Sincere, Performative and Latent Faith in England 1300-1850

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Abstract

We use the full texts of ~26,000 English wills covering the half millennium between 1300 and 1850 to generate quantitative measures of individual religiosity. We distinguish pro forma performative expressions of belief in the preamble, which we term "nominal" religiosity, from "real" religiosity, non-template religious expressions in the substantive body of the will. Informed by the historical literature, we consider the latter to be more sincere than the former. By constructing and validating multiple novel measures of such religious expression, together with information on religious bequests and actions, we estimate a proxy for latent religiosity, and track it over time. We uncover new historical stylized facts about the evolution of religiosity in England over five centuries. We highlight four principal findings. One, traditional Christian language was declining long before the Reformation. Two, the incidence of performative preambles rose after 1400 and came to dominate will making by 1600, thereafter declining. Three, real religious expression rose 1300 to 1450, before a long-run secular decline 1450 to 1850. Four, latent religiosity began declining for the richest willmakers, from high levels, long before Henry VIII's Reformation of the 1530s. The Reformation era is associated with a collapse in this latent religiosity. This evidence points to a two-stage process of cultural change: endogenous changes in religious sentiment preceded, and were subsequently accelerated by, a powerful top-down institutional transformation.

JEL: N33, Z12

I Genesis

Today the developed World can be characterized by economic growth driven by scientific advance coupled with declines in organized religion. The economic stagnation and low rates of innovation of the Old World were accompanied by universal, sincere and passionate belief in a creator God. Society, politics and International relations were organized by, and wars were fought over, religious affiliation.

We ask here about the long run trajectory of religious intensity in England, the crucible of the Industrial Revolution. How can the economic historian peer into the

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mind of the dead? We argue that the personal declarations of wills provide a unique detector for the intensity of religious belief. Over the past millennium, the "last Will and Testament" guided the transmission of wealth at death, in England and in many other places. These handwritten documents typically listed descriptively in about 1,000 of their own words an individual's concerns, their beliefs, their wealth and their close family and friends. Wills represent our best and most representative record of individual, ordinary lives, and the economic, family, social and religious influences which mattered most to them as they contemplated their death. Whilst wills are a selected group, they are by far the most representative and richest, direct historical source to examine such psychosocial behaviors as religiosity. We analyze a sample of ~26,000 wills in this paper. But are wills an honest testament of individual religiosity? Or are they insincere pro-forma declarations at most reflecting the social milieu?

The *preambles* to Wills, and what they can tell us about personal religion, have long been examined and debated by historians (see Dickens (1964); Cressy (1997); Houlbrooke (1998); Duffy (2005)). So much so that Duffy states that the evidence of wills has "dominated" the debates about the English Reformation (2005, p.504). The utility and reliability of wills as evidence for sincere religiosity has thus been extensively critiqued. A well known summary article on the issue states; "...the preambles of some wills for ardent Christians were perfunctory...". However, *beyond* the preamble wills have more information. The quoted sentence continues; "...while their devotion was readily apparent in the phraseology used later in the testaments" Alsop (1989, p.24). We take this distinction and quantify it. The preamble is an unreliable gauge of underlying belief, but the will beyond can reveal this.

The expression of religiosity changes dramatically over the long time span of this paper. The historical literature has noted the rise and decline of explicit mentions to God in the preamble. But from our close reading of early wills we can see clear examples of religious wills that do not specifically mention God, anywhere in the will, such as the quoted will below, from 1417.

> ***Richard Arundel,*** *Knight, July 8th, 1417. My body to be buried in the Chapel of our Lady in the Abbey of Rochester. I will that my executors find one man who, for the good of my soul, shall go to the Court of Rome, to the Holy Land, to the Sepulture of our Lord "et ad sanguinem sanctum" in Germany as soon as they well can provide him after my decease. I will that my goods be equally divided between my daughters Philippa, Johanna, Eleanor.*[1]

Thus we cannot simply summarize a will as religious based upon a declaration to God. Rather, a more nuanced approach is demanded. We go beyond the usual method of sorting wills into discrete categories (e.g. traditional v non-traditional), as has been done in the historical literature. We instead code each will to a set of quantitative measures of religious expression, sentiment and bequests, and use these measures create multiple indices. We do this separately for the preamble, and for the rest of the will, which we will refer to as the *body* of the will. Thus every will maker gets

[1] Source: *Testamenta vetusta: being illustrations from wills, of manners, customs, &c. as well as of the descents and possessions of many distinguished families. From the reign of Henry the Second to the accession of Queen Elizabeth*, 1826, page 196. https://archive.org/details/testamentavetust01nico.

two religiosity index scores, which we term "nominal" (based upon the preamble), and "real" (based upon the body).

This dichotomy between real and nominal religiosity arises as there are often cultural forces which demand fealty to a dominant ideology. Such dynamics are in clear operation across history; the phrase "Heil Hitler" used as a greeting in Nazi-era Germany, the worship of Stalin in Soviet-era Russia, and in our own time the performative adulation of Kim Jong Un in North Korea. In these societies there is a severe penalty to not loudly declaring conformity, whatever of individuals true feelings. Belief in God, over the long span of English history was certainly subject to such cultural dynamics. Witness figure 1. Panel A depicts the burning alive, for heresy, of Protestants during the reign of King Henry VIII (note Henry had broken from Rome by this time (1546) but he retained Catholic doctrine on the Eucharist). Panel B depicts the hanging, drawing and quartering of Catholics, for treason, during the reign of Protestant Queen Elizabeth I. Expressing the wrong Christian flavor of the moment could be expensive.

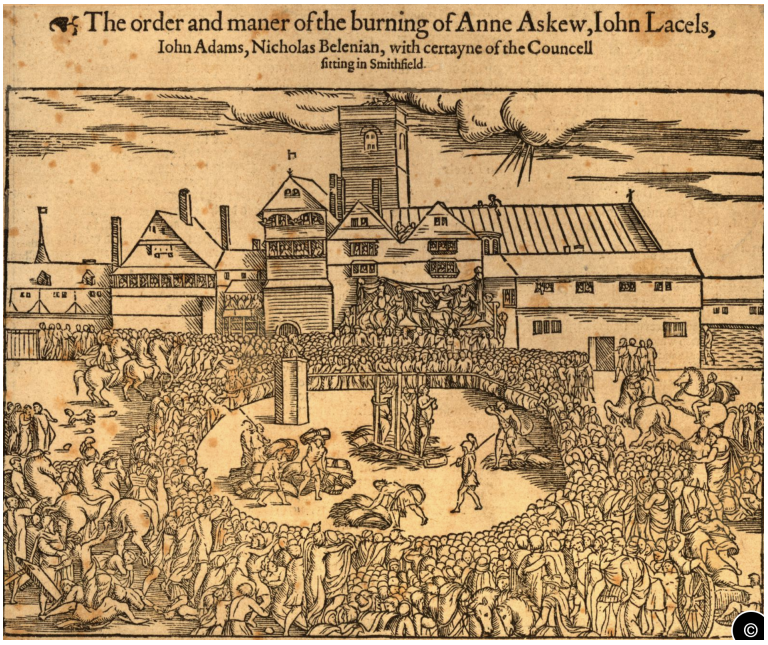
Our scoring of real and nominal religiosity from wills allows us to assess these forces directly, and quantitatively. And allows us to advance the historical debate beyond the sincerity, or not, of the preamble. As Duffy states in his influential *The Stripping of the Altars* "...shifts in the preambles of these wills reflect not a deep-seated change of heart by the testators, but rather shifts in the limits of the possible and the approved" (2005, p.523).

Within economic history, there has been a recent surge of interest in religion. Becker et al. (2021) provide a summary of that literature, broken into two distinct pillars. The first examines the role of economic forces in determining the adoption, intensity and turnover of religion. The other examines the role of religion itself in shaping economic outcomes. We are interested in both these forces; religion as both causal force and outcome.[2]

Not everyone made wills. Wealth, education, culture, gender and personal disposition, as well as belief itself, can all be reasonably assumed to play a role in producing an unrepresentative sub-sample. Inferring wealth, culture and behavior from the raw data of will-makers will be misleading. But does that mean we should throw out all of the information that will makers provide? We argue No. Wills are the most democratically distributed pre-modern source on many of the individual level characteristics we care about. Wealth, behavior and culture can be directly deduced using modern text analysis. No other source comes remotely close to what is possible with Wills. And we can map the observed will patterns onto the general population by examining the poorest will-makers.

To do this we directly assess and account for the representativeness of our will sample and it's economic selectivity. We produce new estimates of the population will making rate, from 1300 to 1850. Our will making rate calculations combine all extant, digitized will indices, ~ 3 million individual records, with new estimates of the English population, by sex and age. Using multiple regression methods we

[2]Using Google Ngrams, based upon published (and digitized) books from 1500 to 2024, Cabello (2024) shows a rise in the proportion of words that are either "God" or "Jesus", 1520-1720, before a decline after 1720 (see his figure 1).



(a) Protestants burnt at the stake, Smithfield, London



(b) Catholics Hung Drawn and Quatered, Tyburn, London

Figure 1: The Cost of Non-Conformity in 16th Century England

Source: Panel A: *The Protestant martyrs Anne Askew, John Lascelles and others about to be burnt at the stake at Smithfield, with a large crowd surrounding them; illustration to John Foxe's, 'Acts and Monuments' ('Book of Martyrs'). Woodcut with letterpress* Source: https://www.britishmuseum.org/collection/object/P_1880-1113-4117. Panel B: *The execution of Edmund Campion, Alexander Briant and Ralph Sherwin*. Source: https://digitalcollections.nypl.org/items/ad163970-c606-012f-2455-58d385a7bc34?canvasIndex=0.

generate a best-guess will-making rate and calibrate it with known data.[3] To examine the selectivity of will makers, we have collected a large sample of ~5 million parish baptism, marriage and burial records. Using these with the ~1 million index records of the Prerogative Court of Canterbury Will Index, we generate time varying economic status measures for ~ 200,000 surnames economic status. We can therefore directly calculate the surname status of will makers by period.

Historical Accounts of the Reformation

This paper focuses on the long run trajectory of real and nominal religiosity. However this needs to be understood through the historian's lens, and the focus upon the form of religious belief, as evident in the historiography surrounding the Reformation.

In "The Stripping of the Altars", Duffy (1992) challenged historians' dominant interpretation of the English Reformation.[4] The influential work of A.G. Dickens (1964) argued that Thomas Cromwell and Henry VIII had simply pushed over a traditional Church that was already dying. By the late medieval period, ritual and the intensity of devotion were already fading amongst the people. But Duffy (1992), followed by MacCulloch (2003) and Marshall (2018), has shown that traditional religion was very much alive, and vibrant, in the decades before the break with Rome.

The debate is reminiscent of that of the role of institutions in economic history. Do economies grow because they have the right package of laws incentivizing productive economic activity? Or are economics and law, and religious affiliation, downstream of underlying culture? To put it another way, is cultural change a top down or bottom up process? Figure 2 visualizes the issue. Can popular culture change because of changes in laws; as rational adaptations to behavior, or in response to elite cultural changes, such as mimetic patterns such as fashion, and taste? Did Cromwell and Henry, and the British Elite, force through a cultural change. Or was the popular culture primed for the Reformation by the early 16th century?

We contribute to the debate on the origin and dynamics of the Reformation by quantifying religiosity, and examining its evolution, by social class, over the going run. We show here that whilst religiosity was high on the eve of the English Reformation, it had been declining for over a century. Thus we can reconcile the historical debate. The revisionist scholars such as Duffy (1992, 2005); MacCulloch (2003); Marshall (2018) are all correct; religiosity was alive and historically vibrant. But it was in decline; the dynamic covered by Dickens (1964) is clear from our data too.

Thus we see the English Reformation as occurring in a climate primed for religious revolution. Tradition, whilst vibrant, was trending down. Henry VIII had good timing.

[3] This is detailed in a note, Cummins (n.d.).
[4] A revised edition is Duffy (2005).

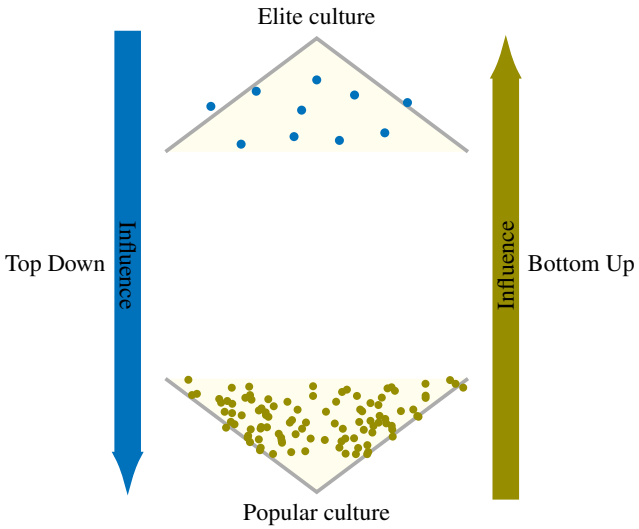


Figure 2: Simple Schema of Cultural Change

II Let the Dead Speak

For over 1,000 years, the mechanism of the "last Will and Testament" has guided the transmission of wealth at death in England. Typically these documents list descriptively, in about 1,000 of the deceased's *own words* an their assets, inheritors, gifts, and often unique aspects of their psychology. These wills represent our best record of individual lives and the economic, family, social and religious influences which mattered most to them as they contemplated their death.

From a variety of sources, we have collected a large sample of the full text of wills from 1258 to 1858. We have also complemented this will sample with a large number of will abstracts (summaries) which are more common for the early period. The sources for these wills are listed in appendix table 6, and include those posted online at *Surrey Plus Wills Index*, *Transcribed Wills*, *Oxfordshire Family History Society*, *the Calendar of Wills Proved and Enrolled in the Court of Husting* (summaries), with books entitled *Early Lincoln Wills: an Abstract of all the Wills & Administration's recorded in the Episcopal Registers of the Old Diocese of Lincoln*, *Somerset Medieval Wills*, and *Notes or Abstracts of the Wills Contained in the Volume Entitled the Great Orphan Book and Book of Wills in the Council House at Bristol.*

Table 1 reports the numbers of full-text observations we have collected by half-century from 1300 to 1900, together with average word count, and proportion female[5]. As mentioned, in addition to the wills, we have collected a complementary sample of will abstracts. These lack the first person expressive quality of the wills but do contain valuable information on religious bequests, and instructions regarding burial (often specifying a church graveyard, and so on).

[5]Observations before 1300 are too few to say anything meaningful statistically.

Table 1: Transcribed Wills, Number of Observations, Average Word Count and prop. Female, by Half-Century, 1300-1900

	Wills				*Abstracts*	
Half		Word Count		Prop.		Prop.
Century	N	Mean	Median	Female	N	Female
1300	24	187	132	0.06	1,529	0.07
1350	279	187	157	0.13	789	0.03
1400	436	223	153	0.14	406	0.06
1450	422	238	178	0.16	150	0.07
1500	650	514	385	0.09	121	0.14
1550	1,460	547	437	0.13	242	0.19
1600	2,523	634	540	0.17	1,547	0.22
1650	2,901	662	565	0.19	621	0.22
1700	3,948	636	533	0.22	543	0.25
1750	4,670	633	501	0.27	553	0.21
1800	7,412	604	456	0.33	859	0.24
1850	1,620	614	481	0.27	928	0.36

Source: Will Text Sample.

The Chosen Few? Selection into Will Making

Not every person who lived left a will. In particular, the young, the illiterate, married women, and the poor are likely to be severely under-represented in the wills. Thus the collected wills only represent a selection of the English. But what is the extent of this selection?

In a companion paper (Cummins (n.d.)), we estimate the rate of will making in England from 1400 to 1858. There we triangulate, by county and sex, estimates of the numbers dying, with a large collection of ˜3 million surviving will indices. We use a set of regression models to predict a best guess estimate of the will making rate. This is facilitated by a fortunate (for us) historical event. During the interregnum, 1649-60, all wills in England were proved at Canterbury, and these records fully survive (unlike the county records). Thus we model the full population will rate based on those observed at the county level, outside the interregnum years.

Figure 3 reports these estimates. The national will-making rate rises from less than one percent 1400-1480, thereafter rising consistently from one to fifteen percent by about 1620. The 1540 statute of wills marks an acceleration in the rise of the national will-making rate, as illustrated in figure 3. From 1620 to about 1760 the will rate is constant at .15-.17. Beginning in about 1760, the will-making rate declines from .15-.17, to .07, by 1850. The proportion probated, from Cummins (2021, 2022b,a), is plotted also in figure 3. It is striking that the predicted will-making rate and probate rate are so close around the mid 19th century. The inequality implications of the falling probate rate from 1700 to 1858 are more fully explored elsewhere (Cummins and Noble (2026)). There is reason to believe that this is capturing a genuine immiseration of the bottom 90% of English during the period of the Industrial

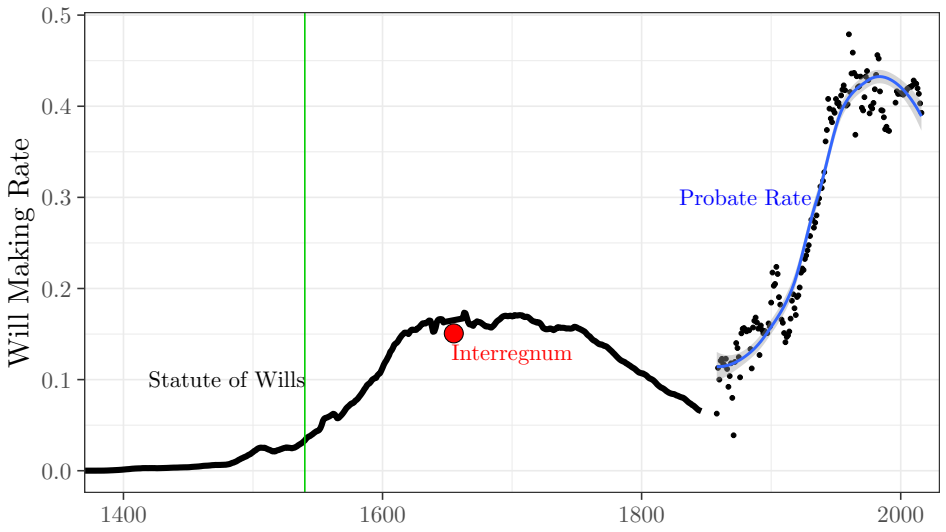


Figure 3: Predicted Will Making Rates, National

Notes: Predicted the regression reported in a related paper. Probate Rate, 1858-1992, from Cummins (2021).

