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Something is coming: Meteorite sightings and religious preferences.

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Abstract

Can meteorite sightings intensify religious sentiments? This paper exploits the exogenous variability of meteorite sightings in the United States to investigate the causal relationship with religious intensity at the county level. The results show that meteorite sighting increases religiosity in the treated counties, as measured by the names children receive from their parents at birth. The historical perspective of this phenomenon allows me to analyse a society with a low dynamic in the flow of information, which is crucial for such a phenomenon to be seen as unpredictable and inexplicable. The hypothesis underlying this result is that religion serves as a response to the existentialist feelings aroused by such events. The results are in line with coping theory.[1]

Keywords: Meteorite, Religion, Coping Theory, United States

¿Puede el avistamiento de meteoritos intensificar los sentimientos religiosos? Este trabajo explota la variabilidad exógena del avistamiento de meteoritos en Estados Unidos entre 1880 y 1930 para investigar la relación causal existente con la intensidad religiosa al nivel del county. Los resultados muestran que el avistamiento de meteoritos aumenta la religiosidad en los counties tratados. La perspectiva histórica de este fenómeno me permite analizar una sociedad con un bajo dinamismo en el flujo de la información, lo cual es crucial para que tal fenómeno sea visto como impredecible e inexplicable. La religión se mide a través de los nombres que los hijos reciben de sus padres al nacer. La hipótesis que subyace a este resultado es que la religión sirve como respuesta a los sentimientos existencialistas que despiertan este tipo de eventos. Los resultados están en línea con la *coping theory*.

Keywords: Meteoritos, Religion, *Coping Theory*, Estados Unidos

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Introduction

The idea of unforeseen events that lead individuals to make changes in their lives is a common narrative in society. Witnessing unlikely and impressionable situations leads people to modify their attitudes. It can be theorised that this occurs because it awakens feelings and questions that were not previously present in the psyche of those who witness such events. We can frame within these unlikely situations natural events such as earthquakes, floods, etc. And also witnessing attacks, sudden deaths or violent robberies. These situations raise complex questions that can hardly be answered, such as Why did I have to be the one to witness this? or Why is this happening? The cost of finding a reasonable answer is high and may not even be satisfactory. Understanding that you are more likely to witness an attack if you live in a target city may not be entirely clarifying for someone who actually watches a building collapse. It is in these situations that religion has a comparative advantage, since it provides simple and comprehensive answers to the complex questions mentioned above. In this sense, some of Martin Luther's bibliographies place a lightning strike near him as an event that was crucial in his decision to abandon law and become a priest. Inspired by this story, this paper investigates the effect of meteorite sightings on religious intensity.

The objective of this paper is to estimate the causal impact of meteorite sightings on religious intensity at the county level within the United States between 1880 and 1930, by exploiting the exogenous variability of this phenomenon. To achieve this, I employ a database published by the National Aeronautics and Space Administration (NASA) and collected by The Meteoritical Society that includes meteorite falls or discoveries from 807 A.D to the present. Additionally, following the methodology used by Berkes et al. (2024), I use the names given to children by their parents as a proxy for religiosity, serving as a revealed measure. Name data come from the U.S. census and are published by IPUMS (Ruggles et al., 2021). Because access to the full data is restricted, I have decided to use the census used by the authors to calculate the measure of religiosity: 1930. The staggered difference method is used because meteorites fall at different times. The results show that there is a significant increase in religiosity in those counties that see a meteorite, which is mainly explained by the increase in religiosity among those affiliated with Protestantism.

The hypothesis put forth in this work is that the observation of a fireball accompanied by a bright halo in the sky can evoke existentialist feelings in people, resulting in stress due to the lack of certain answers about the origin of the phenomenon. This hypothesis becomes even more plausible in the period studied, which was characterized by a relatively low dynamism of information. It is implausible to suggest that a society in the remote western region of the United States in 1850 would have possessed the capacity to provide a definitive explanation for the phenomenon of a meteorite falling from space to Earth. In light of the existential uncertainty that has been recorded in human experience and theorised by various philosophical trends throughout history, it is not implausible to suggest that witnessing the fall of a fireball from the sky could have an effect on the perception of the world. The period chosen is not accidental, as the slow dynamism of information at the time could not give an accurate answer as to the origin of such a phenomenon, at least not for a large part of society.

Even in recent times, the occurrence and observation of meteorites has been a source of astonishment and concern. The videos of this phenomenon have received hundreds of views on platforms such as YouTube[2]. These events are also well covered by the media, which give them dedicated online or newspaper coverage.

Given the importance of religion, it is essential to understand the reasons why individuals decide to turn to faith, taking into account the consequences that this decision has on the aggregate economy and also on the welfare of individuals. As religion and what religion implies has important social and economic impacts, this paper provides evidence on one of the possible causes that make people more religious. I include in this paper an extensive literature review of the economics of religion. What this paper seeks to do is to add evidence that the demand for religion may be linked to the service that religion provides in coping with stressful events. Then, religious intensity at the individual and aggregate level has various effects and it is therefore important to understand the causes that make people more religious.

In this work, religion is understood to function as a response to unexpected and inexplicable situations. Psychology offers one possible explanation for this behavior through the coping theory, which posits that people respond to high-stress or adverse situations by rationalizing them in a religious manner. In simple terms, when facing a traumatic event, individuals tend to seek refuge in religion. Religion, in this context, simplifies complex events, thereby avoiding the need to confront the inherent costs of understanding.

This work will contribute additional evidence to the literature related to the coping theory. Within this body of work, studies such as Bentzen (2015) document that when natural disasters impact a society, the religious intensity of its members increases. Furthermore, Berkes et al. (2024) demonstrate the causal impact of the intensity of the Spanish flu pandemic on religiosity in the United States. Additionally, Corbi (2023) shows that natural disasters influence preferences for environmental care.

In summary, this paper seeks to contribute to two strands of literature. Firstly, it aims to shed light on the reasons why societies turn to faith, thus contributing to the literature on the relationship between economics and religion. Secondly, it will contribute to the psychology literature, particularly to the studies focused on human responses to unusual situations such as earthquakes, pandemics, or the sighting of a meteorite.

[2]For example, this post showing the fall of 5 meteorites has reached 14 million views.

Literature review

Economic research has a long-standing relationship with religion, with two literature reviews [3]. The first one (Iannaccone, 1998) begins with this phrase:

> *With two centuries separating its first and second publications, there is no denying that the economics of religion got off to a slow start. Yet despite this leisurely launch, dozens of economists (and several sociologists) have now picked up where Adam Smith (1776) and Corry Azzi and Ronald Ehrenberg (1975) left off.*

What is clear is that economics has taken up the torch and made up for the lost time claimed by the author, investigating both the causes that explain the rise of religious sentiment and the consequences of this on various economic, social and cultural outcomes.

If we consider religion as a service, its demand and supply are determined by different factors. This paper contributes to the understanding of one of the key components of religious demand: religion offers society a specific service that helps people to cope with traumatic, improbable or difficult to explain events. How does this process work? To understand it, we turn to the psychological literature. Park (2005) argues that religion acts as a meaning-making system. In stressful situations that overwhelm the pre-existing cognitive structure (e.g., the unexpected death of a loved one), religion allows us to "resignify" the experience, adjusting the individual's view of reality. By providing explanations such as "God has a plan," religion aligns the extraordinary with a framework of meaning, which can reduce stress. In this sense, the service provided by religion consists in recalibrating the perception of reality when it is misaligned by unexpected events, helping to reconcile what happened with what was expected.

This is not the first paper to investigate the link between traumatic events and religion. The closest paper to this one is that of Bentzen (2018), which shows that those individuals who experienced an earthquake are more likely to report religious feelings in surveys. It is very important to mention that the effect applies only to individuals who live in areas where this type of phenomena rarely occur, which is in line with the idea that religion functions as a stress reliever in situations where reality is not in line with what is expected. Bentzen (2021) shows that, due to the COVID-19 pandemic, there was an exponential increase in Google searches for religious prayers worldwide and for almost all religions. The author shows that it was due to the use of religion to cope with the stress caused by the pandemic. Berkes et. al (2024) show a causal relationship between exposure to the Spanish fever pandemic and the religiosity of counties within the United States, in a design similar to this paper. Although with a different outcome than this paper, Henrich et. al (2019) and Cesur et. al (2020) are two papers that find a positive causal relationship between exposure to war events and religious ritual attendance. The former also shows that this result is persistent years after the events and the latter also finds this positive relationship but with praying privately, which is related to religious intensity. Similar to these papers, Zussman (2014) finds that intensity in exposure to

[3] see Iannaccone (1998) and Iyer (2016)

Middle Eastern political violence leads individuals to self-perceive themselves as more religious. The results apply to both Jews and Muslims.

Other papers that are related to this work but in a slightly lateral way are those that explain determinants of the demand for religion that are not those of coping theory. Another cause that may explain the demand for religion is the social insurance service that the religious community provides. Sharing the same values leads people to generate bonds, which respond to an emergency. In this sense, Ager and Ciccone (2017) show that counties in the United States with a higher risk in rainfall have a higher religious affiliation. As expected, the relationship is stronger in agricultural counties.

On the other hand, there is another literature within economics that shows how certain events condition individuals' perceptions. The objective of this paper, in essence, is that. To show how certain events lead to the construction of a way of perceiving reality. Having said that, I think it is important to mention two other papers: first, Gravesi and Litina (2023) show that exposure to macroeconomic shocks during the impressionable years and also in the current age of individuals is associated with a higher vote for populist politicians and a negative attitude towards immigrants. On the other hand, Falco and Corbi (2023) show that individuals who experience a natural disaster during the impressionable years develop pro-environmental attitudes.

Having summarized some of the literature that attempts to shed light on the motives that lead people to become more religious, I will now briefly summarize the consequences of this type of behavior in different economic, social and cultural outcomes. Although the religious phenomenon is valuable in itself, economics has tried to disentangle what consequences it has on, for example, growth. Perhaps the first work that seeks to answer this question is that of Barro and McCleary (2003). It shows two very striking facts in a cross-country analysis. On the one hand, keeping a constant level of religious ritual attendance, religious beliefs tend to increase economic growth. On the other hand, holding these religious beliefs constant, higher religious ritual attendance is related to lower economic growth. These mixed results are present in almost all papers relating religion to any outcome and are not surprising. Religion shapes human attitudes in so many ways that it is hard to imagine that its effects are not heterogeneous.

