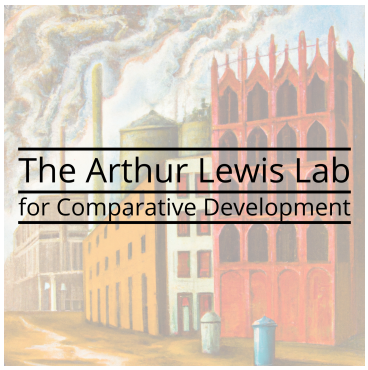
MANCHESTER 1824
The University of Manchester



Lewis Lab Working Paper 2024-02

The Cultural Origins of the Demographic Transition in France

Guillaume Blanc
The University of Manchester

January 29, 2024

Abstract

This research shows that secularization accounts for the remarkably early fertility decline in France. The demographic transition, a turning point in history and an essential condition for development, began in France more than a century earlier than in any other country. Why it happened so early is one of the 'big questions of history' because it challenges traditional explanations and because of data limitations. Using a novel dataset crowdsourced from publicly available genealogies, I comprehensively document the decline in fertility and its timing with a representative sample of the population. Drawing on a wide range of sources and data, I document an important process of secularization in the eighteenth century and find a strong and robust association with the timing of the transition across regions and individuals. Finally, I discuss the persistent impact of the transition on economic growth and explore the drivers of secularization.

JEL Codes: N33, O10, Z12

Keywords: fertility, development, secularization

The Cultural Origins of the Demographic Transition in France

Guillaume Blanc, *The University of Manchester**

January 29, 2024

Link to the latest version

Abstract

This research shows that secularization accounts for the remarkably early fertility decline in France. The demographic transition, a turning point in history and an essential condition for development, began in France more than a century earlier than in any other country. Why it happened so early is one of the 'big questions of history' because it challenges traditional explanations and because of data limitations. Using a novel dataset crowdsourced from publicly available genealogies, I comprehensively document the decline in fertility and its timing with a representative sample of the population. Drawing on a wide range of sources and data, I document an important process of secularization in the eighteenth century and find a strong and robust association with the timing of the transition across regions and individuals. Finally, I discuss the persistent impact of the transition on economic growth and explore the drivers of secularization.

***JEL codes**: N33, O10, Z12*
***Keywords**: fertility, development, secularization*

> And the race of man cannot, by any efforts of reason, escape from it.
>
> —Thomas Malthus, *An Essay on the Principle of Population* (1798)

1 Introduction

The demographic transition is a watershed moment in the process of development. Before the transition, and for most of human history, the world was trapped into stagnation. During the nineteenth century, the course of history underwent sweeping transformations with unprecedented technological progress and mass education. However, it was the fertility decline during the demographic transition that triggered a dramatic leap away from stagnation and towards sustained economic growth, allowing living standards to rise above subsistence by overcoming the offsetting impacts of population growth. The fertility decline is traditionally attributed to

* Arthur Lewis Building, Oxford Road, Manchester M13 9PL, UK, **guillaume.blanc@manchester.ac.uk**. I would like to warmly thank O. Galor, S. Michalopoulos, R. Wacziarg, and D. Weil for their kind support and dedicated supervision. This research has benefited from insightful comments and suggestions of P. Ager, P. Aghion, T. Baudin, D. le Bris, J. Brown, G. Clark, D. de la Croix, D. Cuberes, N. Cummins, K. Desmet, S. Egiev, J. Enguehard, R. Franck, T. Gigout, P. Gobbi, R. Griffith, P. Hoffman, T. Jaworski, E. Karger, C. Malgouyres, J. Mokyr, N. Nunn, N. Palma, T. Piketty, M. Rosenberg, L. Rosenberger, J. Rubin, E. Spolaore, M. Squicciarini, J. Steinsson, U. Sunde, E. Todd, and members of the Growth Lab at Brown. I also thank seminar and conference participants at ASREC, Brown, Clark, College de France, Davis, EHA, EMCON, Louvain, LMU, LSE, Manchester, Northwestern, PAA, Pompeu Fabra, PSE, and RES for helpful comments and discussions. R. Franck, M. Kubo, S. Michalopoulos, C. Motte, and J. Perret kindly shared data. All remaining errors are my own.

technological advancements and the accumulation of human capital, yet important cultural upheavals also took hold during this period.

This research studies the earliest fertility transition in history to understand the role played by these cultural factors. The demographic transition began in France, with fertility declining in the eighteenth century, a century earlier than in any other country, during a period of economic stagnation and prior to the French Revolution.[1] Why it happened so early is an old puzzle challenging traditional explanations since, in many ways, France was a poor country at the time. In fact, historian Robert Darnton (1978) argued that it is one of "the big questions of history" (p. 132), while, according to Alfred Sauvy (1962), it is "the most important fact of all her [France] entire history" (p. 13). Additionally, the absence of comprehensive data or modern censuses has impeded a better understanding of the factors driving the transition.

To answer this question, this paper comprehensively documents the decline in fertility with a representative sample of the population, using a novel dataset crowdsourced from publicly available genealogies; advances the hypothesis that secularization accounts for the decline; and provides empirical evidence supporting this hypothesis.