Revolution.[6]

To further examine selectivity we look at the average status of our will makers, as indicated by their surnames. In England, outside of the 10 most common surnames (which account for less than 10% of thee population), surnames have strong status information (see Clark and Cummins (2015a, 2014); Cummins (2022b)). We score status using the frequency of a surnames appearance in the Prerogative Court of Canterbury (PCC) will index 1500-1800. A will was proved at Canterbury where the deceased had held property in more than two parishes. It was thus more elite than the wills proved locally, and typically represented the top one to five percent of the adult population (our own calculations). We combine the PCC index with a sample of ~1m parish records, 1538-1812, collected by Neil Cummins. The Parish records give us the denominator for the status score, S^i as

$$S^i = \frac{N^i_{PCC}}{N^i_{par}} \tag{1}$$

where N is the number of those with surname i in the PCC or the Parish records (par). We normalize that rate to have mean zero and standard deviation one in the parish population, by half-century. Figure 4 reports this.

Avarice: Estimating the Wealth of Will Makers

We estimate the wealth of individual testators using information from the wills concerning the value of bequeathed items. This procedure has been conducted on a random sample of 23,910 wills. The aim is to produce a rough estimate of the wealth of the testator and to understand the distribution of their wealth.

[6] As probate was legally required for estates above a minimum valuation, this supports the idea that those who did not make wills had wealth comparable to those who did not merit probate.

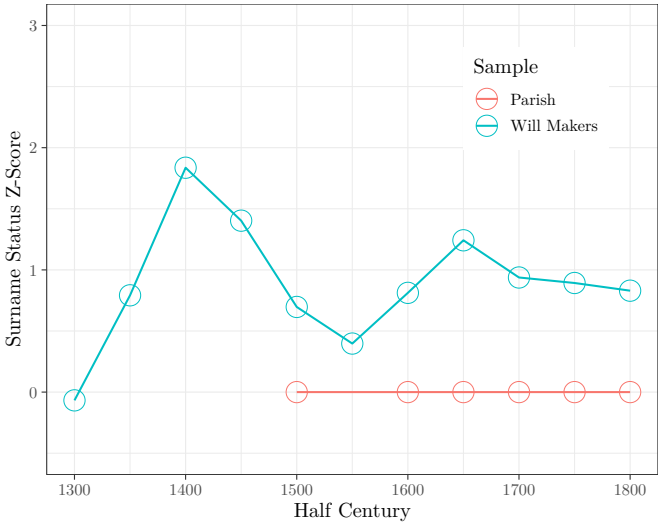


Figure 4: Surname Status in the Will Sample, compared with Parish Records
Note: Surname status is calculated as the rate of appearance in the PCC ($\frac{N_{pcc}}{N_{par}}$) normalized as a Z-score to have mean zero and standard deviation one. As parish records only begin (as part of the English Reformation) in 1538, for the will makers before 1500, we use the 1500-1600 PCC rate to score their surname status.

First, we extract structured fields from the full text, employing the Gemini Flash 2.0 Large Language Model. We extract individual-level biographical variables: name, titles, occupation, marital status, year of will, and location; as well as bequest-level variables: the original item description, a standardized item string, and an item category, an item super-category, the location of the item (if mentioned separately), the name of the recipient, the relation of the recipient to the testator, the quantity of items, the unit the quantity is given in, the monetary value of each item, whether the bequest is for a recurring provision, and whether the bequest represents a summary of items detailed elsewhere in the will. The information is extracted and parsed into JSON using Gemini's structured data extraction tools.

The accuracy of this procedure is evaluated using a manually created dataset of 100 randomly sampled wills. We assess within-biography, within-bequest, and across-bequest accuracy using the standard metrics of F1, precision and recall. For the across-bequest measures, we use a similarity-based matching algorithm to classify whether a ground-truth and prediction set of bequest-level variables are similar enough to classify the overall bequest as "correct". Within-class metrics are calculated using strict matching criteria (i.e. the values predicted must be identical to those in the manually created data). At the across-bequest level, a bequest is considered correct if 70% of fields match exactly between ground-truth and prediction. For biographical-level variables, the pipeline achieves a perfect F1-score of 1.00. The bequest-level variables are also recorded accurately, with the lowest F1-score of any variable at 0.87 (for the name of the recipient). The F1-score for across-bequests is 0.88, which can be loosely thought of as 88% of an individual's bequests are categorized identically by humans and the LLM.

Most wills (98.8%) contain bequest information, averaging 13.3 bequests per will,

though only 11.7% specify monetary values. To address this sparse valuation problem, we develop an imputation model using XGBoost, a gradient-boosted decision tree algorithm. Our training data includes both observed bequest values and Gregory Clark's real estate valuations, which we incorporate as additional bequest observations. The XGBoost model sequentially builds decision trees, with each tree trained on residuals from the ensemble's current predictions, progressively improving predictions for poorly-fitted observations. We employ target encoding for high-cardinality categorical variables (items and counties) and one-hot encoding for super-categories, with predictions made on log-transformed values to handle the skewed distribution of bequest values. This tree-based approach is particularly suited to our context as it captures non-linear relationships between item times and geographic locations, allowing the model to learn, for instance, that silverware in London commands different values than in rural counties. Compared to linear models, gradient-boosted trees better accommodate our sparse, high dimensional feature space.

The model predicts the expected value of a bequest as a function of its characteristics. Input features encompass categorical and continuous attributes, namely: standardised item string (e.g. silver spoon)., item category (e.g. silverware), item super-category (e.g. kitchenware), quantity, county, urban (dummy), decade, polynomial time features, interaction terms (urban:land, urban:super-category, and urban:real-estate).

We employ target encoding with empirical Bayes shrinkage for item and county categories, as these can contain few observations. This hierarchical smoothing operates across a three-level taxonomy: super-category–> category–> item. Items with few observations are smoothed toward their category mean, which in turn is smoothed toward the super-category mean. For instance, if 'silver spoons' appears only three times in our valued bequests, its encoded value combines: (1) the mean of those three observations, (2) the mean for all silverware items, (3) the mean for all kitchenware, and (4) the global mean, with weights inversely proportional to sample sizes at each level. The smoothing parameter controlling shrinkage strength is selected through cross-validation to optimise out-of-sample prediction accuracy. This improves prediction stability for rare items while preserving signal for common ones.

We estimate:

$$\hat{v}_i = f(x_i) \tag{2}$$

where $\hat{v}_i$ is the predicted log value for bequest i, x_i is the observed feature vector, and f is the fitted ensemble of regression trees.

The model is reasonably predictive of bequest values, achieving an R-squared of 0.83 and RMSE of 0.65. The model explains approximately 83% of variance in bequest values once controlling for item category, quantity, trends over time, and geographic factors. There is significant variation in predictive power across super-categories, with the RMSE ranging from 0.41 for jewelry (1.3% of observations), to 1.32 for vehicles (0.7% of observations).

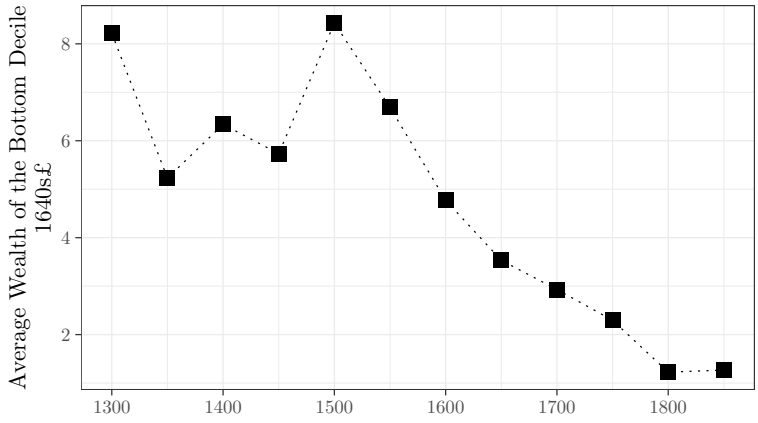


Figure 5: The Average Wealth of the Bottom Decile of Will Makers, 1300–1850
Note: The decline in wealth 1600-1850 is simultaneous with decline in the will making rate, suggesting declining wealth for the average English.

What the Will Making Rate and the Wealth of a Will tell us about Selection

The will making rate and the status score confirm that the local wills are a selected sample, a small minority of all deaths, and over representing the rich. We interpret the will making rate WR as meaning that will makers represent the top $1 - WR$ of the wealth distribution and this is supported by the surname status measure. Thus we are cautious about generalizing the evidence from the observed will makers to the non-observed majority of the population. However, the collected wills display great variance in the estimated wealth of their bequests. There are many very poor will makers, who make wills to ensure what little they owned was handled the way they wished. There are many will makers who have nothing, and there are many with next to nothing. The average wealth of the bottom 10% of the will makers is plotted in figure 5. Wealth is expressed as real 1640's pounds. The wealth of this group declines over time, from a peak of £8 to less than £2.

As selection here is based upon wealth, and the fact that there are also many poor wills, we can stratify the sample into wealth percentiles to control for the bias of the selection. We employ terciles, even cuts of the wealth distribution into thirds. We interpret the bottom tercile as more representative of the population the the top third.

The Information Content of Wills

Today, one, or one's lawyer, typically finds a template when writing a will. Early wills, pre 1500, are notable for their individuality. Rarely do you see stock phrases. They are deeply personal, and evidently sincere. Sometime between the 15th century and today, will making became formalized and structured according to templates, with stock phrases and pro-forma declarations. But when did this happen? At the end of the 16th century, we see the appearance of the first will templates, published

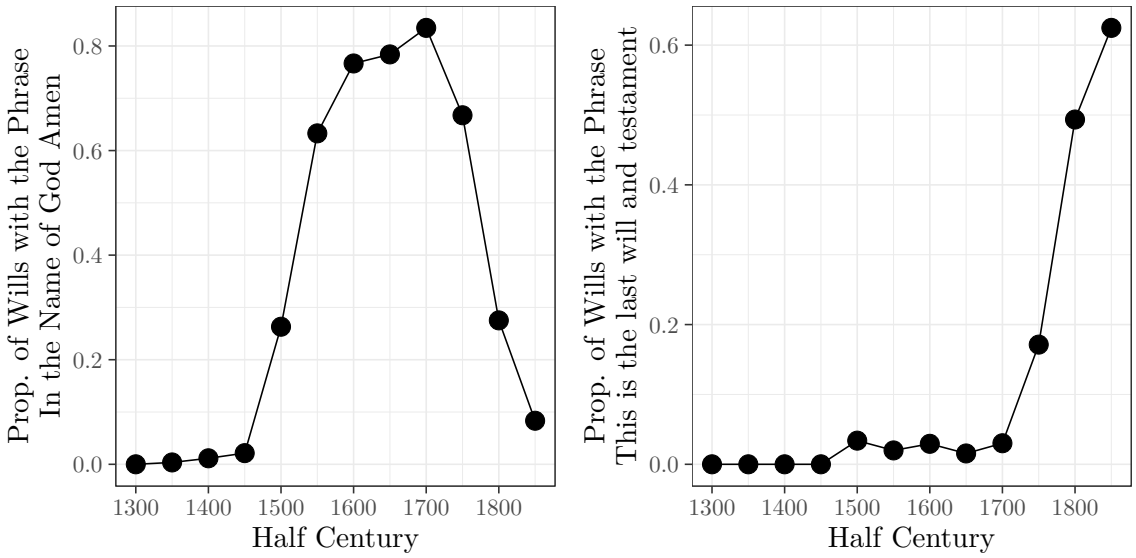


Figure 6: The Emergence of Stock Phrases

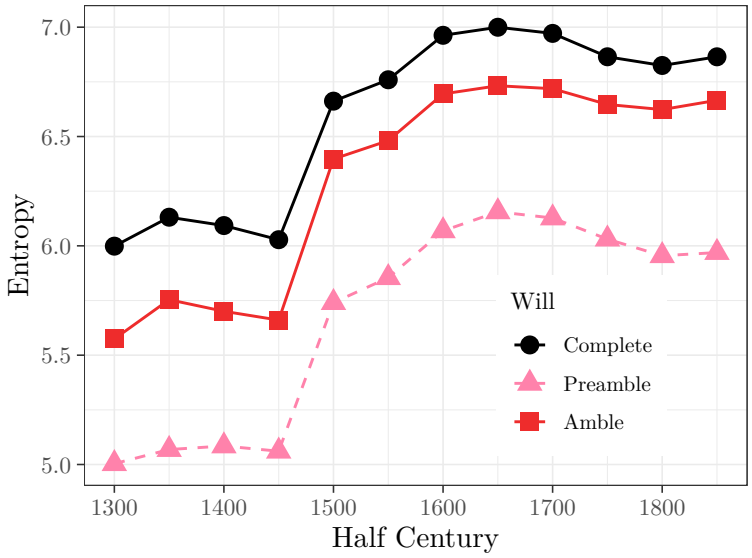
in works such as Phayer (1586); Swinburne (1590) and West (1592).[7]

For our will text collection, appendix figure 23 visualizes the words, and word types, over time. Figure 6 reveals how the stock phrases "In the Name of God Amen", and "This is the last will and testament" come to dominate the vast majority of all wills. This is why many historians, as discussed earlier, consider the preambles of wills as meaningless legalize, pro-forma declarations, with template phrases employed that do not contain sincere sentiment.

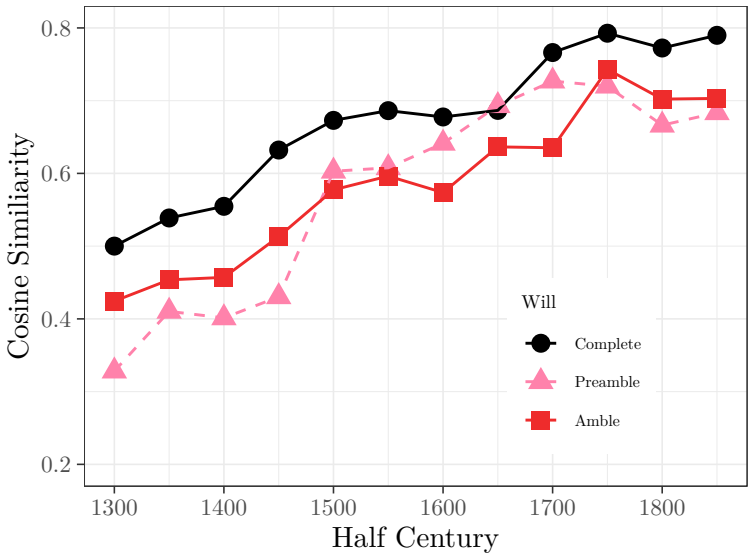
We can more formally analyze both the information content of our will texts, and the across-will similarity. Figure 7 reports Shannon entropy scores, a type of entropy for variables with discrete values, and also simple cosine similarity scores for the Will texts, grouped by half century period, for different elements of each will, from 1300-1850. We first note that the body always has more information than the Preamble. But this is inevitable as by construction the preamble is half the length of the body. Panel b reveals that the wording of wills becomes more similar to each other, over time. Yet their information content also rises (panel a). At first glance, these two findings might appear contradictory. But they are not. Wills became *individually* more diverse in their expression, over time, but this was also accompanied by more shared phrasing *between* wills. An economist might think of this as the difference between *within* and *between* variation in a panel data context.

We extend this idea with the application of a Theil Index inspired entropy decomposition. Theil indices are typically applied to inequality studies. But here we apply it to linguistic entropy in the will texts. We pool all words from all wills, by half century period, and calculate total entropy H^T, as was done for individual wills in figure 7, the average of which we call H^W . We can then derive the between entropy, H^B, of our wills via $H^T = H^B + H^W$.

[7]See Clark (2015) p.196-8 for a discussion of this.



(a) Entropy



(b) Cosine Similarity

Figure 7: Entropy and Cosine Similarity of Wills and their Elements, 1300-1850

Notes: Shannon entropy, H, is calculated as $H = -\sum_{i=1}^{V} p_i log_2(p_i)$, where V is the number of unique words (or n-grams) in the will texts, and p is the probability of the i^{th} word (n-gram). The more low probability words in a will, or in other words, the more surprising the set of words, indicates a larger linguistic diversity, and a higher entropy, H. In panel b, simple cosine similarity is calculated for vectors A and B (representing different wills) as $\frac{A \cdot B}{\| A \| \cdot \| B \|}$, and is bounded $\{0, 1\}$.