Perhaps the most studied topic in the literature is the Protestant Reformation and, especially, its consequences on the human capital formation of societies. The outstanding paper is that of Becker and Woessmann (2009) where, using exogenous variability in the proportion of Protestants in the counties of Prussia, they show a positive relationship between economic prosperity and Protestantism. Most significantly, the mechanism by which this relationship operates is that of human capital accumulation. Once one controls for literacy, which correlates positively with Protestantism, the effect of Protestantism on prosperity disappears. This is a clear example of the effects of certain religious practices. One of the key aspects of the Protestant Reformation was the reading of the Holy Scriptures by the believers. This motivated the literacy of this population and this comparative advantage made this population more prosperous.

Since Luther's motivation to read the Bible was universal, both men and women were motivated to become literate for religious reasons. Another paper by the same authors (Becker and Woessmann, 2008) shows that a higher proportion of Protestants is related to a higher proportion of literate women. The effect holds even when the universalization of education was a fact. On the other hand, as predicted by demographic transition models, there is a negative relationship between human capital formation, or education, and the fertility rate of societies. Becker et. al (2010) show that this trade-off between education and fertility exists even before the 20th century. What is important to mention is that this fertility decline is indirectly created by the Protestant religious practice of reading the bible. The relationship can be summarized in that Protestant practices lead to the formation of human capital, which in turn leads to a decline in the birth rate of counties in Prussia.

There are also studies that obtain slightly different results from those previously mentioned regarding the consequences of the Protestant Reformation. Specifically, Cantoni (2014) shows that the difference in growth, measured with the population of each city, between cities with a higher share of Protestants does not differ from those with a higher share of Catholics. The differences with the paper that found contrary results are twofold: first, this paper has data for counties over time while the former only performs a cross section analysis at a given point in time and second, this paper only contains urban counties for which population data is available. This may explain the differences because the effects of Protestantism on literacy are likely to be differentially greater in rural towns, where the population has less economic incentive to become educated. This gap may close in urban towns, where returns to education are greater and there are economic motives for education beyond religious ones. On the other hand, Becker and Woessmann (2009) show the effect at the time where the second industrial revolution begins and returns to education were at their peak of the period studied by Cantoni (2014). It sounds plausible that the literacy gap does not generate a growth differential when returns to education are not high.

Other religious practices studied in the economic literature are those of Judaism. Again, a change in the power structure within the religion led to a change in the behavioral norms of the faithful, as happened in the Protestant Reformation. When the Pharisees replaced the Sadducees in the leadership of the Jewish community around the year 0, one of the reforms they promoted in the norms of behavior was the imposition of the reading and teaching of the Torah (Botticini and Eckstein, 2005). This imposition had dramatic consequences on later Jewish composition and welfare. Botticini and Eckstein (2007) show that this norm led to the decline of Jewish membership, especially in rural subsistence economies. The low return to education in these settings led the faithful to evade the religiously imposed norm and drove conversion to Christianity. In addition, the comparative educational advantage led Jews to move into urban occupations that generated a higher return for their education. This, according to the authors, explains the prevalence of the Jewish community in skilled urban jobs during the Middle Ages. On the other hand, Botticini et. al (2019) show that the Jewish community had differential population growth between the 1500s and 1930s in Eastern Europe compared to the average.

The authors argue that most of this difference is explained by a lower infant mortality rate, which is due to the human capital previously formed in the Jews and other practices of this religion linked to childcare such as breastfeeding.

Another religious practice, this time by Muslims, has mixed economic and social effects. On the one hand, Campante and Yanagizawa-Drott (2015), show that a higher intensity of Ramadan practice leads to lower economic growth in a cross-country analysis. At the same time, the intensity of Ramadan has positive effects on individuals' perceived happiness.

Up to this point, we have seen the consequences of religious practices on different outcomes. However, religiosity also carries with it certain values or ways of thinking common among its members. The economics of religion has studied these phenomena. Protestantism does not only encourage Bible reading, but its values are also associated with individualism. Individual fulfillment is a fundamental pillar of Protestant practice and success in life, in some of its doctrines, is associated with a selection by God. With this worldview, social ties are likely to be weaker among Protestants. Related to this, Becker and Woessmann (2017) show that in counties within Prussia where there is a higher proportion of Protestants suicides increase considerably. What is interesting is that the effect is smaller in counties where church attendance is higher, which supports the idea that the mechanism by which this happens is the absence of social ties in these communities. The proportion of Protestants is also related to higher voting for pro-Nazi parties, to more intense anti-Semitic sentiment, and to the persecution of witches in the Middle Ages (Becker et. al, 2016). In another cross individual analysis, but for all religions, Guiso et. al (2003) show that there is a correlation between religiosity and various outcomes. More religious people tend to have attitudes that the economic literature identifies as good for growth, such as trust. However, they also show more conservative attitudes towards the role of women in society and are prone to negative attitudes towards minorities.

Another well-studied relationship is that of religious intensity with innovation. Just as religion increases human capital due to its practices, more religious individuals tend to have a negative view of innovation measured as the attitude towards science, technology, new ideas and change in general (Benabou, 2015). This relationship is also present among religious people who assiduously attend church. The same author (Benabou, 2022) also shows that across countries and across U.S states there is a negative relationship between religiosity and patents. The mechanism for this effect to occur is related to the interaction of religious institutions and the secular state, where the lobbying power they obtain from the delegated power of their faithful leads to a blockage of innovation in order to maintain the power they hold. Intimately related to this, Squicciarini (2020) shows that cantons in France with a higher religious intensity have a lower economic and industrial growth only during the second industrial revolution. This effect occurs especially in cantons where primary education was provided by religious institutions, suggesting that the contents in these institutions were less permeable to technical contents. This effect is found in a context where there was an open conflict between church and political institutions after the French Revolution. The author mentions that it is likely that another mechanism that explains this result is the church's anti-modernist sentiments. In line with the latter, Lecce et. al (2021) show that during the 19th century, after the French revolution, cantons with a higher religious intensity have a lower number of famous scientists born. This fact can be interpreted with these cantons being less prone to innovation. Again the mechanism for this to occur is the type of education, with Catholic education explaining much of the effect. Although similar to the analyses of human capital accumulation, these last two papers differ in a central aspect: what explained the accumulation of human capital was a practice imposed by religion (bible reading) and what explains the results here is the institutionalization of religion, sustained through the intensity of its adherents.

Religious intensity serves as a support for political leaders who base their power on religion and for religious leaders themselves, who increase their power when their followers are more intense or when more individuals become religious. For example, in Italy, when earthquakes struck cities ruled by religious emissaries the likelihood of a city's transition from autocratic rule to a communal organization, with greater democracy, decreased (Belloc et. al, 2016). This occurred because earthquakes, seen at the time as a divine sign, increased the power of leaders who relied on religion due to an increase in religious intensity.

The purpose of this literature review was to put into context the work that I develop here. The literature linking economics and religion is vast and this paper provides empirical evidence on the determinants of religious demand. As we have seen here this is of particular relevance because of the effects that religion has on growth, politics, social and technological innovation and on the preferences of individuals.

Data

To investigate the effect of meteorites sighting on religious intensity, I use three sources of data: a database that contains all the meteorites sighted in the United States in the 1880-1930 period, a second database with the names of people born during the same period and also the information about counties characteristics and, finally, a database with the religious affiliation of United States counties in the 1906-1926 period. As previously stated, the data on meteorite falls and sightings are sourced from NASA and collected by The Meteoritical Society. Data on names and counties characteristics came from the U.S. population census and was obtained through IPUMS. It is important to mention that censuses containing the names and surnames of individuals are available for the period 1790-1950. However, only random samples can be used due to restrictions on their access. Because this paper uses the measure of religiosity employed by Berkes et. al (2024) I decided to use the random sample from the census used by them: 1930. With this in mind, the data on the names of individuals comes from a random sample of the 1930 census at 5%. Data of religious affiliation is from the Census of Religious Bodies and was also obtain from IPUMS. This section describes the outcome variable and the main explanatory variables.

Meteorite data

NASA publishes the database that is collected by The Meteoritical Society. This database contains records dating back to the year 860 and includes meteorites that were found once they hit the ground as well as meteorites that were sighted by individuals prior to impact. The classification of a meteorite catalogued as a fall is made according to these criteria: "If any part of the event leading to the delivery of a meteorite to Earth was witnessed, either by humans or their devices (cameras, radar, etc.), it is traditionally called a fall". Classifying meteorites that were recorded by cameras or radar as a fall should not be a problem for the purposes of this paper, due to the time period I am focusing on. Moreover, including meteorites in my sample and classifying them as sighted when they were not actually sighted do not affect my identification strategy but takes down our point estimate. With this regard, I will be finding a lower bound estimate, unless meteorite registration is positively correlated with religiosity, which sounds implausible [4].

Meteorites database contains the georeferencing of the meteorite, along with the weight and year of discovery or fall. The database is global in scope and exhibits a clear bias towards European countries and the United States. The complete sample comprises 45,716 meteorites. Restricting the sample to meteorites sighted results in a reduction to 1,107 meteorites.

Given the extensive availability of data in the United States, I elected to focus the analysis within this country. In addition, the names of individuals may be published in censuses after a period of 70 years has elapsed since the data was collected. Given this restriction, the analysis could be performed from 1807 when the first meteorite was sighted in the United States to 1950, the latest census that has the names of individuals available. However, the availability of name databases is limited by IPUMS. These restrictions, as I mentioned previously, led to the fact that the analysis must be done only with the 1930 census data and with a randomized sample of 5%, which includes all persons born earlier. Because as we move away from the year in which the census took place the number of people born decreases, the analysis is restricted to meteorites fallen between 1880 and 1930. Using this criterion, the total number of meteorites sighted is 49. Figure 1 shows the location on the map of the United States. [5]

[4]See Evidence on the identification strategy section.

[5]A table with the list of meteorites sighted in the periods 1880-1930 and 1807-1950 is included in the appendix. In addition, a map with the meteorites sighted in the period 1807-1950 is also included.