Because of the lack of data, the timing of the French fertility decline is still not fully understood. Using a novel crowdsourced genealogical dataset from online family trees on geni.com, I comprehensively document, for the first time, the fertility decline with a representative sample of the population at the time. The raw genealogical data from geni was made publicly available by Kaplanis et al. (2018). It spans centuries and contains millions of individuals. Using this data, I reconstruct a measure of fertility from the horizontal branches of family trees. To evaluate the degree of selection, I compare geni to census data, which is only available in the nineteenth century, and to a wide range of available representative sources or estimates; and show that the genealogies are a representative sample of the population and provide the best available account of the decline in fertility. Using these lineages, I show that the transition took hold around 1760, earlier than previously thought.

Then, I hypothesize that secularization, the loss of influence of the Catholic Church, brought about the exceptionally early demographic transition in France.

Using a variety of historical sources, including data on the language used in the opening statements of wills, I document an important process of secularization that occurred at the same time in France. The diminished sway of the Church has been discussed by various authors. According to Tackett (1986), secular beliefs spread "in a veritable flood" (p. 252); de Tocqueville (1856) writes that "irreligion was able to become a general and dominant passion in eighteenth-century France" (Book 3, Chapter 2); and historian Braudel (1986) evokes "the liberation of Frenchmen from the teachings, the restrictions, and the yoke of the Catholic Church". At the aggregate-level, the data suggests that such a loosening of traditional religious moral constraints had a profound impact on the early decline in fertility. As the Church lost influence, the clergy could not oppose fertility controls anymore. Indeed,

[1]The demographic transition traditionally encompasses two distinct processes, the mortality transition and the fertility transition. I interchangeably use the terms (historical) 'fertility transition' and 'demographic transition' throughout the paper since economists usually consider mortality as exogenous and often use the two terms interchangeably, and, in France, the fertility transition preceded the mortality transition and marked the beginning of the demographic transition.

according to Noonan (1965), the Catholic Church's views on marriage evolved at the time of the Counter Reformation, in the face of competition, towards 'be fruitful and multiply'.

To further establish this, I study the determinants of the transition across *départements*, using population counts from census data available after the transition, and across individuals, using the crowdsourced genealogical data. I document a large and robust association between the timing of the fertility decline and secularization, captured by the presence of refractory clergy in 1791 (Squicciarini, 2020; Tackett, 1986). The Civil Constitution of the Clergy required all clergy to take an oath of allegiance to the secular revolutionary state and made them civil servants. The presence of refractory clergy captures the process of secularization and is highly correlated with subsequent, more direct measures of the importance of religion in people's lives, such as easter attendance, which is only available in 1966.

Across *départements*, I estimate a strong and robust positive association between the presence of refractory clergy and the timing of the transition using census data available from 1831 to 1961. The regions that secularized experienced a decline in fertility more than a century earlier than those that did not—no other variable has an impact nearly as important. The difference between Provence, a stronghold of secularization, and Brittany, a bastion of Catholicism, is as large as the difference between France and England.

Additionally, I study the heterogeneous effects of the refractory clergy and find that cultural and economic factors played complementary roles. The association between secularization and the decline in fertility is larger in more densely populated places, suggesting that the relaxation of moral and social constraints allowed individuals to reach their desired level of fertility—which was lower in more developed regions. I also show that the estimated correlation is particularly robust, across thousands of alternative specifications, including with variable selection methods, and even after accounting for omitted variables and spatial dependence.

Drawing on the genealogical data, I find similar results at the individual level. Those born in places with refractory clergy had more children. The effect is large, statistically significant, and robust across specifications and methods. Then, using distribution regressions that estimate the relationship between the cumulative distribution function of fertility and the presence of refractory clergy across all fertility levels, I show that large families likely experienced the largest decline in fertility as secularization took place.

To account for unobserved institutional factors that could be driving the association, I rely on a range of empirical strategies. First, I compare individuals born in the same *département* and decade with *département*-by-decade fixed effects to account for time-varying *département*-level institutional unobservables. Second, I compare the coefficient on the refractory clergy before and after the onset of the decline in fertility. I find that the presence of refractory clergy was positively associated with fertility after 1760 but had a null and insignificant effect before. Third, I study second-generation migrants at the time of the decline. I trace historical migrations in the genealogies and compare individuals born in the same district whose parents were born in different districts. I find that the presence of refractory clergy in the district of origin of the parents had a large effect on fertility, which persisted for generations and through migrations. While these findings suggest a causal interpretation, they do not imply

that institutions and institutional change did not play a role, but rather that, if they did, it was only through their influence on the process of secularization.

Finally, I explore the persistent impact of the transition on economic growth, at the aggregate level, and discuss why secularization took place in France, using data on the spatial distribution of Catholic Church influence during the French Wars of Religion. I provide suggestive evidence that the subsequent loss of influence of the Catholic Church resulted from a backlash against elites, in particular against religious authorities holding a monopoly on faith and close ties with an absolutist, divine-right monarchy which granted a monopoly to the Counter Reformation centuries before.