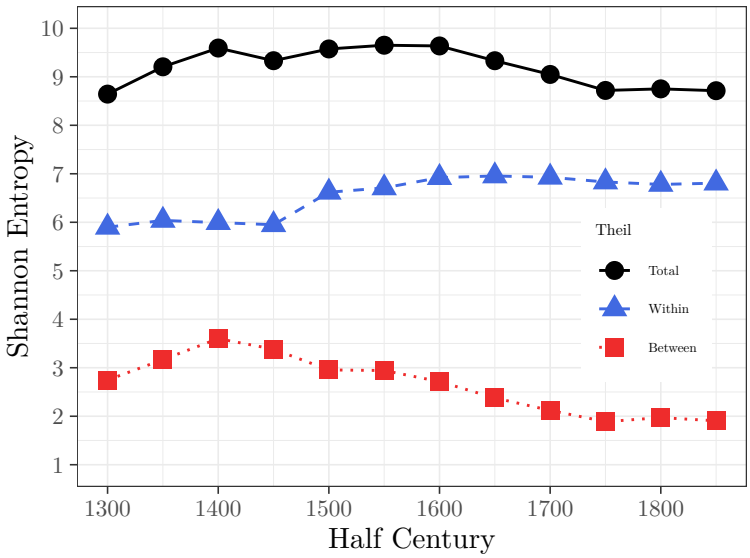


Figure 8: Entropy Decompositions, by Half Century, for the Words of Wills, 1300-1850

Figure 8 reports this decomposition, for the words of wills.[8] In our application, the *between* group inequality component corresponds to how distinct each will is from the average. Whilst *within* measures how linguistically complex an individual will is. Whilst lower entropy wills could be indicative of highly formulaic phrasing, those low values could also simply indicate a smaller voculabary. The rise of entropy over the sample period, 1300-1800, from 6 to 7 Bits per word, could also reflect rising literacy and human capital, as well as a rising complexity of bequests. For comparison, Shakespeare's 35 plays have entropy in the range 6.0-6.5, with *The Comedy of Errors* the lowest, and *Henry V* the highest. His comedies consistently have less entropy than his other genres (Chang et al. (2017)). Pilgrim et al. (2024) report a rising trend in the word entropy of the *Corpus of Historical American English*, from 1900-2022. This upward trend is driven by magazines and news papers (see their figure 2). Twitter, in 2020, has word entropy of about 8.75 bits (also Pilgrim et al. (2024)).

Figure 8 also reports the total entropy of all the words of all of our wills sample, pooled. This varies from 8.5 to 9.5 and displays no trend over time. This is interesting as it suggest a constant common pool of information, language, that will makers draw from in making their wills. It is perhaps surprising that the English lexicon, within wills, is so stable over the six centuries of our sample period. This also means our entropy results are robust to normalization by vocabulary size. Rising entropy per will, combined with a constant total pool of entropy implies a diffusion of will making expression. Words are not zero sum, and there appears to be a rise in their use, as measured by information content, at the individual will level. But not at the pooled will level.

[8] Appendix figure 8 reports this decomposition, for the one-word case, and also phrases, n-grams, of words of length 3, 7, and 12.

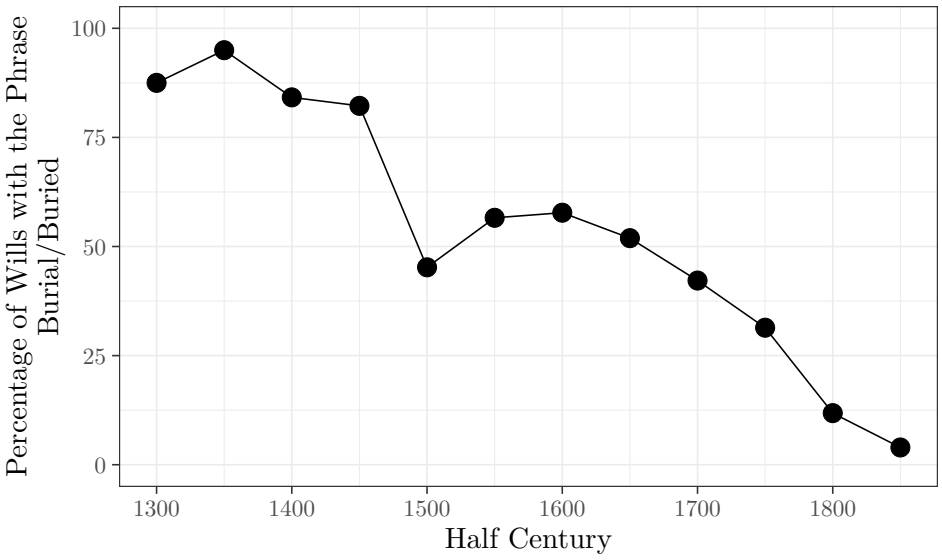


Figure 9: The Early Primacy, then Long Run Decline of Burial Instructions, in Wills, England 1300-1850
Source: Full Text from Wills Sample.

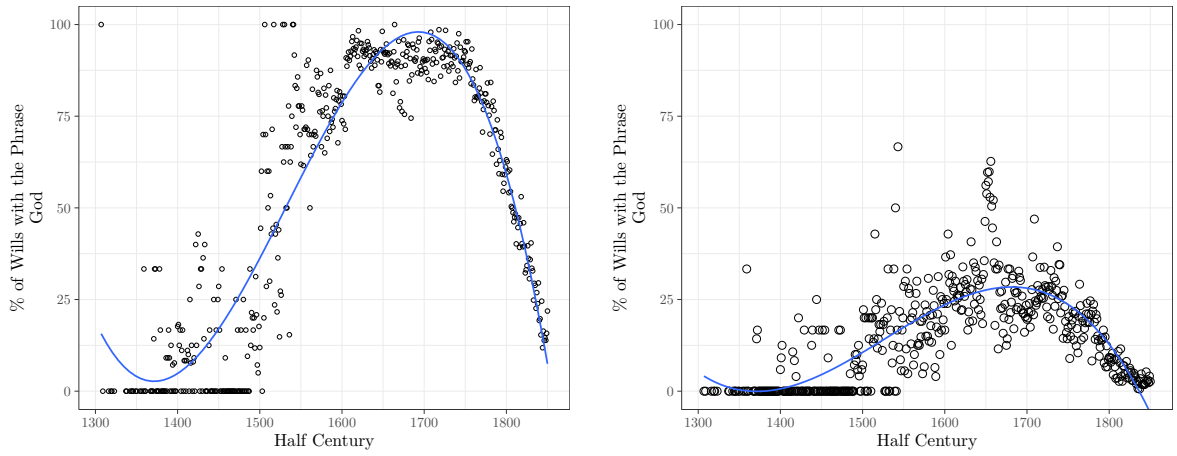
Religious Information in Wills

What religious information do wills reveal?

Firstly, we noticed that many of the early wills contain specific burial instructions. This is unusual in modern wills. By coding each will as either "1"; contains burial details, or "0"; does not, we can inspect this prevalence over time. Figure 9 reports the early primacy, then long run decline of such burial instructions in English wills, 1300-1850. The historical literature notes that early burial rites were a crucial spiritual technology (Duffy (1992); Houlbrooke (1998); Marshall (2018)), and the near universality of burial instructions that we find, before 1500, is striking. The Reformation and the theological changes of the era are coincident with a decline in this. But perhaps this was merely liturgical? Did will-makers find other ways to express concern for their spiritual health?

Next we code a simply dummy for each will for the mention of "God". Figure 10 reports the average of this dummy both for the preamble (panel a) and for the rest of the will (b). Calls to God rise from 1400 about 5% of all will preambles, to over 90% by 1600. Intriguingly, this simple measure suggests a decline of religiosity coincident with the classical Industrial Revolution period, at 1750, with 95% of will preambles mentioning God in the 1600-1750 interval, before declining steadily to about 15% by 1850. Will texts, outside the preamble, are less likely to mention God, but the time-series trajectory amtches that of the preamble. Given the overlap with the period of the scientific revolution, perhaps this is direct evidence for Adam Smith's proposition that "Science is the great antidote to the poison of enthusiasm and superstition" (Smith (1776, Book V, Ch. 1))?

Note that burial instructions appear to follow the opposite trajectory as mentions of God. Perhaps they were spiritual substitutes? To get at overall religiosity we need to expand the analysis. With the full will text, we are able to do so.



(a) with Preamble

(b) without Preamble

Figure 10: The Decline of God in Wills, England 1600-1850

Source: Full Text from Wills Sample.

III Incantation

In this section, we describe our methodology to extract the structure of religious belief from wills. We first examine our method for religious form, then we describe our simple indices of nominal and real expression of religiosity expression. We then describe the structure of this expression using Principal Components Analysis. We then describe our method to construct a continuous measure of underlying, or latent religiosity from a set of religious expression, bequests and actions in the will. Finally, we describe our method to validate our religiosity measures using child names.

Form

One challenge to the interpretation of trends in religious expression over time is the potential chance that it was not sincere, personal faith that changed but rather the *form* it manifested. Traditional belief in burial, the Saints and Mary were replaced by a more direct personal connection with Jesus, as emphasized by the new Protestant flavors of Christianity. As Dicken's states:

> The traditional Catholic form involved bequeathing one's soul not only to Christ, or to Almighty God, but also to the Blessed Virgin and the Glorious company of the saints
>
> (1964, p.192)

To analyze the change in such form over time we generalizes Dicken's schema as a simple checklist, adding a Godless category, and also adding some extra markers of traditional religious belief, such as indications for the mentioning of burial, the Virgin Mary, and the physical church. Table 2 reports these criteria. Religious taste, like all taste, is primarily defined in the negative.[9] Reformist wills are notable by

[9]"Taste...when they have to be justified, they are asserted purely negatively, by the refusal of other tastes" Bourdieu (1984).

Mention	Religiosity: Traditional	Reformist	Godless
Of the Below →	*Any*	*All of the Below*	*All*
God and/or Jesus	✓	✓	×
Saint(s) (as entity)	✓	×	×
Virgin	✓	×	×
Burial	✓	×	×
Church	✓	×	×

Table 2: Religious Form of Wills

Notes: "Virgin" refers to the Virgin Mary, and also includes "Blessed Mary". Derived from Dickens (1964, p.192): "The traditional Catholic form involved bequeathing one's soul not only to Christ, or to Almighty God, but also to the Blessed Virgin and the Glorious company of the saints".

their negation of the traditional reverence for Saints, the Virgin Mary, burial and the physical church. Godless wills mention nothing spiritual.[10]

Nominal and Real Expressions of Religiosity

We code a set of categorical variables (0/1), via regular expressions in R, for the mention of religious entities in a will, such as God, Jesus, the Soul, a Saint, the Virgin Mary, and Angels.[11] We differentiate the mentions in the preamble, the first third of a will, and the body, the latter two-thirds. We code whether a will mentions the location of physical burial, and a church. We categorize bequests by the specified direction (e.g. to a relative or institution), and report the top 20 in appendix table 7. Because we estimate the wealth of each will, we are able to incorporate into our religious variables both the proportion of wealth going to the Church, and also to Charity.

[10]The will of Richard Arundel (1417) reported in section I is coded by the schema of table 2 as Traditional (with $r^{nom} = 1$, $r^{real} = 1$). The will of Thomas Erneley (1595) is coded as reformist ($r^{nom} = 0$, $r^{real} = 1$). The will of Henry VIII is coded as Traditional, ($r^{nom} = 1$, $r^{real} = 0$). For Henry VIII, see Rex for a fluid account of Henry's complex and evolving religiosity: "Henry was never a Protestant" (Rex, 2014, p.1)

[11]Using regular expressions to assign a categorical variable for whether a Saint is mentioned in a will is a risky endeavor, as many locations are named after Saints. After discarding the initial idea of using the presence of a terminal letter 's' to differentiate places from the Saints themselves, we decide upon marking those patterns where the word Saint is preceded by "of", "in" or "at" as locations, and all other mentions as true mentions of a Saint as a spiritual entity. Of the 3,472 mentions of Saint/Sainte/Saynt/Saynte (etc.) we find that 406 refer to the entity, and not a place. For example, see the will below, from 1489.

> Richard Edgcoumbe, Knight ', at Penryn, on the Friday before the Feast of St. John the Baptist', 4 Henry VII. 1489. I bequeath my soul to Almighty God, beseeching the blessedful Virgin Mary, his mother, to be a mean unto his most benign grace to shew his most pitiful grace and mercy to my soul; and mine in especial good master, Saint Thomas of Canterbury, to be a renemberer unto her for the saine; to my cousin Bowley's daughter and heir, in my keeping, c marks to her marriage, in recompence of what I had of her father; to my sister Elizabeth Tremayne xL marks; to every of my household servants xL s.; I will that a priest be found to pray for ne for the space of five years in the Church of Calstock : the residue of my goods and chattels I bequeath to Joan my wife, Sir Reynold Bray

We organize these variables into two groups. One we call *nominal* religious expression, denoted r^{nom}, and the other *real* religious expression, r^{real}. Our *nominal* variables are declarative mentions that occur early in the will, in the preamble, and refer to either God, Jesus, or both. Of course, these are not necessarily insincere signals. But as pro-forma will templates are structured with strong guidance as to the introduction of the will, we suspect that many will-makers use template phrases that refer to God, regardless of their underlying personal belief. Further, as mentioned earlier, we also anticipate that many will adopt the prevailing belief of their culture and era, the *mileu*. Where there is a cost to religious deviation, as there was at many moments in English history (witness figure 1), there is a strong incentive to performatively declare a certain form of belief.

As informed by the historical literature, briefly surveyed in section 1, we consider the latter part of the will to be more informative of underlying belief. Thus we refer to this set of measures as *real*. Again, we Here pro-forma is less used and the verbatim voice of the will-maker rises to the surface.

To abstract these measures from the religious form of a will, we code this variable as binary; whether any spiritual entity is measure in the body of a will i:

$$r_i = \begin{cases} 1 & \textbf{if any } \mathcal{S} \textbf{ equals } 1, \\ 0 & \textbf{if no } \mathcal{S} \textbf{ equals } 1. \end{cases}$$

where $\mathcal{S}$ is the set of spiritual indicators; God, Jesus, a Soul, the Virgin or Blessed Mary, Angels, or a specific Saint (as entity, not as place). This score is calculated separately for the preamble, which we define for simplicity as the first one third by word length of the will text, and the body, which is the remaining two-thirds of the will-text.

The resulting scores for religious expression have the advantage of being readily interpretable, where 0 means no spiritual entity is invoked, and 1 means some spiritual entity is. It is form invariant, and it's average also easily interpreted.

We validate our expression measures against monetary variables, the proportion of the bequest directed to the church, and to charity, and to the religious character of chosen child names.

Principal Components Description of *real* and *nominal* Religious Expression

Here we explore how the religious variables co-move in a Principal Components Analysis (PCA). PCA is a widely used technique to simplify multidimensional data, originally developed by Pearson (1901), and Hotelling (1933). We employ PCA to generate linear transformations of the religious variables into a set of new variables; uncorrelated principal components.

Figure 12 is a heat map illustrating how the coded religious expression elements correlate. Each element is coded separately for the preamble, and the body of the will. Positive correlations could be thought of as complements, negative as substitutes. For example, mentioning God in the preamble may negate the need to mention God in the body. Zero correlations suggest one of the measures is insincere, or performative.

Figure 11 (a) visualizes the first and second principal component, as a simplified bi-plot. Panel (a) nicely captures the dichotomy between traditional belief (pointing downward in the graph) and reformist belief (pointing to the right). The reverence of Saints, the Virgin Mary and Angels all cluster together, whilst mentions of a Soul, God and Jesus form a separate directional cluster. This split in the form of religiosity emerges organically from the text data via the covariance structure of the simple dummies. For real religiosity, in panel (b), the elements of expression are also positively correlated. Despite being less polarized from each other than nominal religiosity, they still span too wide a directional space and lack a common latent signal. Thus from a technical perspective however, PCA is not an ideal method to construct a single cardinal index of either nominal or real religiosity.

Latent Religiosity

Finally we derive from the wills a more extensive measure of underlying religious intensity. We define a latent religiosity ☧ as determining with culture K all expressions of religious intensity, bequests to the church and to charity, and interacting with culture to produce form of religion. Thus

$$r_i = f(☧_i, K, ☧_i * K, \epsilon)$$

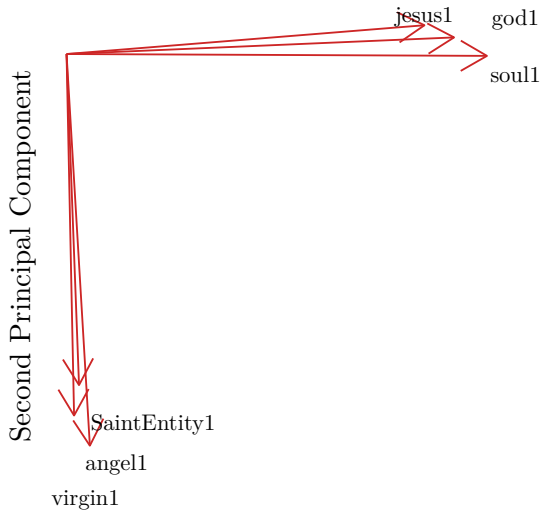
f is the function that maps K and ☧ to the observable religious expressions, behaviors, and forms, r. ϵ is idiosyncratic error.

Empirically, we estimate ☧ for each will from the religious information expressed in the text of the will. We use three components, that are free from form or religious expression. First is our real index of religious expression, r^{real}. Second is the sum of the proportion of bequests to the church and charity. And thirdly, we incorporate any requests for religious action, at any location in the will, such as prayer, worship or penitence. We normalize each measure and combine for each will i as:

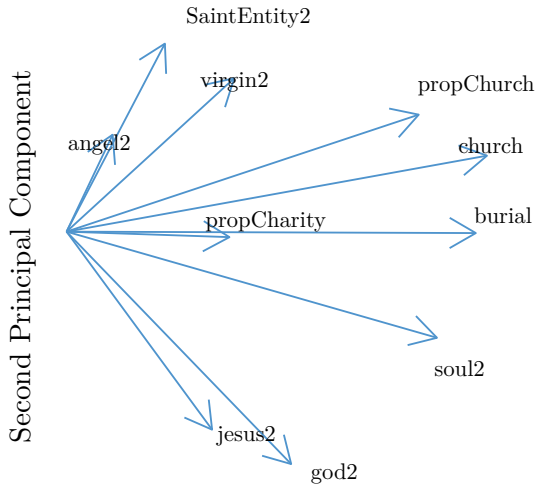
$$☧_i = \frac{Z(r_i^{real}) + Z(propChurch_i + propCharity_i) + Z(Prayer_i + Worship_i + Penitence_i)}{3}$$

We standardize ☧ to have mean zero and standard deviation one across the whole sample. validate this measure by examining the correlation with religious child naming.