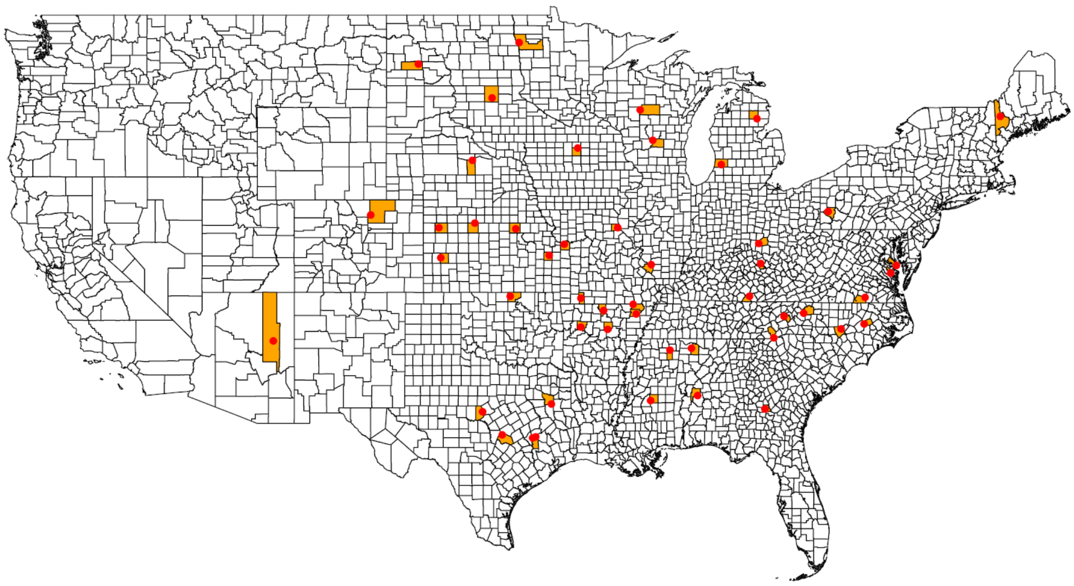

Figure 1: Meteorites sighted in the United States 1880-1930

As illustrated in Figure 1, the concentration of meteorite falls is evident in the eastern region of the country. This is not unexpected, given that the United States originated in the eastern part of the continent, in proximity to the Atlantic coastline. Subsequently, the country expanded westward. Concurrently, the discovery of gold reserves led to the emergence of California as a territory within the same nation, with an eastward expansion. The unification process of the territory can be considered concluded in 1890 (Bazzi et al., 2020), although it may extend until 1950 according to the cited work. Therefore, it is plausible that the meteorite sighting corresponds to the territory that made up the United States in the years in which the sample is restricted.

Data and measure of religiosity

Measuring religious intensity is a challenge for any academic work. Some contemporary studies use surveys that ask individuals questions like "How important is God in your life?" or "Do you consider yourself a religious person?" (Bentzen, 2019). Given the historical nature of this work, such measures are not available for the period studied. Other studies (Abramitzky et al., 2016; Andersen and Bentzen, 2022) that focus on historical periods use religiosity measures based on the names parents give their children. The strategy in these works involves identifying names tied to biblical figures for religions that use the Bible in their teachings, as well as names associated with deities for other religions. Once identified, they count how many people with those names exist in a given region, county, or country, and based on this, they determine the religious intensity of that place relative to others. The strategy in this paper follows a similar approach but with some differences.

To clarify, the available data from U.S. population censuses and religious bodies allow for two types of religious measurements. On the one hand, the census of religious bodies reports the proportion of religious individuals in all counties; however, this measure has a limitation: census data is only collected every ten years, and it was conducted in just four years: 1906, 1916, 1926, and 1936. As a result, the dataset that could be constructed would only have four observations per county, which reduces the statistical power of the study. Additionally, the meteorite dataset is at an annual level, allowing for more detailed analysis that would be underutilized with a decennial measure. It is also likely that the effect of the type of event studied in this work is short-term, making a decennial measure inappropriate. Further compounding the issue, the data from the last census of religious bodies has been questioned in the literature (Berkes et al., 2024), leaving the panel with only three religiosity data points per county.

With this limitation in mind, I decided to use the religiosity measure employed by Berkes et al. (2024). While similar to the measure used in previous papers where biblical and deity names are used to construct a religiosity score for a given place, this measure does not treat names as religious ad hoc but rather empirically calculates the level of religiosity associated with names. In a nutshell, this religiosity indicator attempts to assign a religious score to the names parents give their children at birth. Once the religious score for each name is obtained, the procedure consists of calculating a county-year religious score based on the number of births that have taken place in each county-year. The initial idea of this study was to replicate this measure using the data from the census of religious bodies and the 1930 population census, as done by the original authors. However, this was not possible because access to the full 1930 census database is restricted. This led me to rely on the religious scores from the original work. It is important to note that the original authors used only two of the three censuses of religious bodies because their study deals with a continuous treatment that begins after the 1916 census, meaning that using a census from a period when the treatment had already taken place could reduce the precision of the religious score estimations.

This study, therefore, uses the religious scores for each name calculated by Berkes et al. (2024) and uses birth records (excluding foreign-born individuals) by year for each county from the 1930 population census, but based on a 5% random sample of the total dataset. With these two datasets, I calculate a religiosity score for every year from 1880 to 1930 for all counties in the United States. This approach allows me to construct a panel with annual frequency. Additionally, the census of religious bodies provides information on the proportion of affiliates to all religions, Protestantism, and Catholicism. This allows me to calculate three different types of religiosity scores for each name. For example, the name ”Mary” will have three religious scores: one for Catholicism, one for Protestantism, and one for all religions combined. A religious intensity score will be calculated for each county using these three distinctions, and these will serve as the dependent variables in the analysis.

One more challenge must be added to the approach described. To avoid overfitting when calculating the religious scores, the authors of the original study decided to only include names that appear in at least 0.3% of the full census sample. Since I am working with a random sample, and this sample does not have an identical distribution to the original dataset, the names that appear in at least 0.3% of my dataset differ from those in the full sample. In the original dataset, 71 names meet the 0.3% threshold, whereas in my random sample, only 26 names meet this threshold. This means that I have two religiosity scores for each county and year for each religion: one using the names that meet the threshold in my own dataset and another using the names that meet the threshold in the full original dataset. Below, I detail how the religious score for each name is calculated, as presented in the original paper.

Measure of religiosity

This section replicates the explanation provided by Berkes et al. (2024) regarding their measure of religiosity. Due to the limitations in accessing the complete 1930 census database, my attempt to replicate their estimates does not yield the same results. This is mainly due to two key issues: First, the 5% random sample does not fully represent the total population, as can be inferred from the sample's weights. Second, the low frequency of individual names in the random sample poses a challenge. For instance, the two most common names in the sample, Mary and John, represent only 2.7% and 2.6% of the total observations, respectively. This dispersion in the names, combined with the representation issue, makes the 5% sample unsuitable for replicating the original results. Given these limitations, I will rely on the coefficients estimated for each name by the aforementioned paper.

Since the measure of religiosity is based on the names that parents give their children, it serves as a proxy for the religiosity of the parents. In this sense, it is a form of revealed religiosity. The underlying assumption is that certain names can be associated with specific religious traditions. In some cases, religiosity measures are based on names of prominent figures from sacred texts or saints and deities tied to particular religions. The measure employed by Berkes et al. (2024) goes further by empirically estimating the level of religiosity associated with each name.

Using the census of religious bodies, Berkes et al. calculated the proportion of Catholic, Protestant, and overall religious affiliates for each county during the decades 1906 and 1916. Additionally, since the population census includes birth data, it is possible to determine the number of individuals born with each name in each county and year. The total number of births in each county is also calculated, including only U.S.-born individuals, and the sample is limited to the ten-year cohorts before each census, i.e., from 1896 to 1915, collapsed to the decade level. With this information, the following model is estimated:

$$y_{cd} = \alpha_c + \alpha_d + \beta log(N_{cd}) + \sum_{k=1}^{K} \delta^k log(1 + NameFrecuency^k_{cd}) + \epsilon_{cd} \tag{1}$$

Where y_{cd} is the proportion of religious affiliates reported for the census of religious bodies for all religions, catholics or protestants in decade d and county c. N_{cd} is the total number of births in county c in decade d and $NameFrequency^k_{cd}$ is the total number of births in county c in decade d for name k. County and decade fixed effects are included. In addition, those names that appear in at least 0.3% of the total sample are maintained. [6] What is estimated in this model is the correlation between the proportion of religiosity of a *county* and the relative frequency with which a name appears. In this way, the coefficient $\hat{\delta_k}$ is a religious score associated with each name. Those names that appear more frequently in more religious places will be considered religious names. In addition, it is important to mention that those names that appear more frequently beyond the religiosity level of the county, will not be categorized as religious names. The name Mary, for example, may not have a high religious score because it is a popular name in society beyond any religious affiliation. Figures 5, 6 and 7 in the appendix display the estimated coefficients for all denominations, for Catholics and for Protestants respectively.

Once we have our $\hat{\delta_k}$ estimates we proceed to calculate a score of religiosity at the county level and for each year from 1880 to 1930.

$$religi\hat{o}sity_{ct} = \sum_{k=1}^{K} \hat{\delta}^k log(1 + NameFrecuency_{ct}^k) \tag{2}$$

This variable will be our main measure of religiosity. A higher score value reflects greater religious intensity in county c in year t.

A potential concern with our measure of religiosity is the lack of data related to the proportion of the population that is religious prior to the time in which the first census of religious bodies was taken. The assumption that I would be making in this case is that the score of religiosity associated to a name is constant over time. Since in this work I will only use meteorites sighted between 1880 and 1930 and as a source the same census used to calculate the religious scores, this problem does not apply. However, in case the work is extended to the period 1807-1950, this may result in a measurement error.