This paper makes several key contributions. First, I add to an extensive body of literature in history, demography, historical demography, and economic history that explores the early fertility transition in France, but hasn't conclusively dated or explained it. My contribution is to advance the hypothesis and empirically establish that secularization is the driving force behind this decline, employing a wide array of novel data sources, both aggregate and individual, to comprehensively document the timing of the fertility decline with a representative sample of the population. Second, I add to a growing body of literature on the role of cultural factors in historical fertility transitions (Beach and Hanlon, 2022; Spolaore and Wacziarg, 2022). My contribution is to underscore the significance of these cultural factors in the earliest recorded fertility transition. Additionally, while Spolaore and Wacziarg (2022) focus on the diffusion of the French fertility decline along cultural lines, my focus is on investigating the fundamental factors that initiated this transition. Third, I add to a literature on the cultural origins of the transition from stagnation to sustained growth (Mokyr, 2016; Squicciarini, 2020). My contribution is to document the role of cultural and religious change, not persistence, in economic development. Finally, I add to an emerging literature using genealogies to study demographic change in periods without censuses (Kaplanis et al., 2018). My contribution is to be the first to reconstruct a measure of historical fertility from crowdsourced genealogical data.

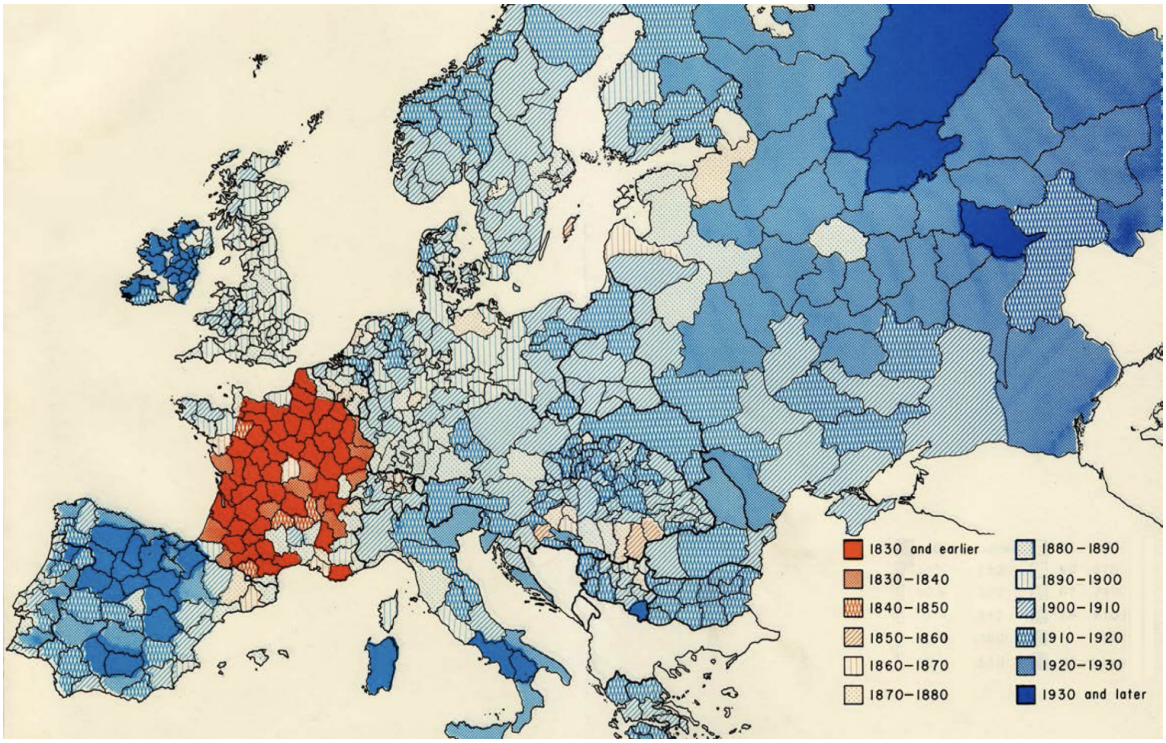
2 Hypotheses and related literature

Theoretical considerations. Throughout the vast majority of human history, life on earth was *nasty, brutish, and short*, dominated by starvation, poverty, wars, and pandemics. Although occasional innovations emerged, they translated into larger populations rather than improvements in living conditions. For that reason, Malthus (1798) believed that humanity was condemned to enduring stagnation. He was wrong because larger population generated more innovations and selected for traits that were complementary to the process of development, creating a positive feedback loop between technology, population, and education (Galor, 2011, 2022; Galor and Weil, 2000; Galor and Moav, 2002). Galor (2022) argues that these undercurrents "operated relentlessly, if invisibly, throughout the course of human history, and its long economic ice age, gathering pace until, at last, technological advancements in the course of the Industrial Revolution accelerated beyond a tipping point, where rudimentary education became essential for the ability of individuals to adapt to the changing technological environment. Fertility rates started to decline and the growth in living standards was liberated

from the counterbalancing effects of population growth, ushering in long-term prosperity that continues to soar in the present day" (p. 6). In a nutshell, education and development are the best contraceptives. After fertility declined, standards of livings were eventually allowed to rise above subsistence in a sustained way, as displayed in Appendix Figure A2.