The 1595 will of Thomas Erneley, whom we score as $r^{nom} = 0$, $r^{real} = 1$, illustrates someone who has low nominal religiosity but high real religiosity. Instead of a perfunctory introductory reference to God, he instead devoted the entirety of the post-introduction text to religious aims. He scores exceptionally high on the spiritual expression dimension. However, he leaves no specific *bequest* to the Church, nor directs a specific religious *action*. So his underlying latent religiosity is scored at .93, where the sample mean is 0, standard deviation 1.



(a) Nominal



(b) Real

Figure 11: Bi-Plots for the PCA Constructed Indices

Note: The number denotes the part of the will (1 is the preamble 2 is the latter two-thirds, the body), and the preceding word indicates the word mentioned, e.g. God1 = "God" is mentioned in the first third of the will (corresponding to the preamble). The axes are removed for clarity; the directions illustrate the components are positively correlated.

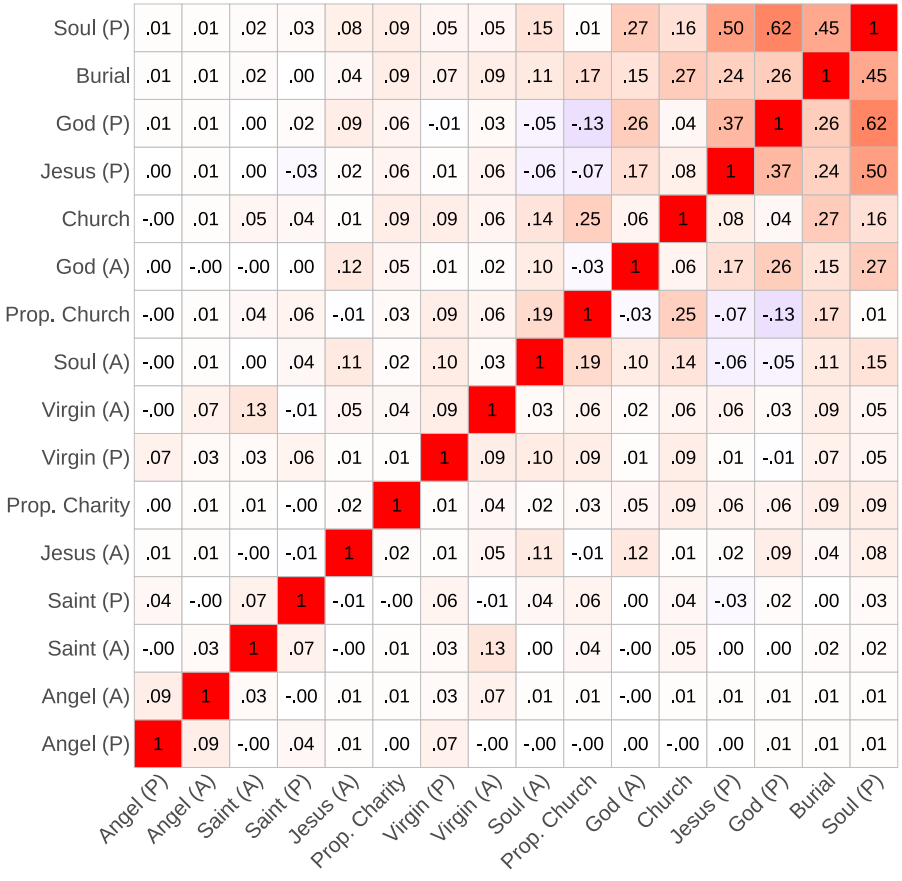


Figure 12: Correlation Matrix of Religious Elements in Wills

Notes: "P" is preamble, "A" is the rest of the will. Positive correlations can be thought of as complements, negative as substitutes. Zero correlations suggest one of the measures is insincere, or performative.

> The four and twentieth of August in the seven and thirtieth year of the reign of our Sovereign Lady Elizabeth of England I Thomas Erneley of Brembridge gent do make this my last will and testament following first I commit my soul to the Almighty God of heaven trusting he will forgive my sins and resurrect it for his son Jesus Christ sake by whose merits only I hope of resurrection and salvation and I will my body to be laid in the parish church where I shall happen to decease.

Note that Thomas has literally nothing of note to say other than his concern for his Soul and his belief in God. (Note also he mentions no assets.) He does not use any religious stock phrases, this is a unique set of terms, and clearly sincere.

In 1547, King Henry VIII, founder of the Church of England and the break of the Anglican Communion from Rome, is scored as as $r^{nom} = 1$, $r^{real} = 0$. He does not mention a spiritual entity outside of his preamble. However, he scores very high on religious action, meaning his ☧ is high, at 2.02. [12]

> In the name of God, and of the glorious and blessed Virgin our Lady Saint Mary, and all the Holy Company of Heaven. We Henry, by the grace of God, King of England, France, and Ireland, Defender of the Faith, and on earth, immediately under God, the supreme head of the Church of England and Ireland ...
>
> ...a sermon and mass on the morrow, devoutly to be done, and that all divine service accustomed for dead folks to be celebrated for us in the next proper place where it shall fortune us to depart this transitory life...
>
> ...Also yearly, for ever, to 13 poor men, which shall be called Poor Knights, to every of them 12d. by day, and once in the year, yearly for ever, a long gown of white cloth, with the garter upon the breast...
>
> ...embroidered with a shield and cross of Saint George within the garter...

Henry's will is consistent with that of a deeply religious man, as he is believed to be.

Figure 13 summarizes the mental maps underlying this analysis. Underlying ☧ produces observable expression and behavior. Underlying religiosity also interacts with culture to produce religious Form. A fundamental question to answer is; did latent religiosity change before, or after, the top down imposition of Henry VIII's Anglican Reformation of the 1530s.

Validation: Child Names as Indicator of Religiosity

A recent literature, by Hacker (1999); Connor (2021); Andersen and Bentzen (2022), proposes that forenames chosen by parents at their child's baptism can be used to measure parental religiosity. The idea is that more intensely religious Christian parents will choose biblical and saintly forenames. We empirically test this idea by assessing the relationship of religious names for children to our novel religiosity scores.

[12] King Henry VIII. died January 28, 1547, and within a month after the date of his will.

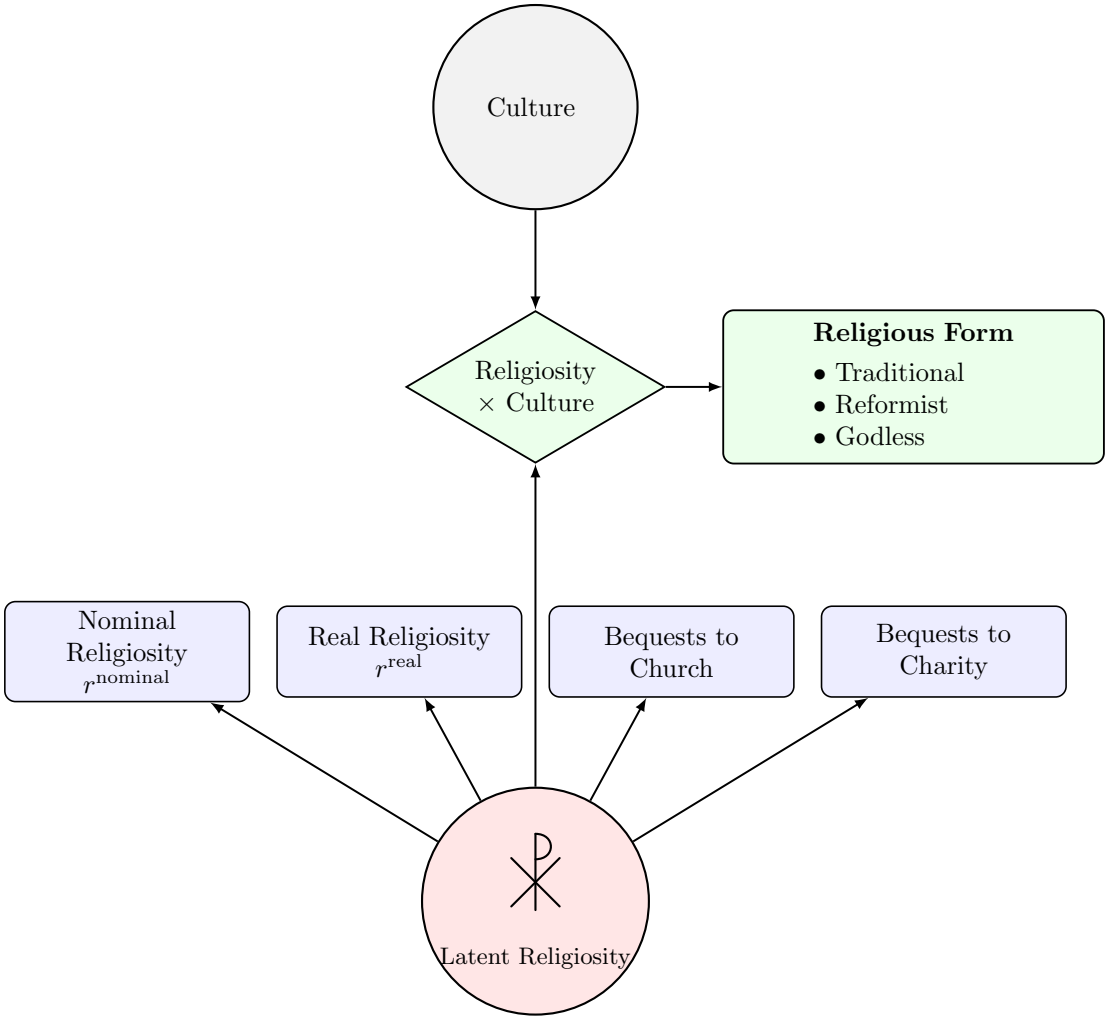


Figure 13: Schema of Underlying and Observed Religiosity

We form a master list of Christian religious forenames from the Bible (Wikidata contributors (2026)), and of Saints, (from Buringh et al. (2020)). Next, using a large cache of names from 7,789,201 parish records from London 1538-1812 (see Cummins et al. (2015)), we establish each forenames frequency. We do this as we consider that rarer religious child forenames contain a stronger signal of parental religiosity than more popular ones. We detail this logic and document the data building in appendix E.

IV Revelations

Form

We first examine the share of our sample for each of the three categories of will form; traditional, reformist and Godless, as detailed in table 2 . Figure 14 (a) reveals that after 1450, traditional wills decline and reformist wills rise, *long* before Henry VIII's Reformation of the English Church in the 1530s. Reformist wills dominate from 1550 to 1750. Throughout, Godless wills are always present. They are a small percentage of all wills, under 10%, from 1300 to 1700. But after 1700, Godless wills increase their share rapidly and come to dominate all wills, at over 75%, by 1800.

Nominal and Real Expression of Religiosity

Validation of Expression with Bequests

We next validate our measures of religious expression by running the following descriptive regression

$$B_i^r = \alpha + \beta_1 r_i^{real} + \beta_2 r^{nom} + \beta_t D_t$$

where B^r is a religious bequest, to the church , or to charity. r is the religiosity measure, $real$ and nominal, and $D_t$are a set of decadal time dummies. Table 3 reports the result of this validation regression. All measures of religiosity correlate positively with the proportion of a will-makers bequest going to the church, which is expressed here as a percentage for easier interpretation. However, this correlation is never statistically different from zero for nominal religiosity. For real religiosity it is always statistically significant. Pre the 1547 Chantries act which made bequest to the Church illegal, the association of real religiosity on the proportion of the bequest going to the church was an extra 3%. Relative to the mean of 21%, this represents a substantial increase. Even more powerful is the association post 1547. The average bequest to the church falls to 1.7% of the estate value. But a will make with real religiosity equal to one gives an extra 1.1%. Bequests to charity are less exclusive to the religious. But even here we see that religious doctrine does result ion those with greater religiosity always giving more. Again, this 'effect' is always statistically insignificant for nominal religiosity, and always statistically significant for real religiosity. The scale of the

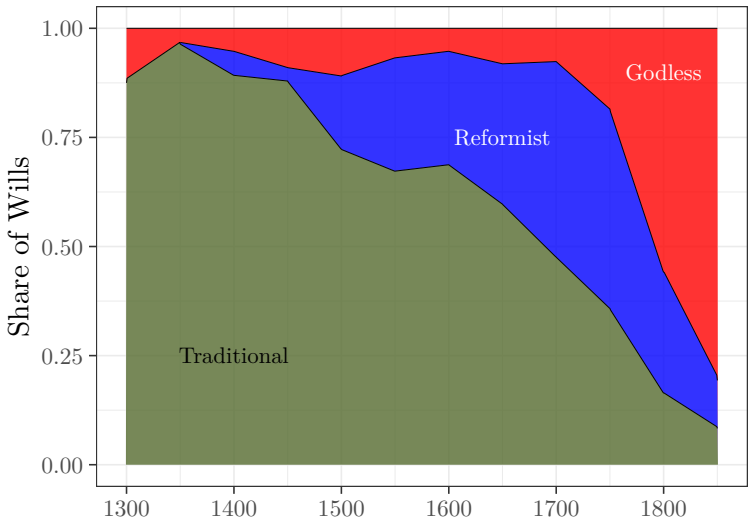


Figure 14: Form of Wills, Relative Shares, 1300-1850

Notes: A will is categorized as Traditional, Reformist of Godless based upon a simple checklist in table 2.

association here is large, with those will makers with real religiosity equal to one, leaving twice the sample average to charity before 1547, and three times after.

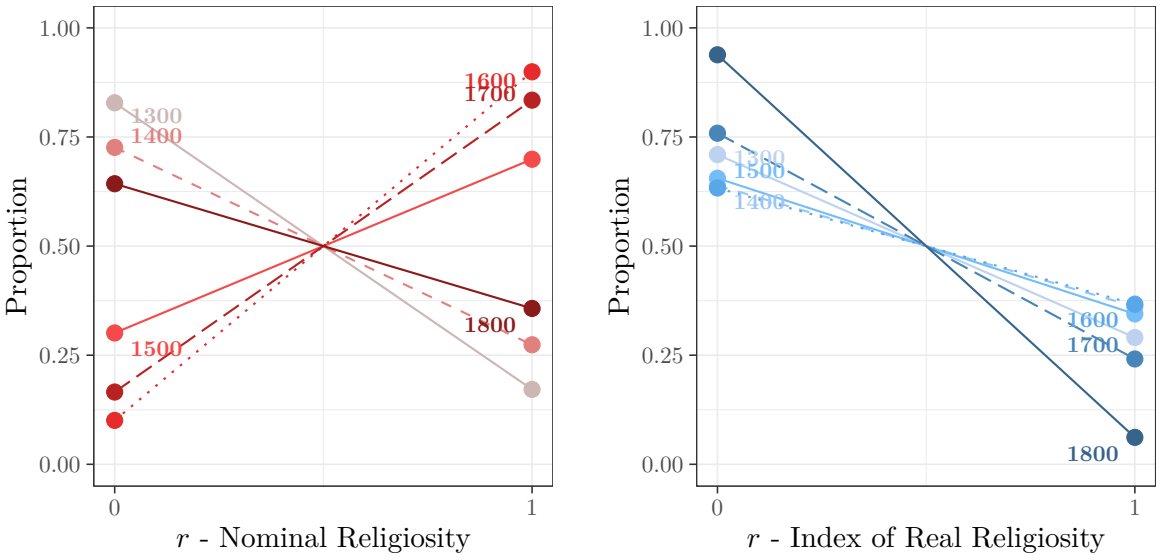
Table 3: The Association of Nominal and Real Religiosity with Bequests to the Church and to Charity, before and after 1547

	Percentage of Bequest			
	to Church		to Charity	
	(1)	(2)	(3)	(4)
r^{real}	3.185*	.207***	1.121**	.198*
	(1.569)	(.054)	(.404)	(.093)
$r^{nominal}$	1.026	.065	.728	.123
	(1.728)	(.054)	(.445)	(.093)
Mean dep. var.	21.32	0.32	1.68	0.96
Observations	1,757	24,668	1,757	24,668
R^2	.038	.038	.023	.033

Note: *p<0.05; **p<0.01; ***p<0.001

We split the regression at 1547 as after then bequests to the Church were illegal (The Chantries Acts).

Thus our real religiosity measure correlates with independently constructed bequest measures, supporting them as good proxies of religiosity.



(a) Nominal

(b) Real

Figure 15: Probability Mass Plots of Nominal and Real Religiosity, 1300-1850
Notes:

Trends over Time

The distributions for nominal and real religiosity, by century, are plotted in figure 15. As they are 0/1 variables, we illustrate the distributions as probability mass plots. For nominal religiosity, there is a dramatic shift during and after the 1500s. This shift towards higher nominal religiosity, peaking in the 1600s, is distinct from both earlier and later centuries. The 1800s distribution, where a majority of wills have no spiritual declarations in the preamble, is similar to that of that of the 1300s and 1400s. For real religiosity, there is more similarity in the underlying distributions by century. But here after 1700 we see a clear shift away from religion. By the 1800s wills rarely have any spiritual declarations in the non-pro-forma text.

Table 4 reports the mean and standard deviation of our religious indices, by half-century, for 1300 to 1857, and figure 16 visualizes annual measures of our indices for nominal (a) and real (b) religiosity. The year to year volatility is high and is a result of our small annual sample size. We can be more confident of trends over half-centuries.

There are 5 primary characteristics.

1. There is a striking sustained and substantial rise in nominal religiosity from 1400 to 1650.

2. There is a striking sustained and substantial decline in nominal religiosity from 1650 to 1800.

3. There is a rise in real religiosity from 1300 to 1500.

4. Real religiosity declines after 1450.

5. The decline in real religiosity accelerates after 1750.

The trends revealed by nominal religiosity, 1 and 2 above, fit the the historians broad picture of religious change well (Dickens (1964); Alsop (1989); Cressy (1997); Houlbrooke (1998); Duffy (2005)) This rise appears to track the cultural shift of the period well and quantitatively captures the social milieu that would result in the English Reformation. Even more dramatic than this long run rise is the relatively sudden decline in nominal religiosity after its 1650 peak. This decline is coincident with both scientific and Industrial Revolutions, and mirrors the trajectory of the simple God dummy reported in figure 10 (a).