Econometric model

To estimate the causal impact of meteorite sightings on religious intensity at the county level, I follow a staggered difference in differences strategy, given that sightings occur at different moments in time. In particular, the model is:

$$Religiosity_{ct} = \beta Meteorite_{ct} + \alpha_t + \alpha_c + \epsilon_{ct} \tag{3}$$

Where religiosity will be the score of religiosity for the county c at time t estimated from the methodology detailed in the previous section. In addition, the meteorite variable will be a dummy that takes value 1 whenever a meteorite was sighted in a year t and a county c. α_t are fixed effects per year and α_c are fixed effects per county. The control group will consist of all those counties where no meteorite was sighted throughout the period studied. In addition, it will be estimated separately for members of all religions, for Catholic members and for

[6] This restriction is made in order to avoid overfitting the model.

Protestant members.

Most importantly, the model is estimated on two different databases. It is important to remember that I am using only those names that appears at least 0,3% to avoid ovefitting in the equation (1) model. Due I am working with a random sample, the 0,3% of names in this database is significantly different from the 0,3% of total census database. Given this, the base estimate is the one that calculate the religious score with names that appears at least 0.3% in the random sample. In an alternative estimate I use to calculate the religious score those names that occur at least 0,3% in the full database. I know exactly which names occur at least 0.3% in the full database because Berkes et. al (2024) published them. The first specification has 26 names and the second specification has a total of 71. On the other hand, because the base is a random sample, it has the weights associated with each household. Taking this into account, the religiosity score will be estimated for both unweighted individuals and weighted individuals according to the weights associated with the census.

By using the difference-in-differences strategy, the inclusion of fixed effects by year and county allows me to control for all unobserved variability that is specific to each county and does not vary over time. At the same time, I am able to control for all variability that is specific to each year. This strategy allows me to strengthen the veracity of the identification assumption, which consists of assuming that meteorite sightings at the county level are not correlated with any other variable not included in the model that explains the variability in religiosity. For the identification assumption not to hold in this case, the omitted variable should not only be correlated with meteorite sighting, but also vary over time and affect the control and treatment groups differently. If the identification assumption is valid, β will be the causal effect of meteorite sighting on religious intensity of the counties.

One potential challenge to the exogeneity of the event is whether religious individuals are more likely to observe meteorite falls. However, it seems prudent to assume that this is not the case, as meteorite falls are typically striking enough to be observed regardless of whether one is looking at the sky. These events transform darkness into light during the night and create visible trails during their descent. Additionally, the analysis of the map presented in the previous section indicates a tendency for meteorite observations to occur on the east coast. This may generate problems in terms of the external validity of the work and it could even be said that the results obtained only apply to the delimitation of the United States at that time, which is logical.

Results

Tables 1 and 2 show the results obtained by estimating the model of equation (3). I present the results for each affiliation and compare them with the mean religiosity score:

All affiliations: In Table 1 (unweighted results), the coefficient for meteorite exposure is 0.0026, indicating a positive and statistically significant effect on religiosity. This suggests that meteorite sightings increase the religiosity index by approximately 520% of the mean, which is 0.0005. The magnitude of the effect is substantial, reflecting that in counties exposed to meteorites, religious names became significantly more frequent. In Table 2 (weighted by household), where the weights reflect how many households each one represents in the 5% sample, the effect is still strong. The coefficient is 0.0097, representing an increase of about 404% relative to the mean of 0.0024.

Catholics: For Catholics, the results are negative but not statistically significant in both tables. In Table 1, the coefficient is -0.0006, suggesting a small decrease in religiosity relative to the mean of 0.0023. This represents a 26.09% decrease. In Table 2, the coefficient becomes -0.0019, representing a 24.36% decrease relative to the mean of 0.0078, but again, this result is not statistically significant. Thus, we cannot conclude that meteorite sightings had any meaningful effect on Catholic religiosity.

Protestants: For Protestants, the results differ across the two tables. In Table 1 (unweighted), the coefficient for meteorite exposure is 0.0016, suggesting a positive but not statistically significant effect. This represents a very large 800% increase relative to the mean of -0.0002. Although the mean is negative, the positive coefficient indicates a shift in the religiosity index towards positive values.

In Table 2 (weighted by household), the coefficient increases to 0.0067 and becomes statistically significant at the 10% level. This represents a 1675% increase relative to the mean of -0.0004. The significance of the result in the weighted model suggests that Protestant religiosity was substantially and meaningfully affected by meteorite sightings, particularly when adjusting for the representativeness of households in the population.

The fact that religious intensity increases in counties that experience a meteorite fall supports the hypothesis that religion acts as a coping mechanism for unexpected events. In the light of the results, Protestant affiliation seems to explain this phenomenon during the period studied, together with denominations that are not specifically analysed. They may even offset a null effect for the Catholic population, which includes a large proportion of the religious population.

Table 1:

	All	Catholics	Protestants
Meteorite	0.0026**	−0.0006	0.0016
	(0.0012)	(0.0007)	(0.0011)
Num.Obs.	104 251	104 251	104 251
R2	0.183	0.490	0.122
Mean	0.0005	0.0023	−0.0002

Notes: This table displays the impact of meteorite sighting on religiosity. The unit of observation is a county observed at a yearly frequency between 1880 and 1930. "Meteorite" is a dummy variable equal to one if a county was a exposed to a meteorite during that year. In columns (1–3), the dependent variable is the name-based religiosity measure described in the main text for all religions, catholics and protestants affiliates. This estimation display the effect of meteorite sighting on the intensity of religious preferences. Regressions include county and year fixed effects. Standard errors, clustered at the county level, are reported in parentheses. Individuals are not weighted in this specification. The sample includes names that appears at least 0,3% from the 5% census sample. * p <0.1, ** p <0.05, *** p <0.01

Table 2: Base Estimation - Household Weighted

	All	Catholics	Protestants
meteorite	0.0097**	−0.0019	0.0067*
	(0.0047)	(0.0026)	(0.0040)
Num.Obs.	104 251	104 251	104 251
R2	0.140	0.280	0.121
Mean	0.0024	0.0078	−0.0004

Notes: This table displays the impact of meteorite sighting on religiosity. The unit of observation is a county observed at a yearly frequency between 1880 and 1930. "Meteorite" is a dummy variable equal to one if a county was a exposed to a meteorite during that year. In columns (1–3), the dependent variable is the name-based religiosity measure described in the main text for all religions, catholics and protestants affiliates. This estimation display the effect of meteorite sighting on the intensity of religious preferences. Regressions include county and year fixed effects. Standard errors, clustered at the county level, are reported in parentheses. Individuals are weighted at the household level. The sample includes names that appears at least 0,3% from the 5% census sample. * p <0.1, ** p <0.05, *** p <0.01

Evidence on the identification strategy

Although an identification assumption cannot be tested, the observation of prior behaviour between treated and untreated pretreatment units can serve as additional evidence for the validity of the assumption. The idea is to observe religious behaviour before certain units enter treatment. A good result supporting the identification assumption would be to observe that treated units have a parallel trend to control units in our outcome of interest. In this way, the counterfactual that I implicitly postulate would become more credible: the trend of the treatment units in religiosity would have been the same as that of the control if they had not observed a meteorite. Due to the nature of this natural experiment, where meteors are observed in different years in each county, I need to estimate a model with leads and lags, where the trend is normalised around the time when the units enter the treatment. Specifically, the model to be estimated is

$$Religiosity_{ct} = \sum_{i=q^-}^{q^+} \beta^i Meteorite^i_{ct} + \alpha_c + \alpha_t + \epsilon_{ct} \tag{4}$$

In this case, we will have $q^- + q^+$ estimated coefficients, where q^- are all the pre-treatment periods and q^+ are the periods after treatment. What is expected is that all coefficients associated with each pre-treatment period are close to zero and not significant; if this is the case, then we will have evidence supporting the identification assumption. As shown in Figure 2 and Figure 3, the estimated coefficients prior to the meteorite sighting are all non-significant. This holds for both the unweighted base and the base with weights for individuals. Then, we have two later periods where the coefficients are significant. However, there is a period in the middle where they are not. This graph adds evidence to support the identification assumption.

Another way to check that meteorite sightings have a quasi-experimental structure is to see if there is a correlation between observable characteristics of the counties and the fact of having sighted a meteorite. Table 4 shows the results of running a regression of various observables against a dummy indicating whether a county sighted a meteorite at any given time. The data come from IPUMS and is aggregated to the county level. The census used is the 1880 census, the first before the first meteorite sighting in our sample. The results show that in 1880 there are no differences between the potentially treated and the never treated on demographic characteristics such as the white population share, the African American population share, the male population share, the foreign population share, people born outside the state of population, and people aged 14 and 19. State fixed effects are included in all regressions and a specification without them is presented in the appendix.

It could be argued, for example, that meteorite falls attract more religious individuals because such events can be related to, for example, a divine calling. One of the symbols of Christianity is the star of Bethlehem, an astronomical phenomenon. To add evidence that this does not happen, figure 4 shows meteorite falls from 1980 to the present day. As can be seen, meteor sightings now include several observations towards the west of the country, which makes sense because the unification of the United States is now a fact. Also, meteor sightings in the past do not seem to be a good predictor of sightings in a recent era, which should occur if religious individuals are selected for treatment. These three pieces of evidence seem to support my identification assumption.