Figure 1: Timing of the decline in fertility (using modern census data)

Note: This figure displays estimated dates of a sustained decline – defined as a 10 percent decline – in marital fertility across regions of Europe (Coale and Watkins, 1986).



Historical fertility transition. The demographic transition began in France. Figure 1 displays the estimated timing of the onset of the decline across regions, using modern census data, available after the 1830s, from Coale and Watkins (1986). Because there is no comprehensive data available before that, even the precise timing of the decline is uncertain. We only know that it took place in the eighteenth century, approximately one hundred years before any other country, and before the French Revolution, as discussed in Section 3. Why France led this demographic change, ahead of more developed nations, is still not definitively understood, as highlighted by Van de Walle and Muhsam (1995): "Why France preceded other countries (including more economically developed England) has never been conclusively established" (p. 261).

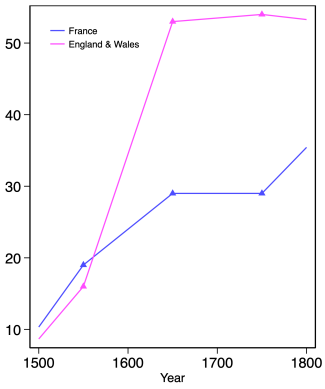
Did fertility decline because of economic or cultural factors, or because of their interaction?[2]

[2]Coale (1973); Coale and Watkins (1986) argue that three preconditions, reflecting both economic and cultural factors, are necessary: "the acceptance of calculated choice as a valid element in marital fertility, the perception of advantages from reduced fertility, and knowledge and mastery of effective techniques of control" (Coale, 1973, p. 69) in other words *readiness*, *willingness*, and *ability*.

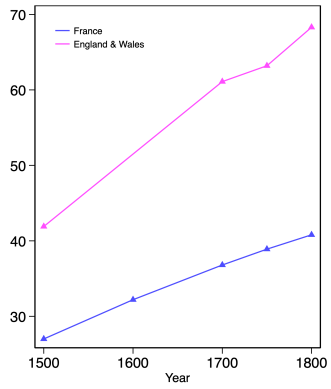
Figure 2 explores human capital accumulation, structural transformation, and economic development in France and in England from 1500 to 1800. In the eighteenth century, France lagged one to two centuries behind England, the cradle of the Industrial Revolution. In 1750, literacy in France was about half that of England and Wales. France only attained in 1850 the GDP per capita enjoyed by England and Wales in 1750, and it took more than two centuries to achieve the rate of urbanization of 1750 England.[3] Therefore, it is highly unlikely that economic factors alone played any major role.

Figure 2: Human capital accumulation, structural transformation, and economic growth

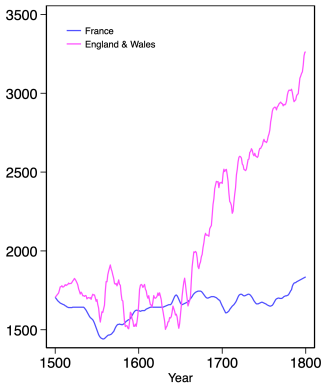
Note: This figure displays literacy rates, the share of the labor force not in agriculture, and Real GDP per capita from 1500 to 1800 in France and in England and Wales. Sources: Buringh and van Zanden (2009) for literacy, Allen (2000) for the share of labor force in agriculture, Bolt and van Zanden (2014); Broadberry et al. (2015); Ridolfi (2016) for real GDP per capita (2011 USD). In Panels A and B, the scatter points represent the years for which data is available. In Panel C, the data is available annually.



(Panel A) Literacy rate



(Panel B) Share of the labor force not in agriculture



(Panel C) Real GDP per capita

A number of recent studies have explored the role played by cultural and institutional factors in fertility transitions. However, a comprehensive investigation into the origins of the initial decline in fertility rates in France has yet to be undertaken. Spolaore and Wacziarg (2022) document the gradual dissemination of the historical fertility transition along cultural and linguistic lines from French-speaking regions to other parts of Europe.[4] Similarly, Beach and Hanlon (2022) provide compelling empirical evidence showcasing changing norms of fertility in England and in English-speaking countries following the Bradlaugh-Besant trial of 1877. A large literature, mostly in history, has also studied the historical fertility transition in France, predominantly using case studies at the village level, since at least the 1970s.[5] More recently,

[3] And as in the rest of Europe, child mortality was high until the mid-nineteenth century, with about half of children dying before they reached five. Weber (1976) even famously depicted the French as "peasants" and "savages", while Crouzet (2003) notes that "France remained fundamentally a peasant-based rural economy" (p. 236).

[4] Similarly, Daudin, Franck and Rapoport (2018) study the diffusion of norms of limited fertility along cultural lines by looking at migrations, while Delventhal, Fernández-Villaverde and Guner (2019) document a temporal decline in the speed of fertility transitions.