Table 4: Mean and Standard Deviation of Religiosity Scores, 1300–1857

Half-Century	N	$\overline{r_{\text{nom}}}$	sd	$\overline{r_{\text{real}}}$	sd
1300	24	0.250	0.442	0.167	0.381
1350	279	0.165	0.372	0.301	0.460
1400	436	0.278	0.448	0.356	0.479
1450	422	0.270	0.445	0.367	0.483
1500	650	0.551	0.498	0.512	0.500
1550	1,460	0.765	0.424	0.270	0.444
1600	2,523	0.907	0.291	0.344	0.475
1650	2,901	0.893	0.309	0.387	0.487
1700	3,948	0.913	0.282	0.290	0.454
1750	4,670	0.768	0.422	0.200	0.400
1800	7,412	0.357	0.479	0.067	0.250
1850	1,620	0.125	0.331	0.038	0.190

Note: Both r_{nom} and r_{real} are standardized to have mean 100 and standard deviation 15 in the sample.

However, the trajectory of real religiosity, points 3, 4 and 5 above, are completely novel. Real religiosity appears to rise from 1300 to 1450. But we acknowledge here that the confidence interval is large. The Black Death of 1346 is at the right time to be considered a *potential* causal factor in this *potential* rise. After 1450, the decline in real religiosity of the English precedes the decline in nominal religiosity, after 1650, by about two centuries. Performative religious statements thus hid an early and previously hidden social evolution in the sincere religious belief of the English. Finally, we find that the decline in real religiosity accelerates after 1750, coincident with the sudden collapse of nominal religiosity.

The trend of real religiosity does not show any 1550s "rebound", as claimed by Duffy. The figure shows that "real" religiosity was trending down long before the period of the English Reformation. Note also that by 1547, they year of the Chantries act which made bequests to the Church illegal, real religiosity had been declining for one and a half centuries, and there is no structural break. This is in contrast to Duffy, who argues that the traditional, "cult of the Saints", style religious worship was alive and well in England, and its disappearance in the 16th century as a result of an enforced "top-down" cultural change.

We next divide our sample of will makers by wealth. As described in section III, we assign each will maker an estate valuation, and simply cut the resulting wealth

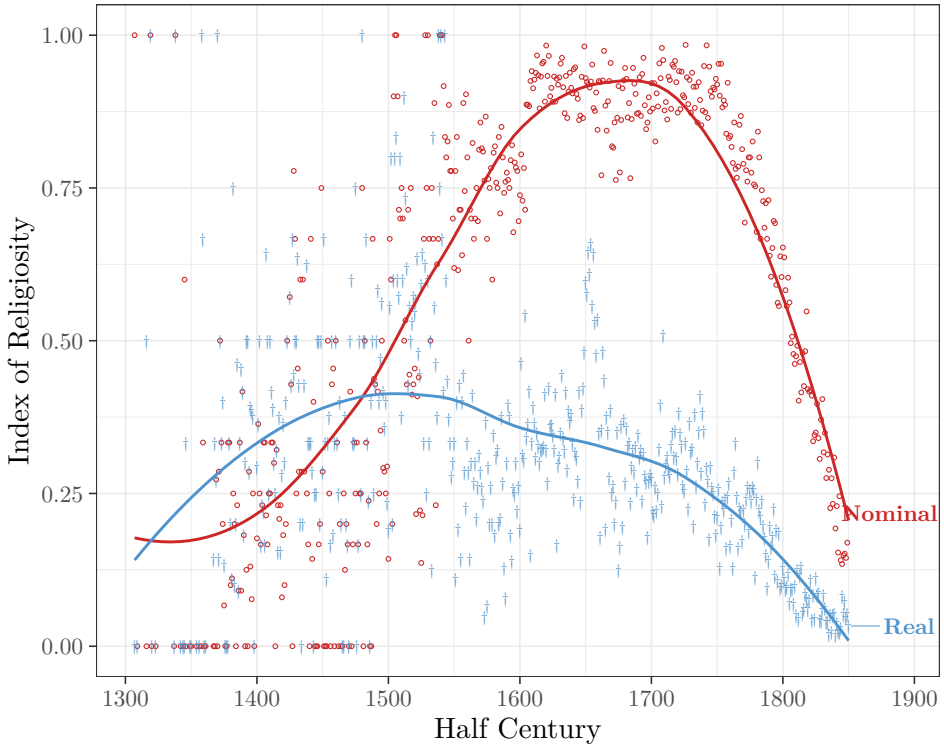
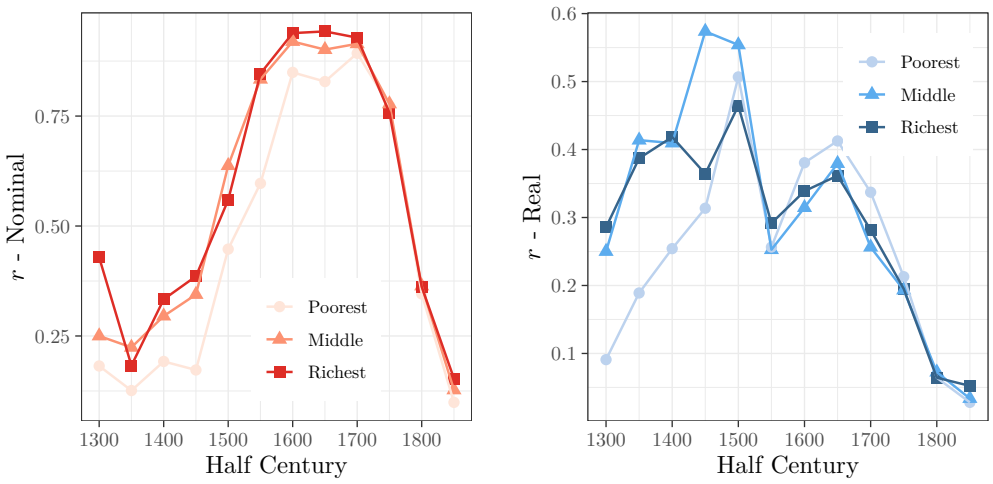


Figure 16: Annual Measures of Religiosity from Wills, 1300-1850

Note: There are 5 Key points in the figure: There is a striking sustained and substantial rise in nominal religiosity from 1400 to 1650.1. There is a striking sustained and substantial decline in nominal religiosity from 1650 to 1800. 2. There is a rise in real religiosity from 1300 to 1500. 3. Real religiosity declines after 1500. 4. The decline in real religiosity accelerates after 1750.



(a) Nominal

(b) Real

Figure 17: Religiosity by Wealth Tercile, 1300-1850

distribution into three even slices, or terciles. Our indices of religiosity, stratified by these wealth cuts, are reported in figure 17.

The rise of nominal religiosity, figure 17 (a), 1400-1650 is common to all groups but there is always a difference between rich and poor will-makers. The poor are always substantially less likely to have highly religious preambles. This wealth-gradient in religiosity is present 1300 to 1700. The decline after 1700 in nominal religiosity is common to all wealth groups and thereafter the wealth-gradient dissolves, and nominal religiosity converges.

Real religiosity, by wealth tercile is reported in figure 17 (b). As nominal religiosity, real religiosity is higher for the richer groups in the earlier period. But unlike nominal religiosity, this is only true before 1500, and ends 200 years before the nominal wealth-gradient substantially dissipates. After 1600, the poorest will-makers have slightly higher real religiosity.

Are nominal and real and nominal religiosity genuinely distinct? Or are they measuring the same underlying *latent* religiosity but with different error? We calculate the correlation of nominal religiosity ($r_{nominal}$) and real religiosity (r_{real}) over time in appendix table 8 and figure 18 below which report the β coefficient from a regression of the form $r_{nom} = \alpha + \beta r_{real} + \varepsilon$, where α is a constant term and ε is a random error. The correlation is positive but relatively weak in most periods, at around .1-.2, 1350 to 1700, thereafter rising to .3. The $R^2$is consistently low in all periods. Whilst measurement error of a singular religiosity could attenuate these observed correlations, the low R^2 , and the different time trends of figure 16 suggest that they are distinct. In periods where performative religious statements were popular, 1600-1750, the sincerely religious do not appear to have substantially higher nominal religiosity. They instead express their devotion through their bequests and more personal expressions later in the will. This suggests to us that the rise in religious

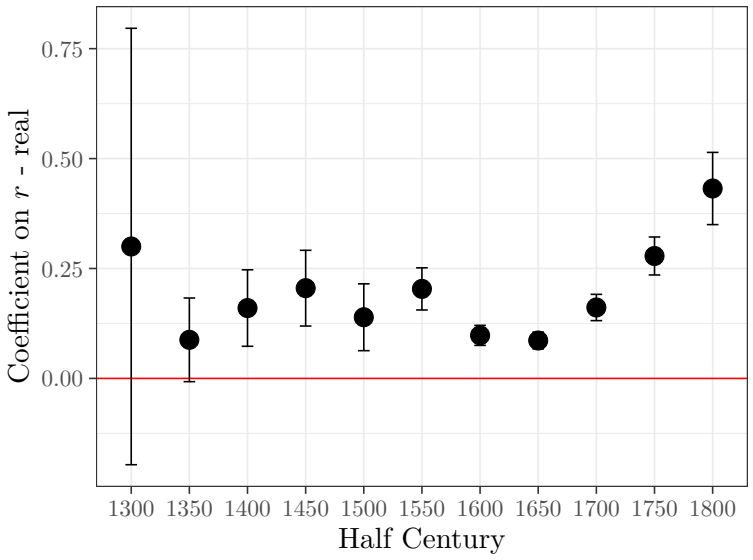


Figure 18: The Association of Real and Nominal of Religiosity

Notes: Estimated by half century from an OLS regression of the form $r_{Nom} = \alpha + \beta r_{real} + \varepsilon$, where r is religiosity, and subscripts *nom* is nominal and *real*, is real. The correlations are always positive, and always statistically significant, but quantitatively low.

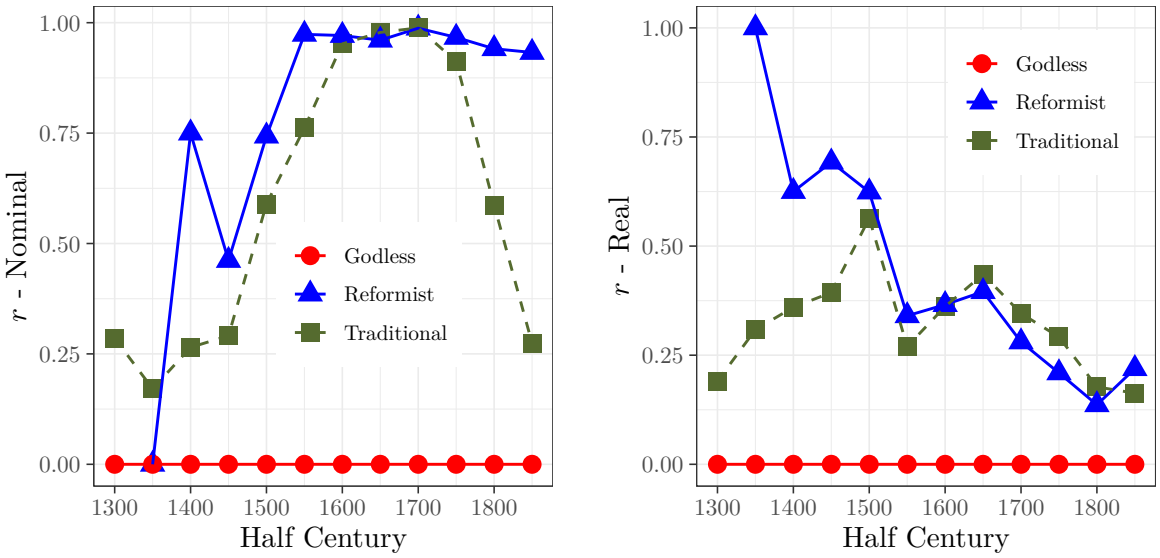
fervor as measured by religious preambles 1400-1650 did not reflect a personal level rise in the intensity of underlying belief. Rather this was a socio-cultural dynamic that demanded performative fealty. The positive correlation between real and nominal religiosity means that they are not substitutes.

Form and Religiosity

How does accounting for form change our interpretation of the trajectory of our real and nominal religiosity scores? We examine this here by distinguishing our religiosity indices by the form of the will, and examining the trend of religiosity *within* each of these form categories. Recall form is defined by the presence of a certain character of religious expression anywhere in the will. Whereas our religiosity scores are split by preamble and body. Thus it is possible for a Traditional or Reformist will to have either $r^{nom} = 0$, or $r^{real} = 0$, but not both.

Figure 19 (b) reports nominal religiosity for each form, 1300-1850. Traditional and reformist wills reveal similar levels and trends in nominal religiosity, with both rising 1300 to 1700. Throughout, traditional wills register slightly lower nominal scores than reformist. There is a divergence in nominal religious expression after 1700, when traditional wills decline, and by the1850s the vast majority avoid declarations to spiritual entities in the preamble.

Figure 19 (c) does the same for real religiosity. Here wills are categorized by the character of their preamble. The rise in real religiosity, 1300-1450, as reported previously in figure 16, is driven entirely by rising real religiosity *within* the then-dominant traditional form of will making. The post-1500 decline in real religiosity is present for both traditional and reformist will forms. This is critical as it means



(a) Nominal

(b) Real

Figure 19: Religiosity Expression by Form of Will

Note: Full-Text Will Sample. Here we classify wills based upon whether the will mentions both God and Jesus (*Reformist*), or also includes the Saints and the Virgin Mary (*Traditional*). We also mark where there is no mention of any spiritual entity, *Godless*. In the early period these are short wills, often of one to two sentences. On subfigures a and b; both the nominal rise and the real decline, which precedes the English Reformation, are clear for both the traditional and reformist forms of wills. The nominal rise is steeper for the reformist form. Within both real religiosity declines after 1450; this decline is *not* simply a result of the share of reformist wills rising, and the share of traditional wills declining. It occurs within both groups, in a striking similar fashion.

that this decline is not a result of changing form alone; it occurs within both. Thus the long run secular decline in real religiosity os not attributable to a declining share of traditional wills but rather a decline in the intensity of real religious expression within all wills. .

V The Ghost in the Machine

In section III, we constructed a proxy for latent religiosity ✠ that determines all expressions of religious intensity, bequests to the church and to charity, and interacting with culture to produce form of religion. Table 5 reports the correlation of ✠ with the score of religious and rare-religious forenames chosen for children. The religious forename score based on all child forenames has a negative correlation with underlying religiosity. But ✠ strongly and significantly correlates with the score for rare religious forenames, which we think of as a better measure of actual religiosity. The correlation is positive but loses statistical significance when we add controls for time (decade dummies), and for religious expression and form. But these additional con-

trols will themselves contain elements of ᛯ, that shared by the culture over time, and mechanically within expression and form. We interpret this as a signal that ᛯ is measuring latent religiosity.

Table 5: The Association of Latent Religiosity with Choice of Religious Forenames for Children

	Religious Forename Score of Children					
	All			Rare		
	(1)	(2)	(3)	(4)	(5)	(6)
r^{real}			.609			.198
			(1.031)			(.475)
$r^{nominal}$			−.575			−.338
			(1.466)			(.676)
ᛯ	−3.017***	−.107	−.347	.679***	.530*	.418
	(.541)	(.607)	(.735)	(.246)	(.280)	(.339)
Reformist			−1.946			.524
			(1.683)			(.776)
Traditional			.706			.724
			(1.599)			(.737)
Mean dep. var.	50.85	50.93	50.93	5.42	5.39	5.39
Decadal Dummies?		✓	✓		✓	✓
Observations	12,292	12,152	12,152	12,292	12,152	12,152
R^2	.003	.040	.041	.001	.006	.006

Note: *p<0.1; **p<0.05; ***p<0.01
Rare religious names are defined as religious forenames outside the most top 50 as observed in London Parish Regsiters, 1538-1812.

Figure 20 plots average ᛯ by year, with separate fitted lines for the data before the 1530s and after 1550, with this period itself shaded light red. The break in the fitted lines highlights a dramatic discontinuity. at this moment, the period of the English Reformation. Latent religiosity ᛯ, defined as mean zero, standard deviation equal to 1, across the whole sample, falls from about 1.5 in the 1520s, to under .25 in the 1550s. The Tudor Reformation is associated with a dramatic collapse in ᛯ. We can see that all components of ᛯ register the dramatic discontinuity at the period of the Reformation, as reported in appendix figure 35.

Is the imposition of a new religion from elites, and its successful plantation amongst the population, an example of a top-down causal effect? There is suggestive evidence in figure 20 that average ᛯ was declining for will makers before 1500. But to see this clearly, we next adjust for sample selection.