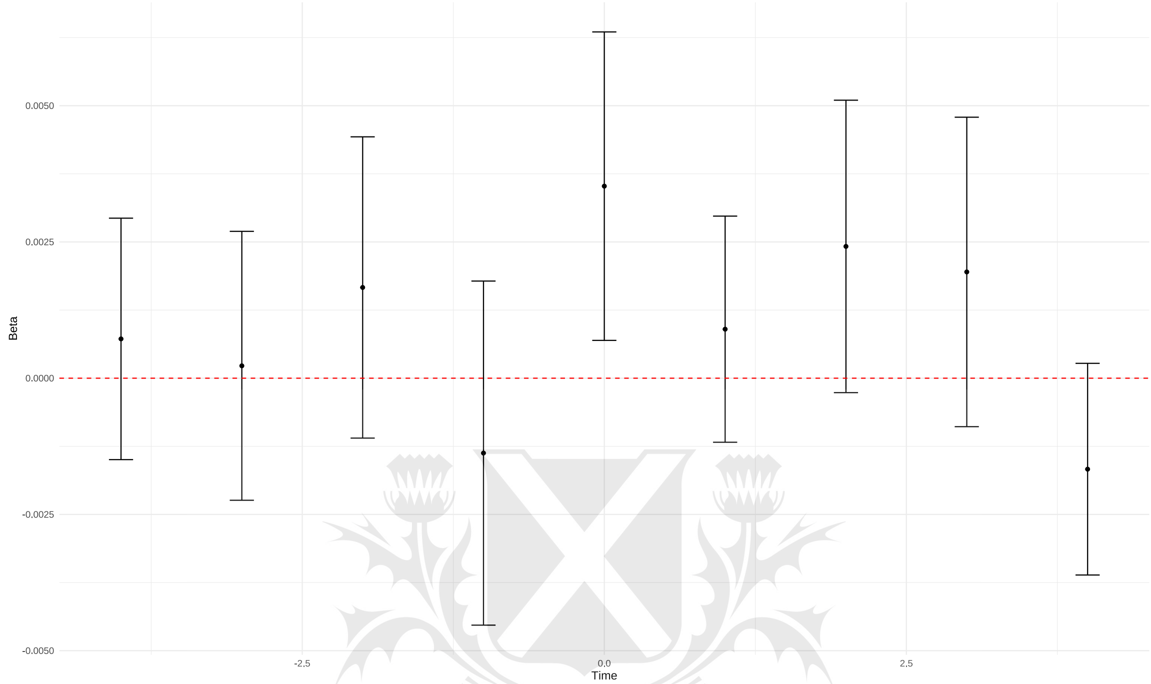

Figure 2: Leads and Lags estimation - Not Weighted

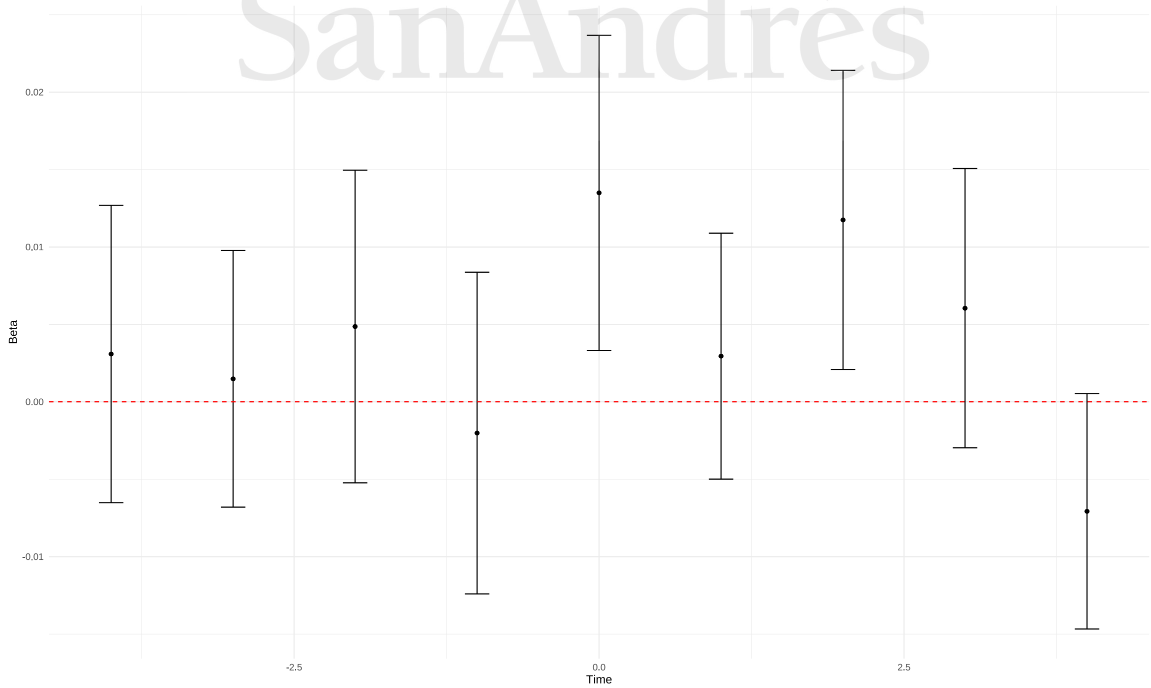

Figure 3: Leads and Lags estimation - Household Weighted

Table 3: Balance Test

	Coefficient	Standard Error	Confidence Interval
White Share	0.008	(0.019)	[−0.030, 0.046]
African American Share	−0.011	(0.020)	[−0.050, 0.029]
Male Share	−0.026	(0.046)	[−0.116, 0.064]
Foreign Share	−0.033	(0.034)	[−0.100, 0.033]
Outstate Share	0.027	(0.031)	[−0.033, 0.088]
Young Share	0.063	(0.061)	[−0.056, 0.182]
Num.Obs.	2571		

* p <0.1, ** p <0.05, *** p <0.01. Include state fixed effects.

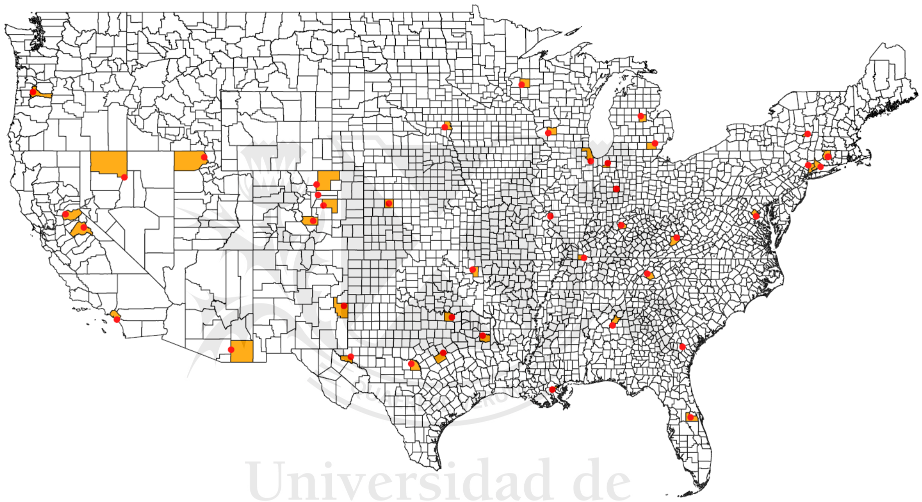

Figure 4: Meteorites sighted in United States - (1980-2023)

Conclusion

In this work, I show that the sighting of meteorites generates an increase in the religious intensity of the counties. The reason for this result is that the fall of a meteorite is an unlikely event, which generates existential uncertainty for people and, therefore, stress. Such a result aligns with the previously mentioned coping theory.

In addition, this paper contributes to an extensive literature linking economics and religion. In this case, I have examined one of the reasons why individuals increase their religious intensity. Understanding why this happens has value in itself, but it can also be used to understand what happens to societies that become more religious. As summarized in this paper, religious norms and intensity have a major impact on various outcomes.

It is important to mention that this paper finds a causal impact for the United States between the years 1807 and 1950. The results cannot be extrapolated to other countries and cannot be extrapolated to other points in time within the United States. The idea that the sighting of a meteorite in 1900 would have the same effect in 2023 is unlikely, considering the speed with which information circulates today. It is possible that by simply searching the internet, one can find a scientific answer, at least partially, to why a phenomenon like this occurs.

Moreover, although the results provide evidence in favor of the hypothesis that meteorite sightings increase religiosity, they should be interpreted with caution, particularly due to the limitations of the database used, which does not represent the entire population. In future extensions, it will be necessary to obtain the complete database to verify whether the results hold when applied to a more comprehensive sample.

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Appendix

Table 4: Meteorites Sighting (1880-1930)

	County Name	State Name	Classification	Year	Geo Location
1	ALLEGHENY	PENNSYLVANIA	FELL	1886	(40.5, -80.08333)
2	JOHNSON	ARKANSAS	FELL	1886	(35.5, -93.5)
3	WILKES	NORTH CAROLINA	FELL	1889	(36.1, -81.41667)
4	WASHINGTON	KANSAS	FELL	1890	(39.75, -97.03333)
5	HANCOCK	IOWA	FELL	1890	(43.25, -93.66667)
6	BROWN	SOUTH DAKOTA	FELL	1892	(45.41667, -98.31667)
7	WILSON	NORTH CAROLINA	FELL	1892	(35.63333, -78.13333)
8	HIGHLAND	OHIO	FELL	1893	(39.11667, -83.85)
9	POLK	MINNESOTA	FELL	1894	(47.81667, -96.85)
10	FRANKLIN	KANSAS	FELL	1896	(38.6, -95.21667)
11	OXFORD	MAINE	FELL	1898	(44.61667, -70.75)
12	ROCK	NEBRASKA	FELL	1898	(42.71667, -99.38333)
13	ALLEGAN	MICHIGAN	FELL	1899	(42.53333, -85.88333)
14	PERRY	ALABAMA	FELL	1900	(32.53333, -87.16667)
15	PHILLIPS	KANSAS	FELL	1901	(40.0, -99.25)
16	BATH	KENTUCKY	FELL	1902	(38.25, -83.75)
17	JACKSON	NORTH CAROLINA	FELL	1903	(35.03333, -83.03333)
18	SCOTT	KANSAS	FELL	1905	(38.5, -101.1)
19	KAY	OKLAHOMA	FELL	1906	(36.83333, -97.33333)
20	GRIMES	TEXAS	FELL	1906	(30.75, -95.95)
21	LAWRENCE	ALABAMA	FELL	1907	(34.58333, -87.5)
22	BROWN	TEXAS	FELL	1909	(31.83333, -98.83333)
23	SCOTT	MISSISSIPPI	FELL	1910	(32.31667, -89.71667)
24	COLUMBIA	WISCONSIN	FELL	1911	(43.58333, -89.6)

Table 5: Meteorites Sighting (1880-1930)

