religiosity have been used in the literature. Even though the way one defines and measures religiosity may impact the magnitude of the correlation, the direction of such an association seems to be robust to how religiosity (or the lack of it) is measured.

Regression analyses have been carried out to estimate the strength of the impact of intelligence on religious disbelief after other conditioning effects have been taken into account. Such studies thus aim at measuring the net impact of intelligence on the lack of religious beliefs. Using data on a large cross-section of nations, Cribari-Neto and Souza (2013) performed a beta regression analysis to estimate the *functional form* of such a net impact. They showed that the impact is positive, statistically significant, gains strength up to a certain level and then weakens. In that analysis, nonetheless, the U.S. appears as an outlying observation, being much more religious than predicted by the statistical models on the basis of its per capita income and average IQ. For instance, according to the data used by Cribari-Neto and Souza (2013), 10.5% (34%) of the U.S. population is made of atheists (people who do not value religion in their daily lives) which contrasts with the model prediction for that country: 26.2% (60.8%). Even though the two regression models used by Cribari-Neto and Souza (2013) provide good overall fits to the data, it is clear that the U.S. behaves substantially differently from what the empirical analysis predicted, displaying much lower prevalence of religious disbelief than it would be expected on the basis of the existing international evidence. We used the fitted beta regression model of Cribari-Neto and Souza (2013) to obtain predictions for the prevalence of atheists in the U.S. varying *IQ* and fixing all other covariates at their observed values. The results showed that the predicted and observed values roughly coincide when *IQ* is set at 90. Since the average intelligence quotient in the U.S. equals 98, it can be asserted that in what concerns religious beliefs Americans behave as if their IQ were 8 points lower than it really is. As noted by Berggren and Bjørnskov (2011), the least religious U.S. state (Vermont) is roughly on par with Spain and Switzerland whereas the most religious state (Mississippi) is placed along countries such as India, El Salvador and Malaysia. Hence, religion is, on average, substantially more important in the U.S. than in most other countries in the Western hemisphere. We thus believe that the U.S. deserves a separate analysis, and this is the motivation for this paper.

In this paper, we use data on the 50 U.S. states to perform a beta regression analysis and estimate the net impact of average intelligence on the prevalence of religious disbelievers. Our results show that the functional form of that net impact is quite different from the one found using data on many different countries: it is strictly increasing, i.e., it does not weaken after peaking. The results also how that it is stronger outside the U.S. most religious area. We call that area 'the Extended Bible Belt', an area of the country that contains a large population of fundamentalist Christians who tend to interpret the Bible literally. The Bible Belt generally refers to a handful of states in the southeastern U.S. in which Evangelical Protestants are relatively more numerous than in other areas of the country. Additionally, there also exists in the Western United States a region called the Mormon Corridor, where the predominant religious denomination is The Church of Jesus Christ of Latter-day Saints. It includes the state of Utah. By Extended Bible Belt we mean the states whose entire territory (5 states) or most of it (8 states) belong to the Bible Belt plus Utah, more exactly: Arkansas, Texas, Oklahoma, Louisiana, Kentucky, Tennessee, Mississippi, Alabama, North Carolina, South Carolina, Virginia, Georgia, Missouri and Utah.

We also perform a quantile regression analysis, which allows us to measure the impact of religious disbelief over the entire conditional distribution of the prevalence of religious disbelievers, and not only at its mean. The results we report show the impact of intelligence on religious disbelief becomes stronger as we move from the conditional distribution lower tail up to the median. Interestingly, from that point on the intensity of the impact of intelligence on religious disbelief slows down inside but not outside the Extended Bible Belt. We thus say that there is a 'hurdle effect' that takes place in the U.S. most religious area.

The paper unfolds as follows. Section 2 describes the data. In Section 3, we briefly present the beta and quantile regression models, on which our results are based. Section 4 contains the results of our empirical analysis. In particular, we present impact curves that describe