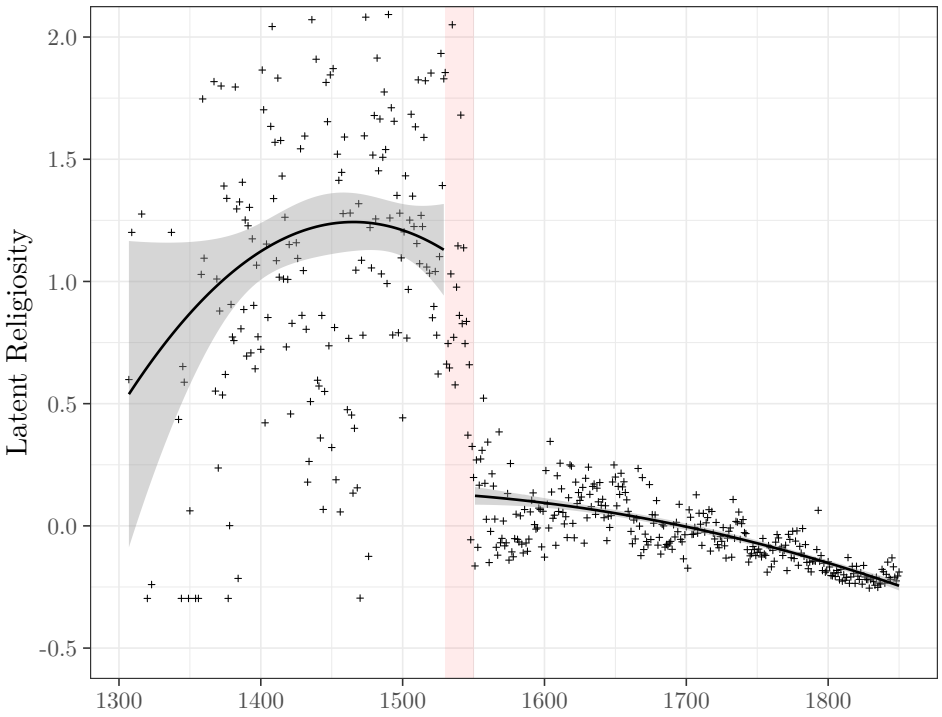


Figure 20: Annual Estimates of ᛯ

Note: ᛯ is a proxy for latent religiosity that combines expression, bequests and actions. It is normalized to be mean 0, and standard deviation 1, across the sample.

VI The Chosen Few?

To what degree does selection into our sample of will-makers, and it's change over time, matter for interpretation?

Selection into will-making is non-random. Will Makers are more likely to be better educated, more literate and numerate, richer, more male, and older than the population at large ((Clark and Cummins, 2015b)). Here, we make no pretensions that we are measuring the poor, or even the average, English. We are tracking a selected elite.

Further, our sample is selected into both by those making wills (1), and within will makers again (2); through those whose that survive (in some cases as much as 700 years), and then (3) copied into one of our sources (as listed in our appendix table 6). We are measuring an elite that jump over three substantial hurdles. It is also likely that the nature of the elite we observe is changing over time.

To address this, we here define groupings of will-makers to hold constant over time. We define these groups through real wealth. Our intuition is that fixed wealth groupings will control for changing composition of the will sample over time. For example, if the will sample is becoming more, or less, selected over time, then any changes in religiosity could be attributed to that changing selection.[13] By examining changes in religiosity within fixed wealth bands we can estimate religiosity scores that

[13]For example, Gregory Clark argues that will makers are becoming more elite over time ((Clark, 2010)).

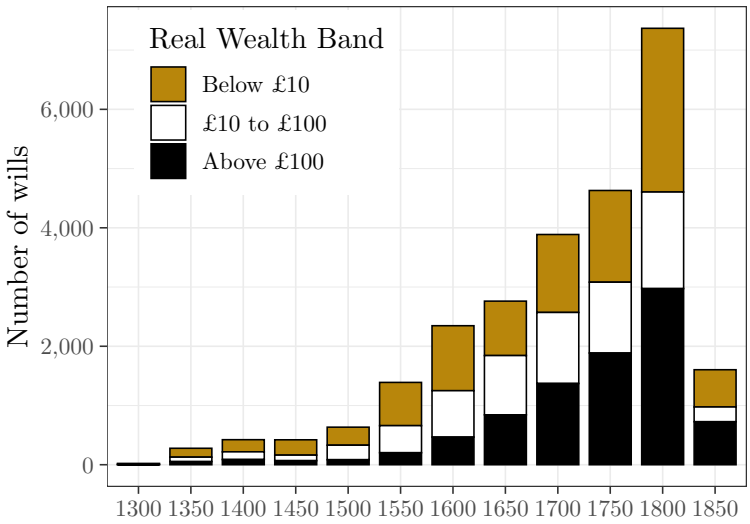


Figure 21: Counts of Wills, by Real Wealth Bands, 1300-1850

are robust to that compositional change.

We distinguish three bands based upon the estimated total value of the will in constant 1600 prices, as described in section III. Figure 21 reports the counts of wills by each real wealth band; under £10, £10-£100, and above £100.[14]

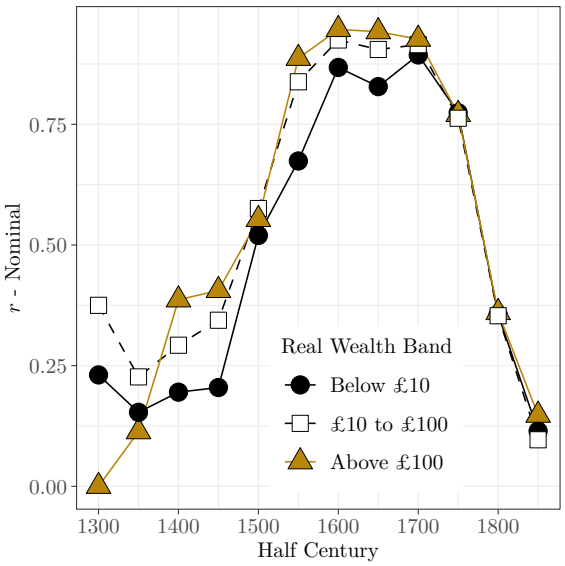
Our religiosity indices, nominal and real expression, and latent, ☧, are reported for these fixed wealth groups, in figure 22.

In panel (a) we see a universal rise of nominal religiosity from 1300 to 1650, followed by a universal decline thereafter. But the wealth groups display substantially different levels; before 1750 the poorer will-makers, those with wealth below £10 are always less religious than richer will-makers. The 1300-1750 is most pronounced for the very richest; those with wealth above £100. There is a striking convergence when nominal religiosity declines after 1700, with all wealth groups being almost exactly equal in each of they half centuries 1750, 1800, and 1850.

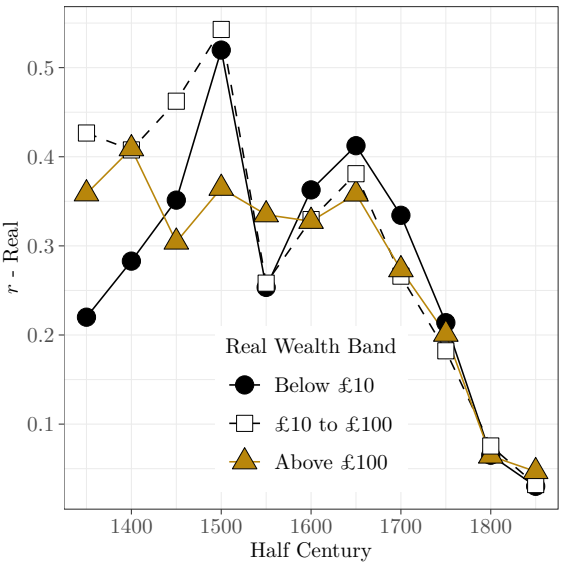
Panel (b) reports the trends in real expression of religiosity for the wealth groups. Here the post-1450 decline is also universal. The middle group has the highest expression of real religiosity 1300-1500. The richest have relatively stable r^{real}, in the region of .3-.4, before declining just before the secular decline at the Reformation.

Latent religiosity in panel (c) reveals a different picture to simple expression. Here the richest groups register declining ☧, from a very high level, in the 1400 to 1450, and the 1450 to 1500 period. The poorest groups decline 1450 to 1500. Thus the underlying religiosity of the English is declining in the century and one half preceding the English Reformation. Extrapolating the trend of the very richest 1400 to 1450, to 1600, as if there had been no Reformation, estimates their latent religiosity at exactly the level of ☧ we find.

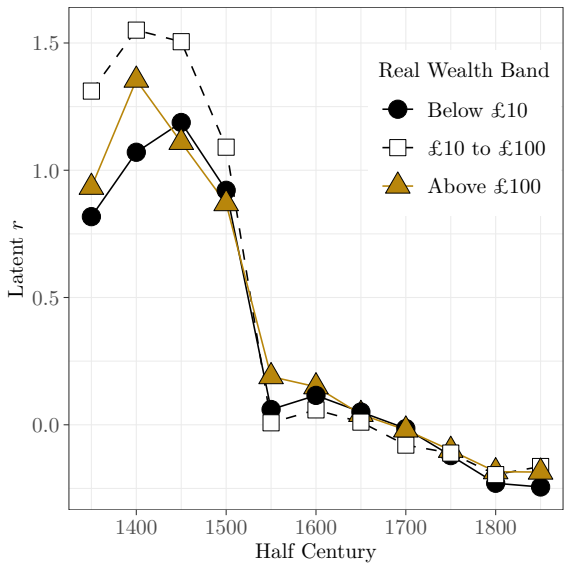
[14] This is similar but different to the wealth analysis of section IV, which reported evenly distributed tercile wealth groupings. In the end the result are very close, compare 17 figure with 22..



(a) Nominal



(b) Real



(c) Latent ✠

Figure 22: The Religiosity of Constantly Defined Groups of Will-Makers

VII Judgement

This paper conducts a quantitative analysis of the religiosity of the full text of a large sample of English wills, 1300-1858. Constructing and validating multiple novel measures of religious expression, bequests, action and sincerity, we uncover new historical stylized facts about the evolution of religiosity in England over five centuries.

We highlight four principal findings. One, traditional Christian language was declining long before the Reformation. Two, the incidence of performative preambles rose after 1400 and came to dominate will making by 1600, thereafter declining. Three, real religious expression rose 1300 to 1450, before a long-run secular decline 1450 to 1850. Four, latent religiosity began declining for the richest will-makers, from high levels, long before Henry VIII's Reformation of the 1530s. The Reformation era is associated with a collapse in this latent religiosity. This evidence points to a two-stage process of cultural change: endogenous changes in religious sentiment preceded, and were subsequently accelerated by, a powerful top-down institutional transformation. Thus there was a "bottom up" sentiment to religious change that was dramatically accelerated by "top down forces".

The secular change in religiosity occurs at roughly the same time as the decline in aristocratic violence (Cummins (2017), and like violence, precedes the behavior change of the poor. Here we find new evidence of the emergence of modern behavior, and the roots of the enlightenment, and the scientific and Industrial Revolutions.

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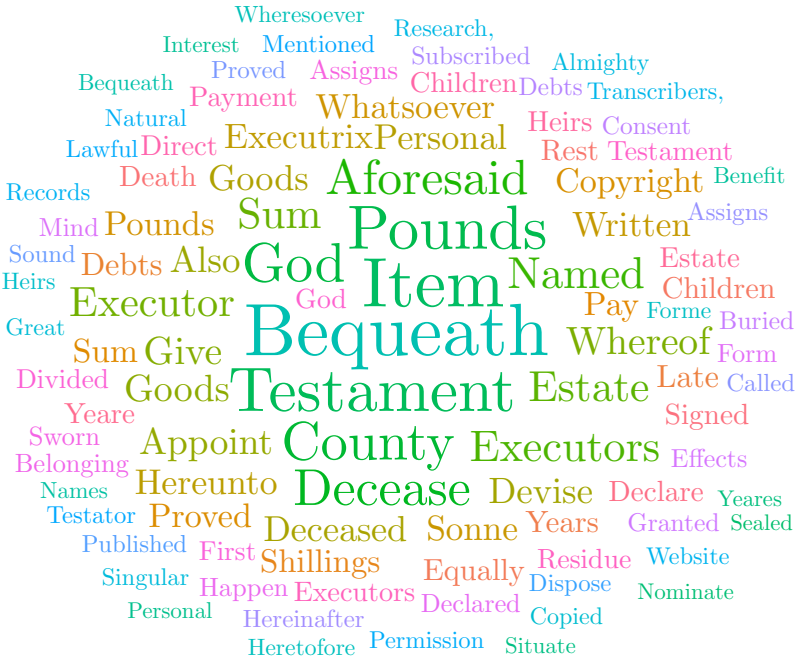
Wikidata contributors, "List of biblical characters," 2026. Wikidata list, accessed 2026-04-07.

A Extra Tables and Figures

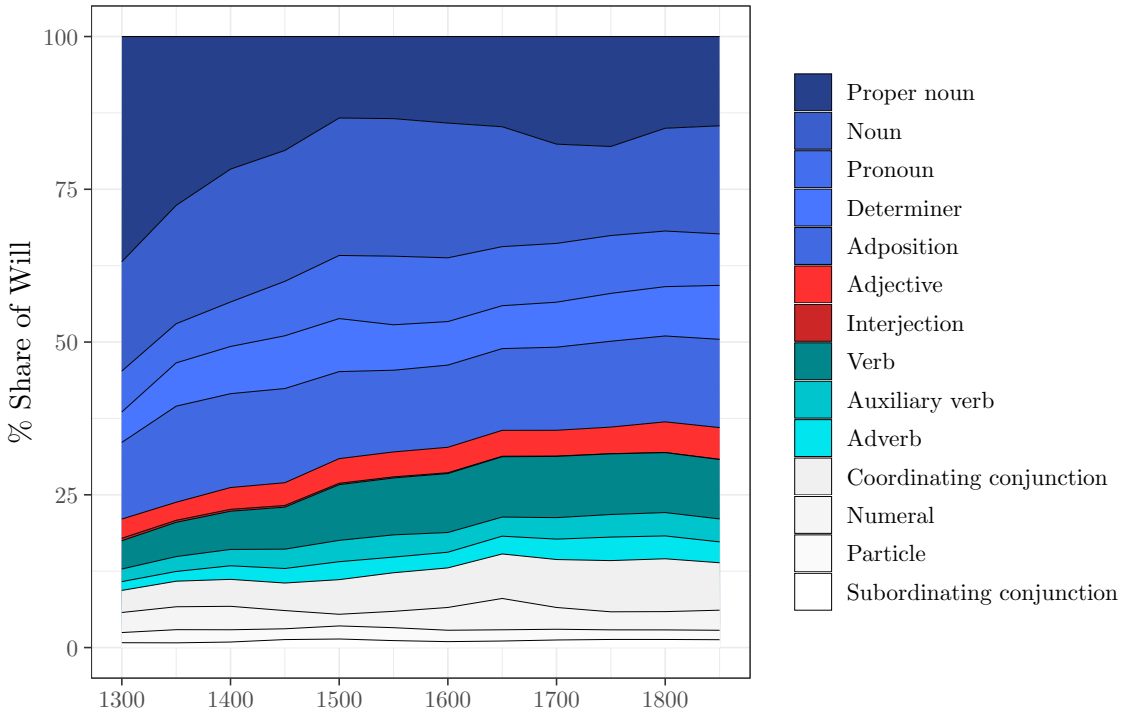
Table 6 reports the sources for our will sample, and table 7 reports the direction, and amount, of specified bequests within our wills. Figure 23 visualizes a word cloud of the top 100 most frequent words in the will text data, excluding stop-words, and calculated over the entire sample period, 1300-1850. Figure 19 (a) reports nominal and real religiosity by half century, separately for , *traditional*, *reformist*, and *Godless* wills, defined as in table 2. Figure 19 (b) categorizes all words into types (nouns, verbs etc.) and plots their shares over time.

Title	Type	Start Year	End Year
Surrey Plus Wills Index	Wills	1470	1856
Transcribed Wills	Wills	1650	1858
Oxfordshire Family History Society	Wills	1500	1914
Kent Will Transcripts	Wills	1500	1858
Wills, Cornwall Online Parish Clerks	Wills	1553	1903
Calendar of Wills Proved and Enrolled in the Court of Husting	Summaries	1258	1688
Lincoln Wills, 1271-1489	Wills	1271	1532
Castlethorpe Wills & Inventory Index	Wills	1486	1930
Ledbury Wills, Inventories and Accounts	Wills	1504	1837
Wills and inventories from the registers of the commissary of Bury St. Edmunds and the archdeacon of Sudbury	Wills	1370	1650
Notes or Abstracts of the Wills Contained in the Volume Entitled the Great Orphan Book and Book of Wills in the Council House at Bristol	Abstracts	1379	1595
Early Lincoln Wills: an Abstract of all the Wills & Administration's recorded in the Episcopal Registers of the Old Diocese of Lincoln	Wills	1282	1547
The Fifty English Wills in the Court of Probate, London	Wills	1387	1454
Testamenta vetusta: being illustrations from wills, of manners, customs, &c. as well as of the descents and possessions of many distinguished families. From the reign of Henry the Second to the accession of Queen Elizabeth	Wills	1154	1557
Somerset Medieval Wills	Wills	1383	1500
Wills & Administration from the Knaresborough Court Rolls	Wills	1507	1604