	County Name	State Name	Classification	Year	Geo Location
25	NAVAJO	ARIZONA	FELL	1912	(34.9, -110.18333)
26	MOORE	NORTH CAROLINA	FELL	1913	(35.41667, -79.38333)
27	STONE	MISSOURI	FELL	1916	(36.75, -93.5)
28	MARATHON	WISCONSIN	FELL	1917	(44.9, -90.28333)
29	JACKSON	MISSOURI	FELL	1917	(39.08333, -94.4)
30	SMITH	TEXAS	FELL	1917	(32.16667, -95.1)
31	BAXTER	ARKANSAS	FELL	1918	(36.21667, -92.26667)
32	STARK	NORTH DAKOTA	FELL	1918	(46.88333, -102.31667)
33	MCCREARY	KENTUCKY	FELL	1919	(36.83333, -84.35)
34	ST MARYS	MARYLAND	FELL	1919	(38.16667, -76.38333)
35	WILCOX	GEORGIA	FELL	1921	(31.95, -83.51667)
36	OSCODA	MICHIGAN	FELL	1921	(44.51667, -83.95)
37	RICHMOND	VIRGINIA	FELL	1921	(37.83333, -76.7)
38	LEE	MISSISSIPPI	FELL	1922	(34.5, -88.66667)
39	WILLIAMSON	TEXAS	FELL	1922	(30.83333, -97.76667)
40	MECKLENBURG	VIRGINIA	FELL	1924	(36.78333, -78.08333)
41	WELD	COLORADO	FELL	1924	(40.35, -104.9)
42	CLAY	ARKANSAS	FELL	1924	(36.48333, -90.66667)
43	MARION	MISSOURI	FELL	1926	(39.8, -91.5)
44	RANDOLPH	ILLINOIS	FELL	1927	(38.2, -89.68333)
45	YANCEY	NORTH CAROLINA	FELL	1929	(35.96667, -82.48333)
46	RAWLINS	KANSAS	FELL	1929	(39.8, -101.2)
47	CLEBURNE	ARKANSAS	FELL	1930	(35.4, -92.05)
48	GREENE	ARKANSAS	FELL	1930	(36.06667, -90.5)
49	GRIMES	TEXAS	FELL	1930	(30.7, -96.11667)

Table 6: Meteorites Sighting (1807-1950)

	County Name	State Name	Classification	Year	Geo Location
1	FAIRFIELD	CONNECTICUT	FELL	1807	(41.266667, -73.266667)
2	CASWELL	NORTH CAROLINA	FELL	1810	(36.5, -79.25)
3	LINCOLN	MAINE	FELL	1823	(44.08333, -69.48333)
4	HONOLULU	HAWAII TERRITORY	FELL	1825	(21.3, -157.86667)
5	CHARLES	MARYLAND	FELL	1825	(38.41667, -77.16667)
6	SUMNER	TENNESSEE	FELL	1827	(36.4, -86.5)
7	CHESTERFIELD	VIRGINIA	FELL	1828	(37.46667, -77.5)
8	MONROE	GEORGIA	FELL	1829	(33.01667, -83.96667)
9	DICKSON	TENNESSEE	FELL	1835	(36.16667, -87.33333)
10	PULASKI	MISSOURI	FELL	1839	(37.91667, -92.08333)
11	LEE	SOUTH CAROLINA	FELL	1843	(34.16667, -80.28333)
12	CAPE GIRARDEAU	MISSOURI	FELL	1846	(37.26667, -89.58333)
13	LINN	IOWA	FELL	1847	(41.9, -91.6)
14	HANCOCK	MAINE	FELL	1848	(44.38333, -68.75)
15	CABARRUS	NORTH CAROLINA	FELL	1849	(35.25, -80.5)
16	LINCOLN	TENNESSEE	FELL	1855	(35.3, -86.63333)
17	ALBANY	NEW YORK	FELL	1859	(42.53333, -73.83333)
18	HARRISON	INDIANA	FELL	1859	(38.25, -86.16667)
19	MUSKINGUM	OHIO	FELL	1860	(40.0, -81.76667)
20	VERNON/BAD AX	WISCONSIN	FELL	1865	(43.5, -91.16667)
21	MORGAN/COTACO	ALABAMA	FELL	1868	(34.4, -87.06667)
22	FRANKLIN	ALABAMA	FELL	1868	(34.48333, -87.83333)
23	STEWART	GEORGIA	FELL	1869	(32.03333, -84.76667)
24	WESTCHESTER	NEW YORK	FELL	1869	(41.28333, -73.81667)
25	WALDO	MAINE	FELL	1871	(44.36667, -69.2)
26	NASH	NORTH CAROLINA	FELL	1874	(36.08333, -78.06667)
27	IOWA	IOWA	FELL	1875	(41.8, -91.86667)
28	FULTON	INDIANA	FELL	1876	(41.08333, -86.28333)
29	HARRISON	KENTUCKY	FELL	1877	(38.4, -84.25)
30	WARREN	MISSOURI	FELL	1877	(38.68333, -91.15)
31	EMMET	IOWA	FELL	1879	(43.41667, -94.83333)
32	ALLEGHENY	PENNSYLVANIA	FELL	1886	(40.5, -80.08333)
33	JOHNSON	ARKANSAS	FELL	1886	(35.5, -93.5)
34	WILKES	NORTH CAROLINA	FELL	1889	(36.1, -81.41667)
35	WASHINGTON	KANSAS	FELL	1890	(39.75, -97.03333)
36	HANCOCK	IOWA	FELL	1890	(43.25, -93.66667)
37	BROWN	SOUTH DAKOTA	FELL	1892	(45.41667, -98.31667)
38	WILSON	NORTH CAROLINA	FELL	1892	(35.63333, -78.13333)
39	HIGHLAND	OHIO	FELL	1893	(39.11667, -83.85)
40	POLK	MINNESOTA	FELL	1894	(47.81667, -96.85)
41	FRANKLIN	KANSAS	FELL	1896	(38.6, -95.21667)
42	OXFORD	MAINE	FELL	1898	(44.61667, -70.75)
43	ROCK	NEBRASKA	FELL	1898	(42.71667, -99.38333)
44	ALLEGAN	MICHIGAN	FELL	1899	(42.53333, -85.88333)

Table 7: Meteorites Sighting (1807-1950)

	County Name	State Name	Classification	Year	Geo Location
45	PERRY	ALABAMA	FELL	1900	(32.53333, -87.16667)
46	PHILLIPS	KANSAS	FELL	1901	(40.0, -99.25)
47	BATH	KENTUCKY	FELL	1902	(38.25, -83.75)
48	JACKSON	NORTH CAROLINA	FELL	1903	(35.03333, -83.03333)
49	SCOTT	KANSAS	FELL	1905	(38.5, -101.1)
50	KAY	OKLAHOMA	FELL	1906	(36.83333, -97.33333)
51	GRIMES	TEXAS	FELL	1906	(30.75, -95.95)
52	LAWRENCE	ALABAMA	FELL	1907	(34.58333, -87.5)
53	BROWN	TEXAS	FELL	1909	(31.83333, -98.83333)
54	SCOTT	MISSISSIPPI	FELL	1910	(32.31667, -89.71667)
55	COLUMBIA	WISCONSIN	FELL	1911	(43.58333, -89.6)
56	NAVAJO	ARIZONA	FELL	1912	(34.9, -110.18333)
57	MOORE	NORTH CAROLINA	FELL	1913	(35.41667, -79.38333)
58	STONE	MISSOURI	FELL	1916	(36.75, -93.5)
59	MARATHON	WISCONSIN	FELL	1917	(44.9, -90.28333)
60	JACKSON	MISSOURI	FELL	1917	(39.08333, -94.4)
61	SMITH	TEXAS	FELL	1917	(32.16667, -95.1)
62	BAXTER	ARKANSAS	FELL	1918	(36.21667, -92.26667)
63	STARK	NORTH DAKOTA	FELL	1918	(46.88333, -102.31667)
64	MCCREARY	KENTUCKY	FELL	1919	(36.83333, -84.35)
65	ST MARYS	MARYLAND	FELL	1919	(38.16667, -76.38333)
66	WILCOX	GEORGIA	FELL	1921	(31.95, -83.51667)
67	OSCODA	MICHIGAN	FELL	1921	(44.51667, -83.95)
68	RICHMOND	VIRGINIA	FELL	1921	(37.83333, -76.7)
69	LEE	MISSISSIPPI	FELL	1922	(34.5, -88.66667)
70	WILLIAMSON	TEXAS	FELL	1922	(30.83333, -97.76667)
71	MECKLENBURG	VIRGINIA	FELL	1924	(36.78333, -78.08333)
72	WELD	COLORADO	FELL	1924	(40.35, -104.9)
73	CLAY	ARKANSAS	FELL	1924	(36.48333, -90.66667)
74	MARION	MISSOURI	FELL	1926	(39.8, -91.5)
75	RANDOLPH	ILLINOIS	FELL	1927	(38.2, -89.68333)
76	YANCEY	NORTH CAROLINA	FELL	1929	(35.96667, -82.48333)
77	RAWLINS	KANSAS	FELL	1929	(39.8, -101.2)
78	CLEBURNE	ARKANSAS	FELL	1930	(35.4, -92.05)
79	GREENE	ARKANSAS	FELL	1930	(36.06667, -90.5)
80	GRIMES	TEXAS	FELL	1930	(30.7, -96.11667)
81	CASS/VAN BUREN	MISSOURI	FELL	1932	(38.5, -94.3)
82	LIMESTONE	ALABAMA	FELL	1933	(34.75, -87.0)
83	SPARTANBURG	SOUTH CAROLINA	FELL	1933	(35.03333, -81.88333)
84	EDDY	NEW MEXICO	FELL	1933	(32.21667, -104.0)
85	UNION	NEW MEXICO	FELL	1933	(36.21667, -103.4)
86	SIOUX	NEBRASKA	FELL	1933	(42.58333, -103.66667)

Table 8: Meteorites Sighting (1807-1950)