[5] Especially following the seminal work of Louis Henry, whose contributions will be elaborated upon in Section 3.1. See Blanc and Wacziarg (2020); Cummins (2012); Knodel and Van de Walle (1979); Weir (1984, 1994); Wrigley (1985*a*,*b*). More recent research has weighed the relative importance of economic and cultural forces across regions (see de la Croix and Perrin, 2018; Murphy, 2015; Perrin, 2021). Murphy (2015) argues that the French Revolution was one of many causes of the decline. He examines the cross-sectional determinants of fertility in France and devotes a couple of

Gay, Gobbi and Goñi (2023) provide strong empirical evidence that revolutionary changes in inheritance rules played an important role in sustaining the fertility decline, although it could not have started it, since fertility declined before the French Revolution.

3 Using crowdsourced genealogical data to document the fertility decline

3.1 Existing historical data

Modern censuses and aggregate statistics from parish records. The timing of the transition remains uncertain because there is no representative data available so long ago; which in turn has hampered efforts to understand its origins. The most representative and reliable sources, modern censuses and the extraction of aggregate statistics from parish records, are not available in most countries until the nineteenth century. For example, in France, the first modern census was only conducted in 1851 (Brambor et al., 2020).[6]

Using population counts from censuses, the Princeton European Fertility Project (Coale and Watkins, 1986) reconstructed series of marital fertility in Europe after the 1830s, long after the onset of the demographic transition in France. Their index of marital fertility I_g measures the fertility of a population relative to the maximum that it might experience without any form of limitation—using the fertility of the Hutterites, an Anabaptist sect without controls—and given a particular age structure.[7] Because their data relies on modern censuses, Coale and Watkins (1986) only date the onset of the fertility decline to "1830 and earlier", as displayed in Figure 1.[8]

Using the extraction of aggregate statistics of births and marriages, by age, from vital records in more than 400 parishes, Wrigley and Schofield (1981) reconstructed series of total fertility in England as early as in the sixteenth century, which would not have been possible with censuses. Their series provides the best available account of the evolution of fertility over time in a pre-transition society, and captures fertility in both rural and urban places. Unfortunately, such data is not available in France.[9] Figure 4, Panel D, displays the time series of the total fertility rate in England throughout the eighteenth and nineteenth centuries using the data provided by Wrigley and Schofield (1981). The series correlate remarkably well with the marital fertility index measured using census data.

paragraphs to the effect of the oath across *départements* in 1831. Similarly, González-Bailón and Murphy (2013) study the role of social interactions on fertility following the Revolution.

[6] See Appendix Figure A1, which plots data on the timing of adoption of the modern census across countries.

[7] The index is constructed as follows: $(I_g)_i = B_i^m/(\sum_j M_{ij}G_j)$, where B_i^m is the total number of children born to married women in society i, M_{ij} the number of married women in age cohort j, and G_j the rate of fertility of Hutterites for age cohort j.

[8] Figure 4, Panels C and D, display the time series of marital fertility in France and in England after 1851 using the data provided by Coale and Watkins (1986). Note that data is available for most regions of France until 1831, with the exception of Paris.

[9] The aggregate nature of the data renders the process of collection relatively easy in a country such as England, which has a relatively small number of parishes. However, such a representative reconstruction is virtually impossible in France, which contains more than 36,000 municipalities. Blayo (1975*b*); Fleury and Henry (1958) attempted to reconstruct the population of France before 1830 using a survey of about 400 municipalities. However, these were mostly rural municipalities, and they did not attempt to reconstruct marital status, which is essential to measure fertility. Weir (1994) makes a number of assumptions to reconstruct series of fertility using this data. Using econometric analysis to test for structural break in these series, Cummins (2009, 2012) date the onset of the decline in fertility to 1776.

Parish records and family reconstitutions. If there is no representative data available at the time, how can we know that fertility declined in France a century before it did everywhere else, in the second half of the eighteenth century and before the Revolution?

Only case studies are available in France, using complete family reconstitution from parish records, the only reliable source of fertility data in the eighteenth century, pioneered by Louis Henry in France (Henry, 1972*a*,*b*, 1978; Henry and Houdaille, 1973; Houdaille, 1976) and Tony Wrigley in England (Wrigley et al., 1997). Demographers searched through handwritten records of baptism, marriage, and death, which "life consists only of" (Wrigley et al., 1997, p. 12), to study the populations of selected small, rural villages, reconstituting the entire life histories of their inhabitants.

Figure 4, Panels C and D, plot the total fertility rates for married women estimated using the family reconstitutions data of Henry in France and Wrigley in England, based on 40 parishes in France and 26 in England. The data shows that the onset of the fertility decline occurred during the 1770s in France, approximately aligning with the estimation of Cummins (2009, 2012), who dated it to 1776. However, there is a poor correlation in levels with available representative sources, in the years when both sources are available.