Table 6: Sources for the Wills

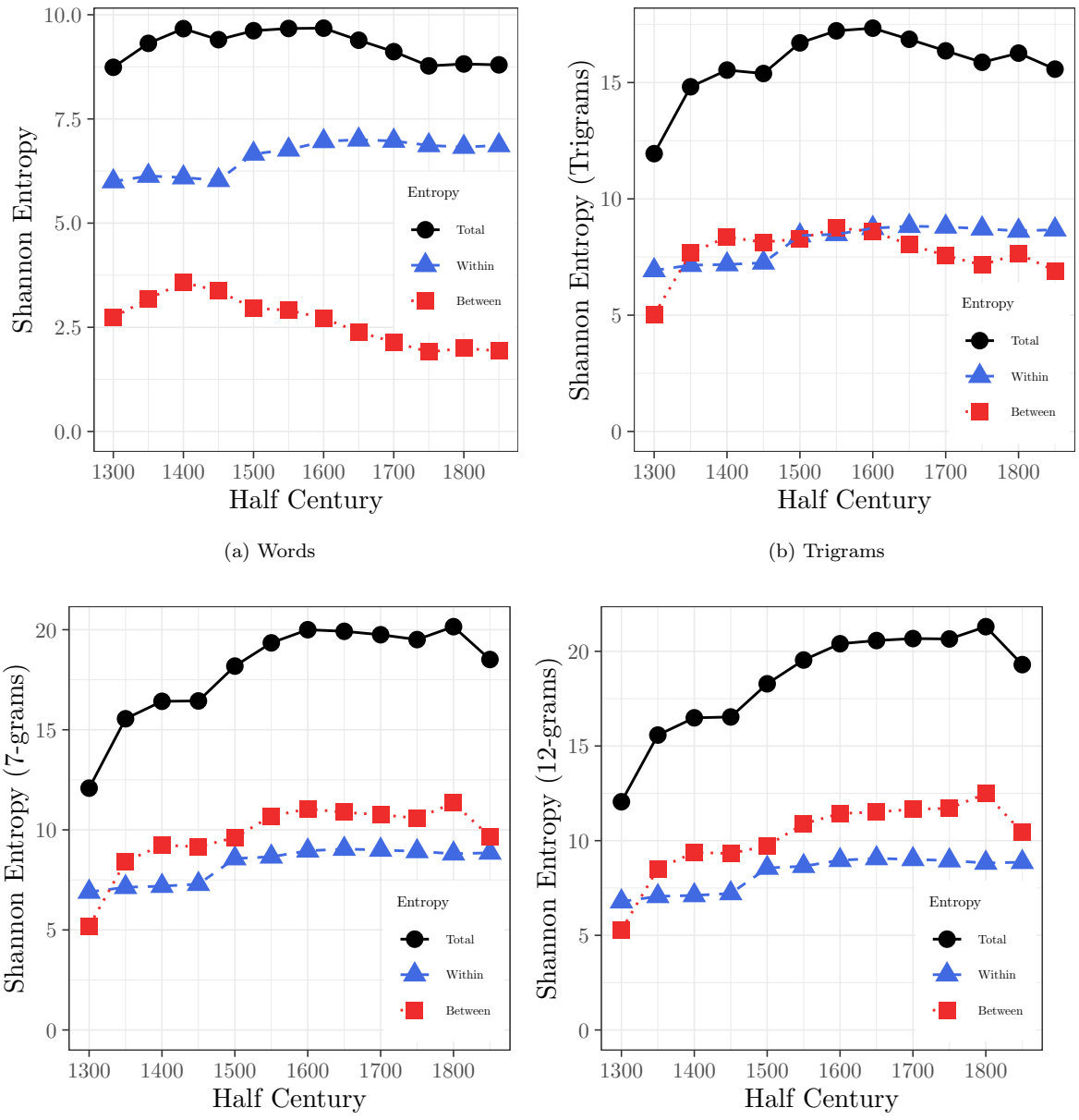


(a) The Top 100 Words in the Will Text Data, 1300-1850



(b) Types of Words as Share of Will

Figure 23: The Words of the Dead



(a) Words

(b) Trigrams

(c) ngram=7

(d) ngram=12

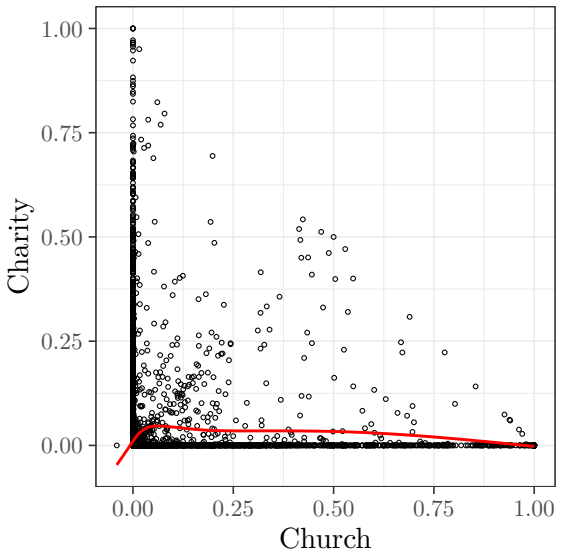
Figure 24: Entropy Decompositions, by Half Century, for a set of N-gram Lengths, 1300-1850

Table 7: Direction of Bequests

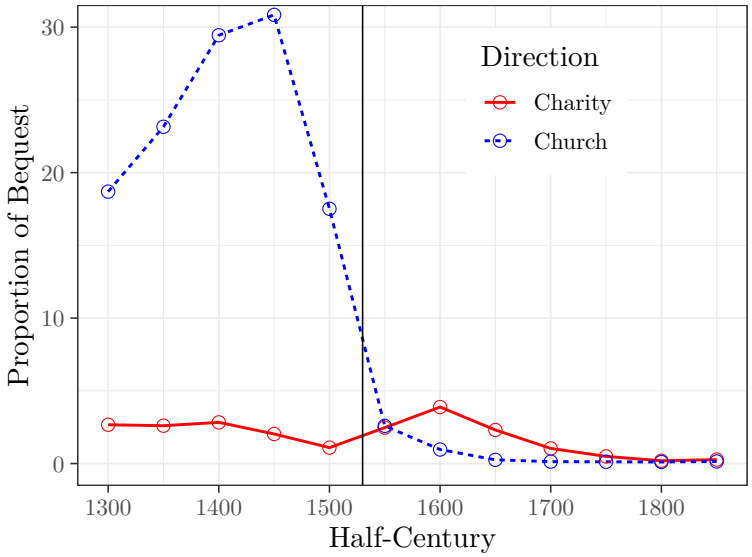
		Value	
Relation	N	£Real	Prop.
Son	58,618	2,352,705	0.228
Wife	49,958	2,269,743	0.220
Daughter	39,126	1,554,490	0.151
Grandchild	16,565	580,658	0.056
Niece	13,483	413,898	0.040
Brother	13,202	468,441	0.045
Nephew	12,450	426,286	0.041
Sister	11,128	475,496	0.046
Friend	8,648	247,816	0.024
Church	6,058	548,148	0.053
Servant	5,501	274,239	0.027
Cousin	5,333	201,296	0.019
Charity	4,709	274,654	0.027
Mother	2,130	108,276	0.010
Father	1,246	35,757	0.003
Uncle	505	31,885	0.003
Aunt	424	17,027	0.002
Husband	344	13,209	0.001
Guild	126	13,736	0.001
Family	117	7,064	0.001

Specified Bequests Only.

Are charity and gifts to the church related? Possibly they are either compliments or substitutes? Figure 25 suggests no systematic relationship.



(a) Relationship to Each Other



(b) Trend Over Time

Figure 25: Charity and Gifts to the Church

Notes: $N = 23,516$. Note that the English Reformation at 1530 comes *after* the decline in bequests to the Church...

B Godless

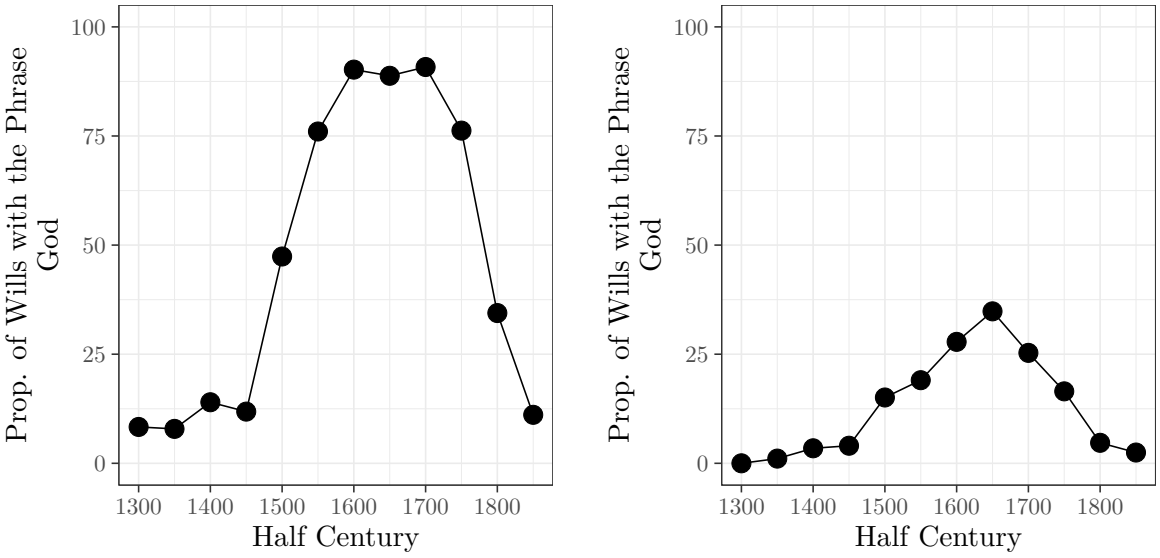
An example of some early Godless wills

> John Denton, 6th September 1493. I will that my wife,. if living sole, have all my lands in Oxfordshire and Berk-. shire. To my brother Philip Purefoy's father; to my fa- ther Browne, and my mother, his wife. My manor of Fox- cote, during the non-age of my son.. And I appoint Isabel' my executrix. Proved 17th November, 1497.
>
> John Catesby, of Althorpe, Esquire. I bequeath my manor of Althorp to my nephew John, son of my deceased brother Sir William Catesby, in fee. Proved 1486 +.
>
> Thomas Bishop of Durhama, March 28, 138t. My house in Ottford, near London. To John de Popham, my nephew, m marks, which William de Windsor oweth me, for Alice Pers', now his wife. [Note he was Bishop of London 1375-81.]
>
> HENRY HETH, of Grosham, co. Hunt. Not dated; probably 1446.[fo. 72.] My wife Katherine to have the Manor and advowson of. Grosham for life or widowhood, with remainder to my son Richard. Heth in tail. No probate annexed..

Many early Godless wills are stubs, short wills, or mention rarer spiritual entities (such as Angels)

C Figures of Specific Word Presence in Wills, Preamble and Body Separately

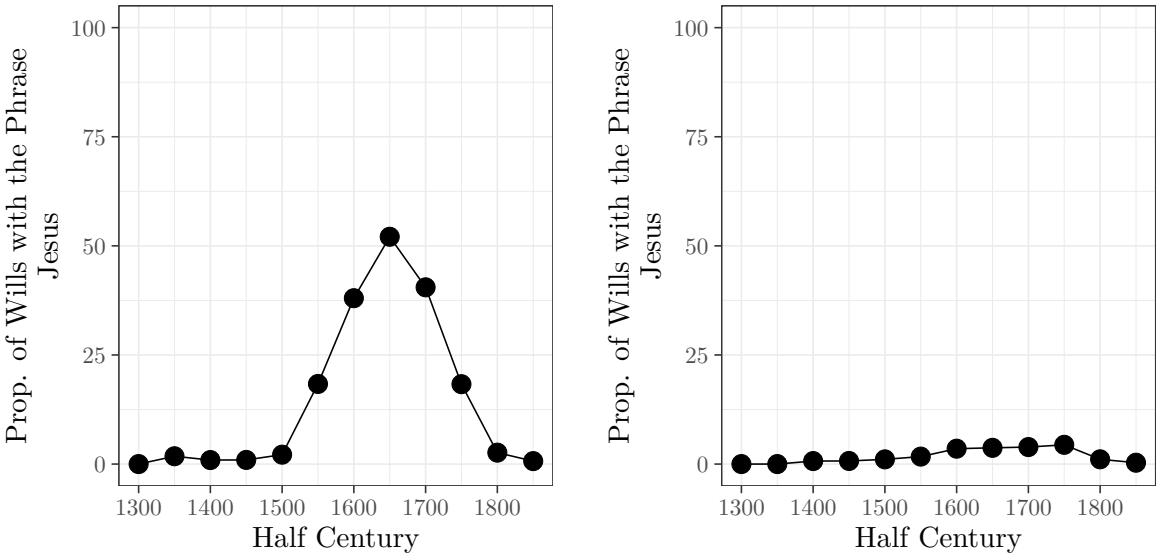
Here we report figures charting the presence of simple phrases in the will text, separated by preamble and body, over time. Figure 26 reports the average of a dummy variable indicating that a will mentions "God" (1), or not (0). The same is done for "Jesus" in figure 27, a Church in figure 28, Saint as entity in figure 29, and "Blessed Virgin" (and variants) in 30.



(a) Preamble

(b) ex. Preamble

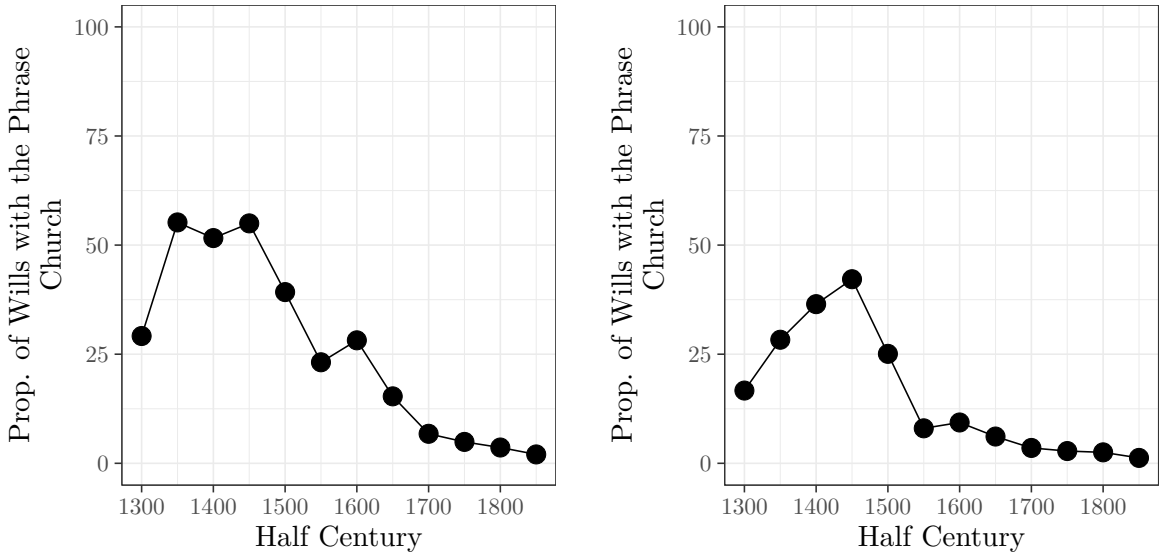
Figure 26: "God", Prop. of Wills Mentioning, 1300-1850



(a) Preamble

(b) ex. Preamble

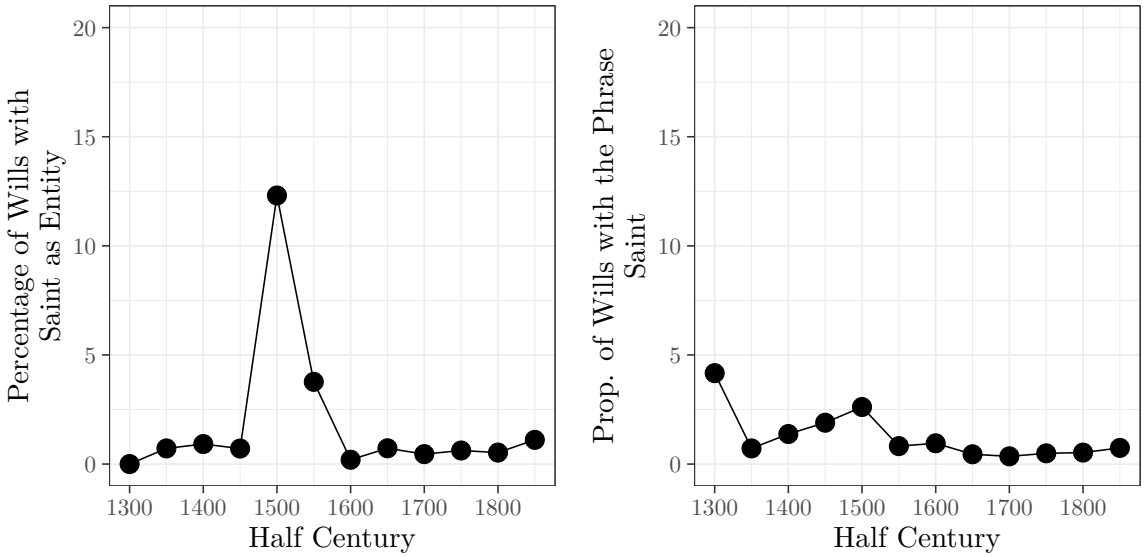
Figure 27: "Jesus", Prop. of Wills Mentioning, 1300-1850



(a) Preamble

(b) ex. Preamble

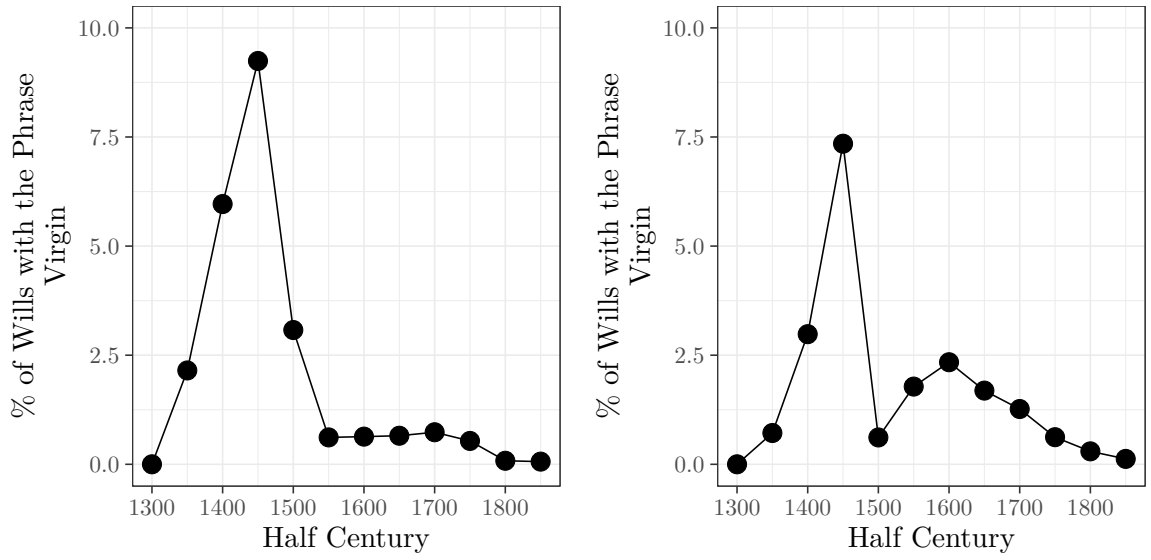
Figure 28: Church, Prop. of Wills Mentioning, 1300-1850



(a) Preamble

(b) Amble

Figure 29: Saint as Entity, Prop. of Wills Mentioning, 1300-1850



(a) Preamble

(b) Amble

Figure 30: "Virgin", "Blessed Mary", Percentage of Wills Mentioning, 1300-1850

D The Association of Nominal and Real Religiosity

Are nominal and real religiosity distinct? Perhaps they are substitutes, or complements? Or perhaps they are simply noisy measures of the same underlying latent process. Table 8 and figure 18 report the β coefficient from a regression of the form

$$r_{nom} = \alpha + \beta r_{real} + \varepsilon,$$

where α is a constant term and ε is a random error. The correlation is positive but very weak in all periods. The $R^2$is consistently low in all periods. Whilst measurement error of a singular religiosity could attenuate these observed correlations, the low R^2 , and the different time trends of figure 16 suggest that nominal and real religiosity are measuring distinct processes.