	County Name	State Name	Classification	Year	Geo Location
87	PITT	NORTH CAROLINA	FELL	1934	(35.55, -77.53333)
88	WASHINGTON	ARKANSAS	FELL	1934	(36.05, -94.16667)
89	LOGAN	OKLAHOMA	FELL	1936	(35.95, -97.58333)
90	SAN JUAN	NEW MEXICO	FELL	1938	(36.8, -108.0)
91	FAYETTE	ILLINOIS	FELL	1938	(39.08333, -89.15)
92	MCLEAN	ILLINOIS	FELL	1938	(40.48, -89.00417)
93	BUTLER	PENNSYLVANIA	FELL	1938	(40.93333, -79.73333)
94	FORT BEND	TEXAS	FELL	1939	(29.45, -96.0)
95	CLARK	WASHINGTON	FELL	1939	(45.58333, -122.35)
96	CENTRE	PENNSYLVANIA	FELL	1941	(40.91667, -78.08333)
97	DEWEY	OKLAHOMA	FELL	1943	(35.88333, -99.33333)
98	GOSHEN	WYOMING	FELL	1944	(42.06667, -104.16667)
99	ATOKA	OKLAHOMA	FELL	1945	(34.31667, -96.15)
100	BREWSTER	TEXAS	FELL	1946	(30.125, -103.11667)
101	COTTON	OKLAHOMA	FELL	1946	(34.33333, -98.3)
102	LANCASTER	NEBRASKA	FELL	1947	(40.78167, -96.47167)
103	NORTON	KANSAS	FELL	1948	(39.68333, -99.86667)
104	HONOLULU	HAWAII TERRITORY	FELL	1949	(21.3, -157.78333)
105	BOX ELDER	UTAH	FELL	1950	(41.68333, -112.13333)
106	CALLOWAY	KENTUCKY	FELL	1950	(36.6, -88.1)
107	ST LOUIS CITY	MISSOURI	FELL	1950	(38.7, -90.23333)

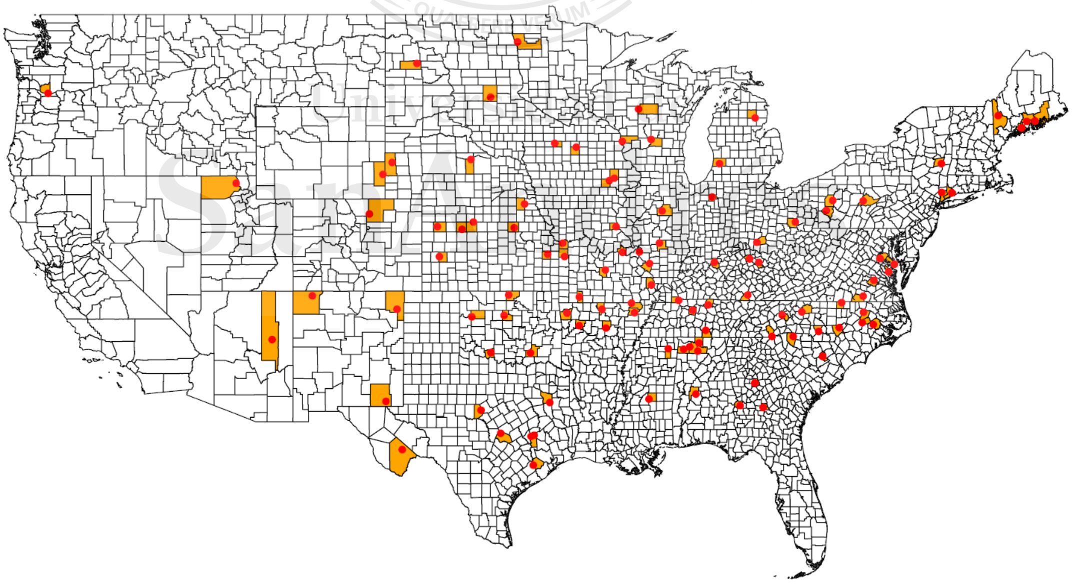
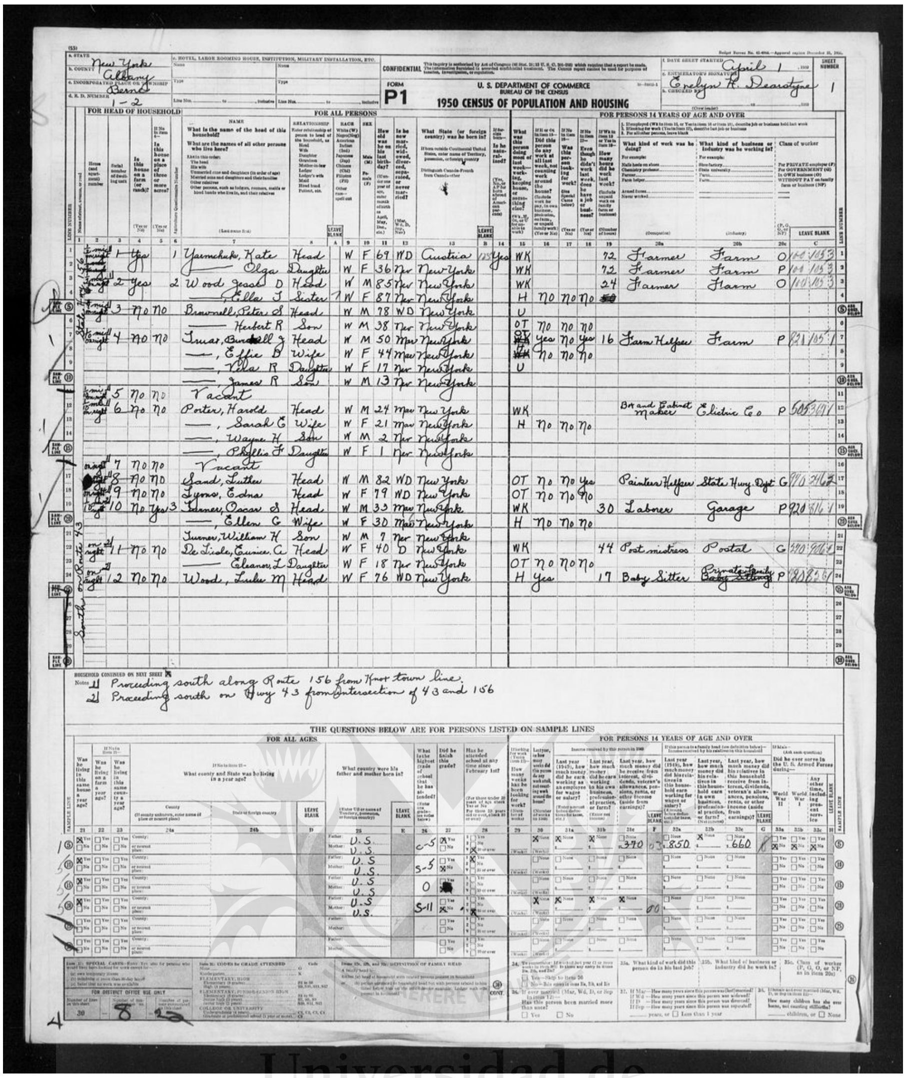


Figure 5: Meteorites sighted in the United States 1807-1950


U. S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
FORM P1
1950 CENSUS OF POPULATION AND HOUSING
CONFIDENTIAL

State: New York — County: Albany — Berne — E. D. Number: 1-2 — April 1 — Sheet number 1

Line	Serial no. of dwelling	On a farm?	On 3+ acres?	Agr. Quest.	Name	Relationship	Race	Sex	Age	Marital status	Birthplace	Naturalized?	Activity	16	17	18	Hours	Occupation	Industry	Class
1	1	Yes		1	Yarmchuk, Kate	Head	W	F	69	WD	Austria	Yes	WK				72	Farmer	Farm	O
2					Olga	Daughter	W	F	36	Nev	New York		WK				72	Farmer	Farm	P
3	2	Yes		2	Wood, Jesse D	Head	W	M	85	Nev	New York		WK				24	Farmer	Farm	O
4					—, Ella I	Sister	W	F	87	Nev	New York		H	no	no	no				
5	3	no	no		Brownell, Peter S	Head	W	M	78	WD	New York		U							
6					—, Herbert R	Son	W	M	38	Nev	New York		OT	no	no	no				
7	4	no	no		Truax, Burdell J	Head	W	M	50	Mar	New York		OT	yes	no	yes	16	Farm Helper	Farm	P
8					—, Effie B	Wife	W	F	44	Mar	New York		H	no	no	no				
9					—, Vela R	Daughter	W	F	17	Nev	New York		U							
10					—, James R	Son	W	M	13	Nev	New York									
11	5	no	no		Vacant															
12	6	no	no		Porter, Harold	Head	W	M	24	Mar	New York		WK					Bx and Cabinet Maker	Electric Co	P
13					—, Sarah E	Wife	W	F	21	Mar	New York		H	no	no	no				
14					—, Wayne H	Son	W	M	2	Nev	New York									
15					—, Phyllis F	Daughter	W	F	1	Nev	New York									
16	7	no	no		Vacant															
17	8	no	no		Sand, Luther	Head	W	M	82	WD	New York		OT	no	no	yes		Painter Helper	State Hwy. Dept	G
18	9	no	no		Lyons, Edna	Head	W	F	79	WD	New York		OT	no	no	no				
19	10	no	yes	3	Turner, Oscar S	Head	W	M	33	Mar	New York		WK				30	Laborer	Garage	P
20					—, Ellen G	Wife	W	F	30	Mar	New York		H	no	no	no				
21					Turner, William H	Son	W	M	7	Nev	New York									
22	11	no	no		De Lisle, Eunice C	Head	W	F	40	D	New York		WK				44	Post mistress	Postal	G
23					Eleanor, L	Daughter	W	F	18	Nev	New York		OT	no	no	no				
24	12	no	no		Wood, Lulu M	Head	W	F	76	WD	New York		H	yes			17	Baby Sitter	Private family	P

Notes:
1) Proceeding south along Route 156 from Knox town line.
2) Proceeding south on Hwy 43 from intersection of 43 and 156