Indeed, there are important issues with these studies (see Alter, 2019; Ruggles, 1999; Schofield, 1972; Séguy, 2001, among others). Henry and Wrigley could only select a handful of small rural villages, resulting in limited spatial variation, potential issues of representativeness, and migrations being unaccounted for. Additionally, The efforts required to undertake such data collection are colossal. To reconstruct fertility, researchers need a comprehensive knowledge of lineages, encompassing all births from specific parents. However, there are limited clues regarding where and when to find the different records containing this information. Furthermore, historical records often lacked essential details, because of changing names, incomplete or missing age and date of birth, and rounded dates. As a consequence, substantial efforts are necessary to cross-check and validate each piece of information. Last but not least, other challenges that emerged from the quality of early registers are the issues of poor handwriting and dubious reliability. As a result, while family reconstitutions allowed the measurement of fertility in periods without census data, careful interpretation is crucial.

3.2 Crowdsourced genealogical data

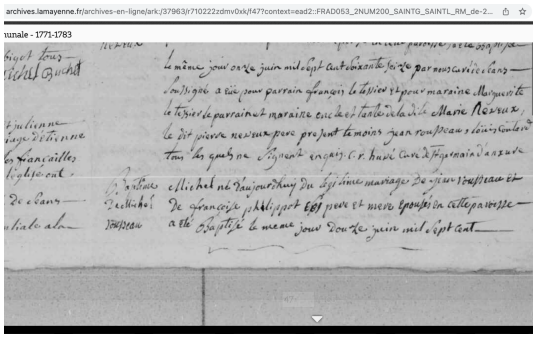
The data. To alleviate these issues and comprehensively document the fertility decline with a representative sample of the population, I use a novel individual-level dataset crowdsourced from publicly available genealogies on geni.com. The raw genealogical data, the *familinx* dataset, was downloaded, cleaned (in particular, to account for the double counting of individuals), and made publicly available by Kaplanis et al. (2018), from all public profiles on geni. It contains 86 million individuals, with direct intergenerational links. Approximately one-fifth were placed into latitude-longitude coordinates, with less than 10 million observed in Europe at some point after 1400. Among these, 370,242 were born, had their first child, or passed away in France.

This data relies on the work of descendants reconstituting their family tree by searching

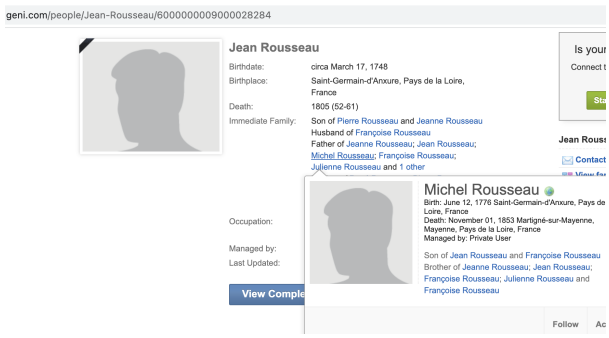
through the same parish records as the ones used by demographers. In France, those records are scanned and available online with unrestricted access from the mid-seventeenth century onward. For example, in the village of Saint-Germain-d'Anxure, they are publicly available starting 1629.[10] Figure 3, Panel A, shows such a record, the baptism of Michel Rousseau on June 12, 1776. His descendants reconstituted their family tree, found this record, and created a profile for Michel Rousseau. Not only they found his baptism record, but also those of his five siblings, Jeanne, Jean, Françoise, Julienne, and Françoise, all born between 1772 and 1788, and associated them to the father Jean Rousseau, whose profile on geni is displayed in Panel B. Panel C shows the observation for Jean Rousseau in the dataset used in this paper, including information about how many children his parents had.

Figure 3: From parish records to geni.com to crowdsourced genealogical data

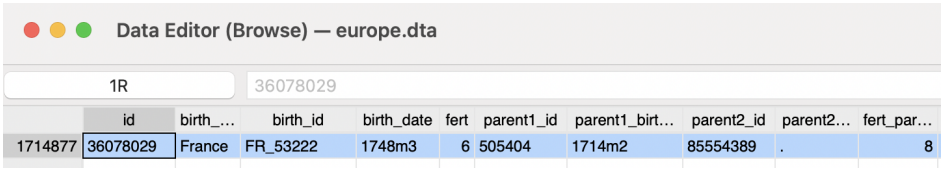
Note: This Figure displays the birth record of Michel Rousseau on June 12, 1776 (Panel A), the page of Jean Rousseau, Michel's father on geni.com (Panel A), and the observation for Jean Rousseau in the main dataset used in this paper (Panel C). Panel A is a screenshot from **archives.lamayenne.fr/archives-en-ligne/ark:/37963/r710222zdmv0xk/f47** while Panel B is a screenshot from **geni.com/people/Jean-Rousseau/6000000009000028284**.