Table 8: The Association between Nominal and Real Religiosity, by Half Century, 1300-1850

	r - Nominal									
	1300-1350	1350-1400	1400-1450	1450-1500	1500-1550	1550-1600	1600-1650	1650-1700	1700-1750	1750-1850
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
r - real	.300	.088	.160***	.205***	.139***	.204***	.098***	.086***	.161***	.278***
	(.239)	(.048)	(.044)	(.044)	(.039)	(.024)	(.012)	(.010)	(.015)	(.022)
Observations	24	279	436	422	650	1,460	2,901	3,948	4,670	7,412
R^2	.067	.012	.029	.050	.020	.045	.024	.019	.023	.021

Note: *p<0.05; **p<0.01; ***p<0.001

E Child Names as Indicators of Parental Religiosity

We form a master list of Christian religious forenames from the Bible (Wikidata contributors (2026)), and of Saints, (from Buringh et al. (2020)). Next, using a large cache of names from 7,789,201 parish records from London 1538-1812 (see Cummins et al. (2015)), we first investigate the popularity of such religious forenames over time. In this data, there are 27,102 forenames that occur three or more times. Of these 288 are religious. But these religious names account for 4,079,721, 52.3% of all 7,789,201 individuals.[15]

Figure 31a reports the percentage of the London parish data that have religious forenames, by year, 1538-1812. There is a striking rise in this percentage from 1600 to 1750, before a decline thereafter. This is different from trends in both nominal and real religiosity (see figure 16 previous). But the post 1750 decline matches the nominal trend. Do these child-naming trends tell us anything meaningful abut parental religiosity?

A concern in using popular forenames as a measure of parent's religiosity is *fashion*. Parent's may simply pick names that are trending amongst their social peers, and the original meaning of the name may not matter to them. Unlike surnames, there are a smaller number of forenames that dominate the forename distribution. For example, in the London parish data, 1538-1812, the most popular surname "Smith" is 1.2% of all surnames. But the most popular forenames "John", and "Mary" are 19.7%, and and 14.3% of all male and female forenames respectively. Many of the most popular forenames, including "John", "Thomas", "Mary" and "Elizabeth" are biblical in origin; but does anyone really believe that naming a son one of these popular forenames signals anything specifically deep and meaningful about a parents underlying religiosity?

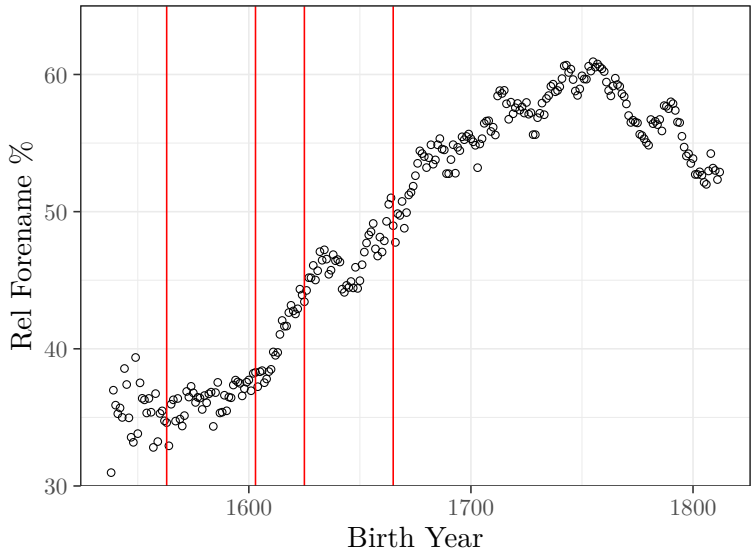
Thus we remove the 50 most popular forenames from our measure of religiosity. These 50 account for 1,979,446 25.4% of all 7,789,201 forenames. Figure 31b reports the trends in the proportion of religious forenames for the top 50 forenames, and the rest, separately. Whilst popular forenames are less religious than unpopular forenames, it is evident that the trends over time are driven by changes in the most popular forenames, which we think are less likely to be informative of underlying parental belief.[16] Thus we take the naming of a child with an relatively unpopular, non top-50, forename as a signal of parental religiosity. These account for 266 of the 288 religious forenames identified above, and 4.5% of the sample, 1538-1812.

Table 9 reports the top 20 forenames in these records, their counts, and whether they are religious or not, and table 10 reports the top 20 religious forenames and their overall rank, and count, in the parish London data.

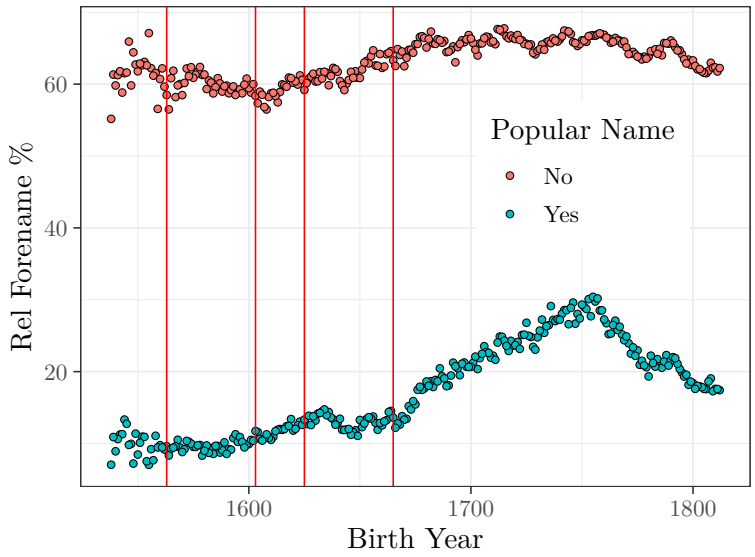
Figure 32 reports the proportion of forenames religious in the London parish registers, for different frequency ranges, 1538-1812.

[15] Appendix table 9 reports the top 20 forenames in these records, their counts, and whether they are religious or not, and appendix Table 10 reports the top 20 religious forenames and their overall rank, and count, in the parish London data.

[16] For the interested reader, appendix figure 32 reports the proportion of forenames religious in the London parish registers, for different frequency ranges, 1538-1812.



(a) Overall



(b) by Popularity

Figure 31: Religious Forenames, as % of All Names in Parish Records

Notes: Calculated at individual level, not at name level. Source: 7,789,201 parish records from London 1538-1812 (see Cummins et al. (2015)).

Table 9: Top 20 Most Frequent Forenames in London Parish Records, 1538-1812

Rank	Forename	N	Percent	Religious?
1	John	756,896	9.72	†
2	Mary	676,098	8.68	†
3	Elizabeth	500,546	6.43	†
4	William	412,244	5.29	
5	Thomas	401,287	5.15	†
6	Sarah	292,782	3.76	†
7	Ann	286,976	3.68	
8	James	200,930	2.58	†
9	Richard	171,158	2.20	
10	Jane	140,774	1.81	
11	Anne	136,718	1.76	†
12	George	131,631	1.69	†
13	Robert	126,667	1.63	
14	Edward	108,525	1.39	
15	Henry	107,826	1.38	
16	Joseph	105,760	1.36	†
17	Martha	72,948	0.94	†
18	Eliz	71,551	0.92	
19	Charles	70,134	0.90	
20	Margaret	66,249	0.85	†

Note: London Parish records, 1538–1812.

Table 10: Top 20 Most Frequent Religious Forenames in London Parish Records, 1538-1812

Rank	Rank	Forename	N	Percent
1	1	John	756,896	9.72
2	2	Mary	676,098	8.68
3	3	Elizabeth	500,546	6.43
4	5	Thomas	401,287	5.15
5	6	Sarah	292,782	3.76
6	8	James	200,930	2.58
7	11	Anne	136,718	1.76
8	12	George	131,631	1.69
9	16	Joseph	105,760	1.36
10	17	Martha	72,948	0.94
11	20	Margaret	66,249	0.85
12	21	Samuel	62,118	0.80
13	22	Susanna	57,126	0.73
14	25	Francis	49,120	0.63
15	30	Rebecca	35,445	0.46
16	31	Peter	34,640	0.44
17	35	Sara	28,384	0.36
18	36	Elisabeth	28,280	0.36
19	38	Benjamin	25,987	0.33
20	42	Catherine	23,680	0.30

Note: London Parish records, 1538–1812.

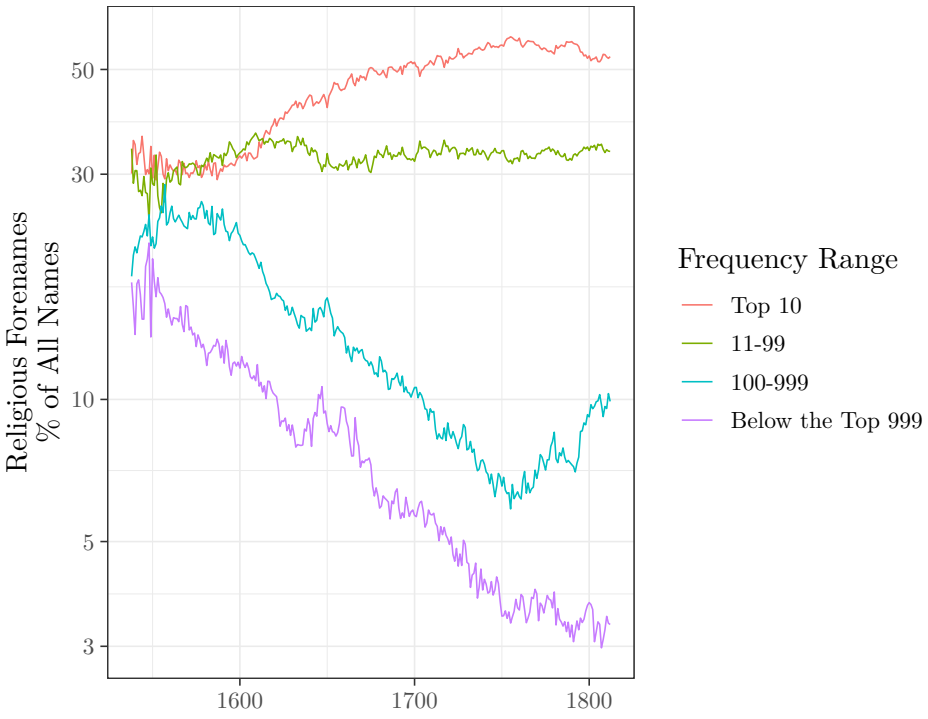


Figure 32: by Frequency Range

F ChiRho DeComposition

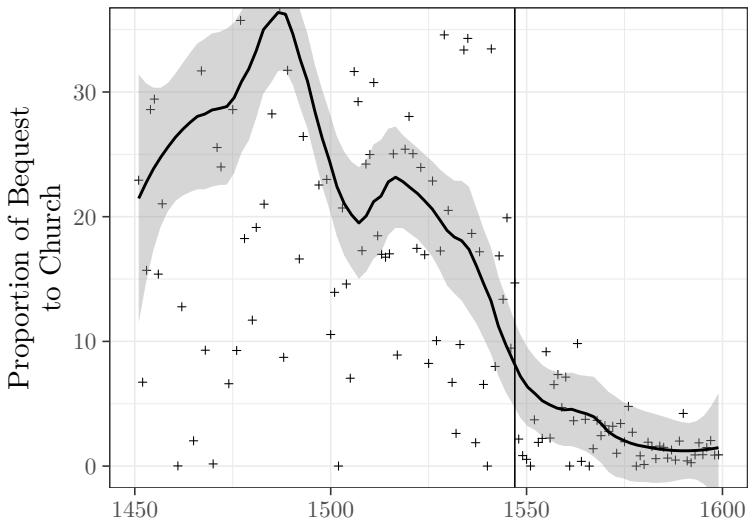


Figure 33: Annual Estimates of the Average Proportion of a Bequest Directed to the Church

Notes: The fitted line is estimated using LOESS with span = 0.3 and weighted by the annual number of observations. The shaded band reports the 95% confidence interval around the fitted mean.

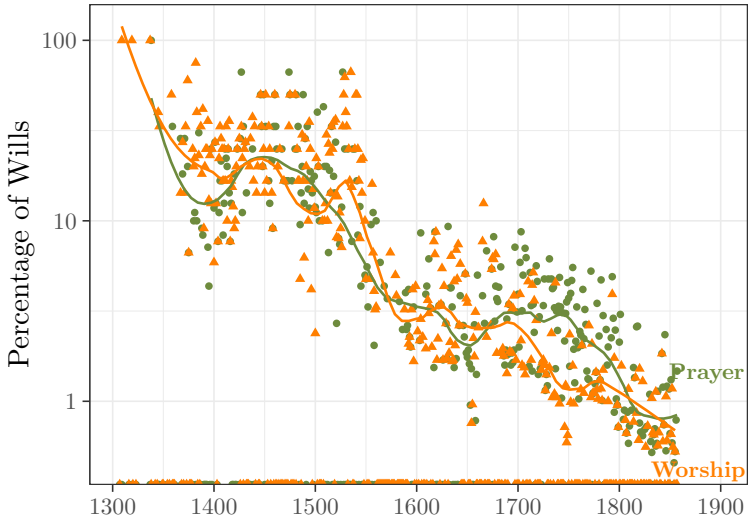


Figure 34: Religious Actions in Wills

Notes: Based on a string search for "prayer", and "worship" across the entire will text. Log10 scale to emphasize the consistent decline over the sample period.

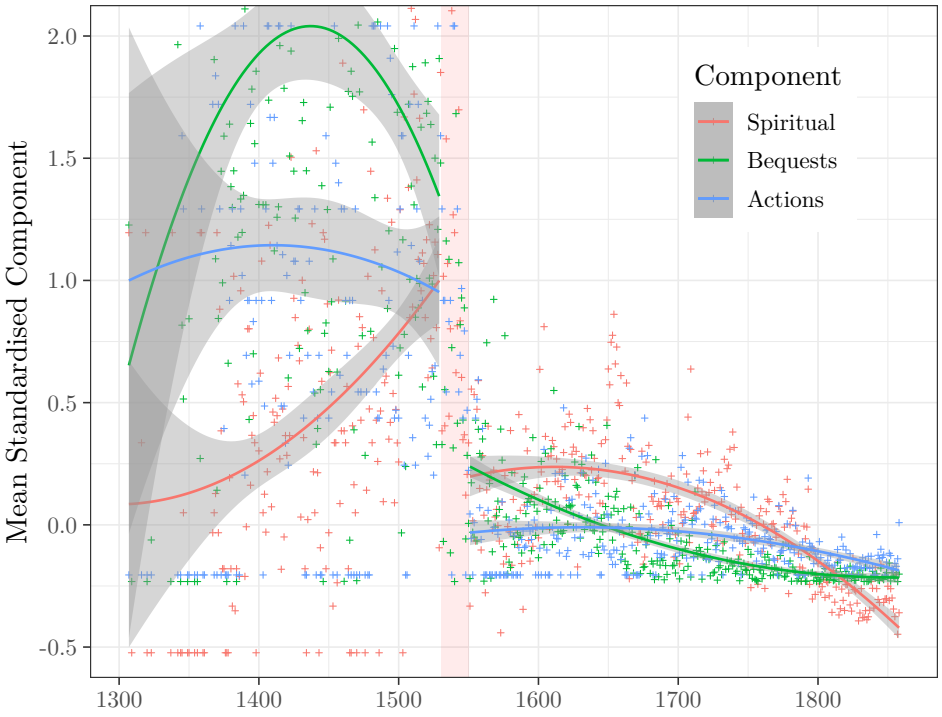


Figure 35: Annual Estimates of the Components of ᛯ

Note: ᛯ is a proxy for latent religiosity that combines expression, bequests and actions. It is normalized to be mean 0, and standard deviation 1, across the sample.

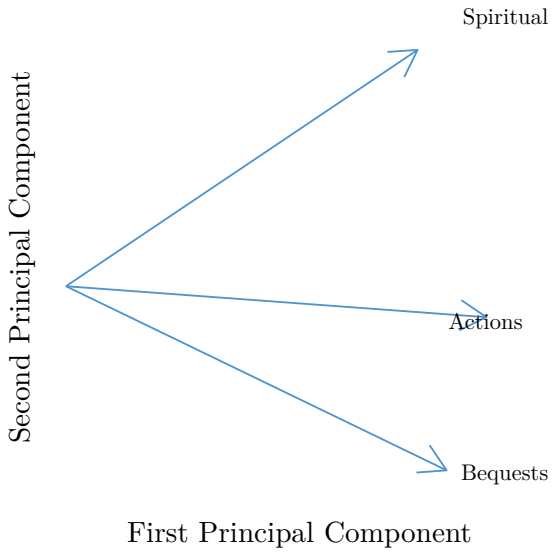


Figure 36: Bi-Plot of the First and Second Principal Component of ᛯ

Note: ᛯ is a proxy for latent religiosity that combines expression, bequests and actions. It is normalized to be mean 0, and standard deviation 1, across the sample.