THE QUESTIONS BELOW ARE FOR PERSONS LISTED ON SAMPLE LINES

Figure 6: Census form 1950

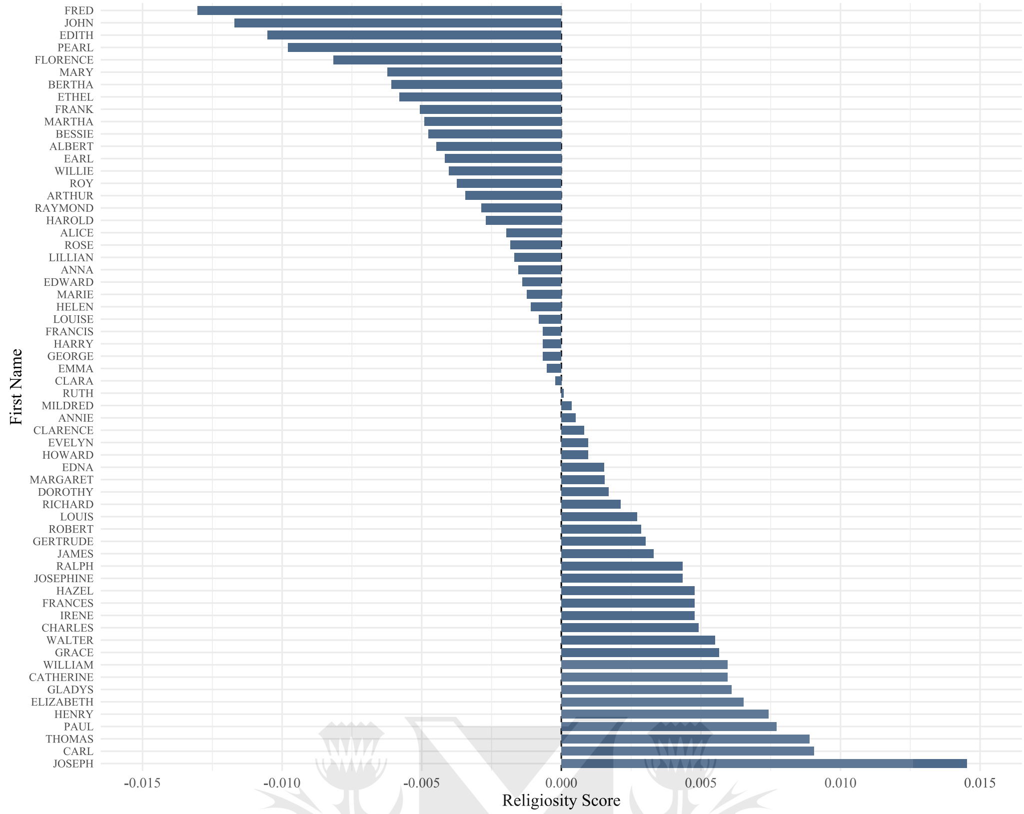


Figure 7: Berkes et. al (2024) coefficients for all denominations

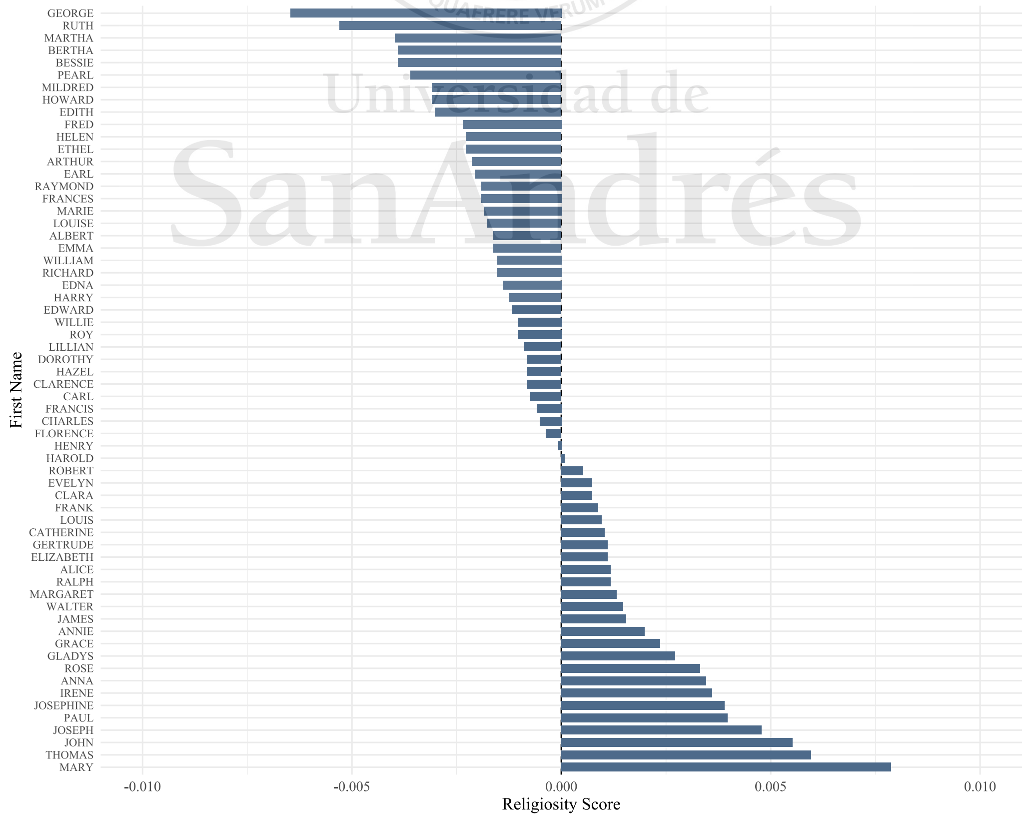


Figure 8: Berkes et. al (2024) coefficients for catholics

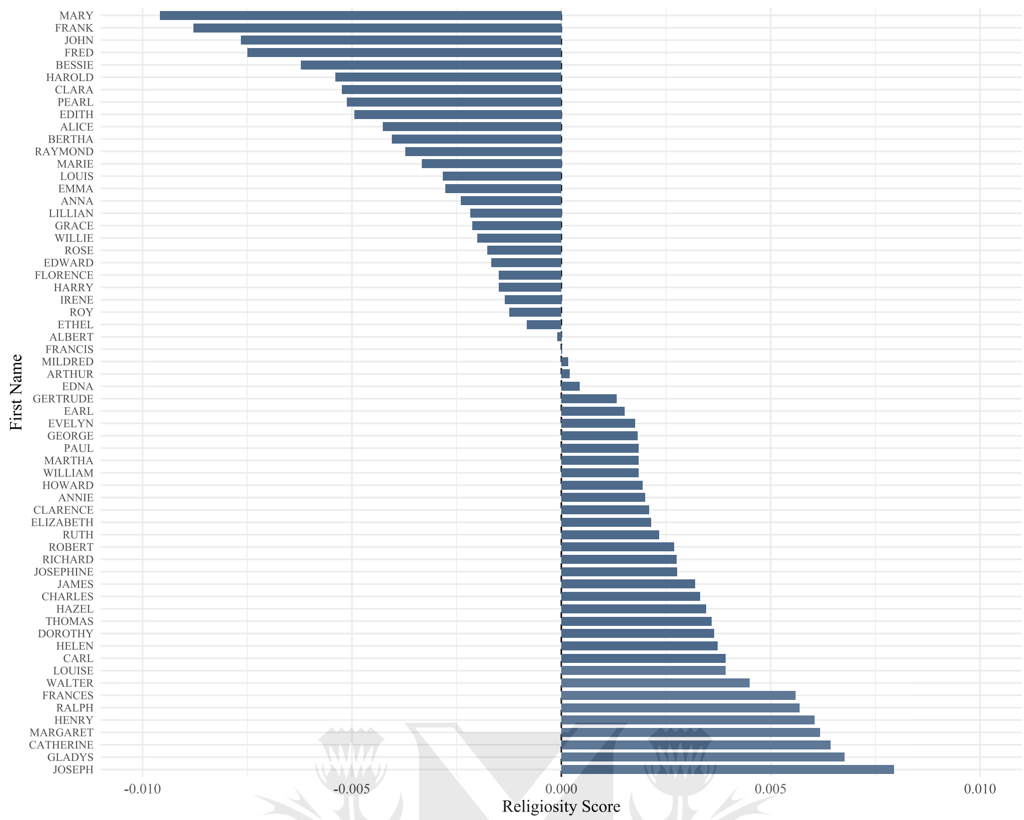


Figure 9: Berkes et. al (2024) coefficients for protestants

Table 9: Base Estimation - Without Weighted Population

	All	Catholics	Protestants
meteorite	0.0019	−0.0009	0.0013
	(0.0015)	(0.0007)	(0.0012)
Num.Obs.	123 608	123 608	123 608
R2	0.170	0.361	0.115
Mean	−0.000 02	0.0011	−0.0004

Notes: This table displays the impact of meteorite sighting on religiosity. The unit of observation is a county observed at a yearly frequency between 1880 and 1930. “Meteorite” is a dummy variable equal to one if a county was a exposed to a meteorite during that year. In columns (1–3), the dependent variable is the name-based religiosity measure described in the main text for all religions, catholics and protestants affiliates. This estimation display the effect of meteorite sighting on the intensity of religious preferences. Regressions include county and year fixed effects. Standard errors, clustered at the county level, are reported in parentheses. Individuals are not weighted in this specification. The sample includes names that appears at least 0,3% from the complete census sample. * p <0.1, ** p <0.05, *** p <0.01

Table 10: Base Estimation - Household Weighted Population

	All	Catholics	Protestants
meteorite	0.0085	−0.0029	0.0063
	(0.0058)	(0.0032)	(0.0044)
Num.Obs.	123 608	123 608	123 608
R2	0.133	0.171	0.119
Mean	−0.0002	0.0031	−0.0016

Notes: This table displays the impact of meteorite sighting on religiosity. The unit of observation is a county observed at a yearly frequency between 1880 and 1930. "Meteorite" is a dummy variable equal to one if a county was a exposed to a meteorite during that year. In columns (1–3), the dependent variable is the name-based religiosity measure described in the main text for all religions, catholics and protestants affiliates. This estimation display the effect of meteorite sighting on the intensity of religious preferences. Regressions include county and year fixed effects. Standard errors, clustered at the county level, are reported in parentheses. Individuals are weighted at the household level. The sample includes names that appears at least 0,3% from the complete census sample. * p <0.1, ** p <0.05, *** p <0.01

Table 11: Balance Test

	Coefficient	Standard Error	Confidence Interval
White Share	−0.002	(0.012)	[−0.026, 0.021]
African American Share	0.003	(0.012)	[−0.020, 0.027]
Male Share	−0.005	(0.033)	[−0.069, 0.059]
Foreign Share	−0.026	(0.020)	[−0.065, 0.014]
Outstate Share	0.031*	(0.016)	[0.000, 0.062]
Young Share	0.045	(0.044)	[−0.042, 0.132]
Num.Obs.	2571		

* p <0.1, ** p <0.05, *** p <0.01.