(Panel A) Parish record



(Panel B) geni.com



	id	birth_...	birth_id	birth_date	fert	parent1_id	parent1_birt...	parent2_id	parent2...	fert_par...
1714877	36078029	France	FR_53222	1748m3	6	505404	1714m2	85554389	.	8

(Panel C) Data

Using the *familinx* dataset, I clean and improve the geocoding of observations and augment the data with information on the urban status of municipalities at the time; construct estimates of fertility by tracing the horizontal lineages in the genealogies; and evaluate selection into the sample by comparing the data to the best available representative data. I provide a comprehensive and detailed account of each step below. First, to improve the geocoding, I merge together different coordinates associated with each location and link them to coordinates of 2016 local administrative units (municipalities) and NUTS statistical regions (*départements* and regions). Then, I merge the data with time-varying estimates of the urbanization of municipalities from Bairoch, Batou and Chèvre (1988) to capture rural-urban

[10] See **archives.lamayenne.fr/archives-en-ligne/ark:/37963/r710211zmqbftk/f1**.

differences, account for migrations, and evaluate sample selection.

Finally, I generate a measure of fertility by searching through horizontal lineages. Indeed, family trees predominantly contain vertical lineages, with direct ancestors, rather than horizontal branches, with indirect ancestors (cousins, grandcousins, etc). Appendix Figure A3 shows such a tree. Because accurately measuring fertility requires counting siblings, found in horizontal lineages, I focus throughout the paper on the *fertility sample*, the sample of individuals i with a recorded horizontal lineage, for which at least one parent in any of the four preceding generations, excluding individual i themselves, is recorded as having more than one child. There are $31,553$ individuals in the fertility sample, approximately 10 percent of the main sample. This approach is already being adopted and discussed in subsequent papers (see Blanc, 2023; Gay, Gobbi and Goñi, 2023; Omenti, 2023).

Evaluating selection into the sample. To assess the reliability of the genealogical data and the degree of selection in the fertility sample, I compare the genealogies to the best available representative sources over time. Throughout the paper, year is defined in the genealogies as year of birth of the first child, except for mortality, where year is defined as as year of death. I show that the genealogical data is a representative sample of the overall population in the eighteenth and nineteenth centuries. Kaplanis et al. (2018) also find a high correlation with representative data, but only look at longevity, at a much more aggregated level, worldwide, after 1840.[11]

To do this, I systematically leverage a particularly wide range of representative sources for longevity, urbanization, and fertility, from censuses to various estimations, spanning various historical periods. For longevity, I collect data on adult life expectancy from the Human Mortality Database (HMD, 2019), mostly based on censuses and available from 1816 to 2017; and from Blayo (1975*a*,*b*), available from 1740 to 1829.

For urbanization, I collect estimates of the share of the population who lived in municipalities of more than 5,000 inhabitants from population counts (BDCassini, 2017), available from 1793 to 1999; and from a diverse array of sources. First, using rates of urbanization constructed by Paul Bairoch and co-authors from estimates of urban population of Bairoch, Batou and Chèvre (1988) and unknown estimates of total population, available from 1500 to 1800 (Bairoch, Batou and Chèvre, 1988, Table B5, p. 259), 1800 to 1910 (Bairoch and Goertz, 1986, Table 3, p. 288), and 1800 to 1980 (Bairoch, 1988, Table 13.4, p. 221). Estimates for a given year sometimes vary widely across sources. I rely on the average estimate. Second, combining estimates of urban population of Bairoch, Batou and Chèvre (1988) and estimates of total population of Bolt and van Zanden (2014); Ridolfi (2016), available from 1500 to 1850. Third, using rates of urbanization constructed by Acemoglu, Johnson and Robinson (2005) from estimates of urban population of Bairoch, Batou and Chèvre (1988) and estimates of total population of McEvedy and Jones (1978), available from 1500 to 1850. Finally, using rates of urbanization constructed by de Vries (1984) from its own estimates of urban population

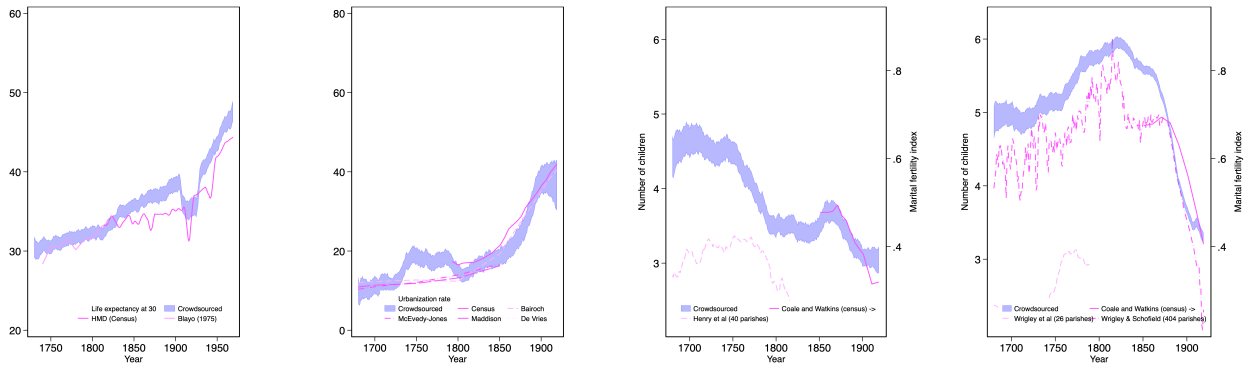
[11] A number of subsequent papers also find limited bias and selection in the geni data (see, e.g. Cozzani et al., 2023; Minardi, Corti and Barban, 2023). Examining mortality in Germany and the Netherlands, Stelter and Alburez-Gutierrez (2022) show that there is bias in the data only prior to circa 1800, that is for individuals who were born before the late seventeenth century.

using a 10,000 inhabitants threshold and (unknown) various estimates of total population, available from 1500 to 1850.

For fertility, I collect data on marital fertility from census data (Coale and Watkins, 1986), available from 1851 to 1961 in France and in England; on total fertility from the aggregative extractions of vital statistics of Wrigley and Schofield (1981), available from 1541 to 2015 in England; and on total fertility from the family reconstitutions of Henry in France and Wrigley in England, available from 1670 to 1819 and 1580 to 1837, respectively.

Figure 4: Is geni.com a biased sample?

Note: This figure displays longevity, urbanization, and fertility series over time in the fertility sample of the crowdsourced genealogies in France (and England for fertility) and in representative data. Longevity is defined as the average age at death minus 30 years for individuals who died aged 30 years or older in a given year (in the genealogies), or as the life expectancy at 30 in a given year (in representative data). Urbanization is defined as the share of the population who had their first child in a given year and were born in a town coded as urban at the time of their birth (in the genealogies), or as the share of the population living in a urban town in a given year (in representative data). Fertility is defined as the average number of children born to individuals who had their first child in a given year (in the genealogies), or as the marital fertility index in a given year (in representative data). Further information on the data is provided in the accompanying text.



(Panel A) Longevity in France **(Panel B)** Urbanization in France **(Panel C)** Fertility in France **(Panel D)** Fertility in England

Figure 4 compares the genealogies to representative series over time. There are only limited differences and the correlation between the genealogical data and representative series is well above 90 percent, suggesting that selection is limited.[12] For the study of fertility, the genealogies are particularly consistent with censuses when available and, in England, superimpose almost perfectly with the representative series in the eighteenth century—which are not available in France. In subsequent research, Blanc (2023) systematically extends and standardizes this comparison to thirty European countries and finds similar results. The results suggest that the data is a a representative sample of the overall population, allowing to comprehensively document the fertility decline.

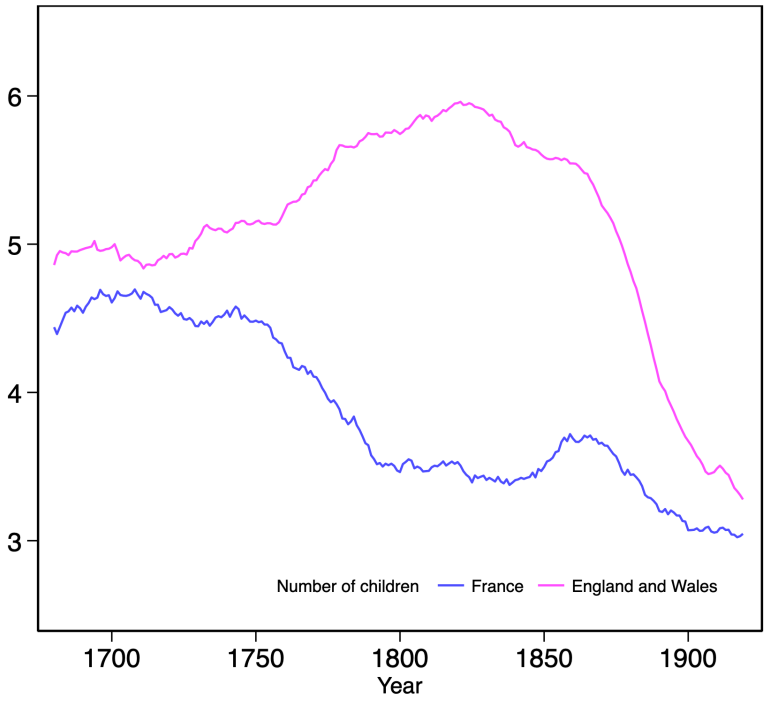
In addition to alleviating the measurement issues discussed in the previous sub-section, genealogical data has a number of advantages. First, it provides a unique continuous series spanning the entire eighteenth and nineteenth centuries, during which representative sources are typically not available or limited to restricted intervals only, mostly towards the end of the period. For example, there are more than five different measures of historical urbanization,

[12]Outside of the period displayed (results available upon demand), there is a high degree of selection into the data. For example, individuals in the genealogies lived predominantly in cities.

each offering significantly divergent estimates. Second, while demographers usually need to rely on population-level measures, such as life expectancy or the marital fertility index, which are constructed using available cross-sectional data for different age groups, the genealogies allow the measurement of longevity and fertility at the individual level.

Figure 5: The historical fertility transition

Note: This figure displays the gross rate of fertility for France and for England and Wales over time using the geni data. Further information on the data is provided in the accompanying text.



Using crowdsourced genealogical data allows to establish that the decline took hold around 1760, as displayed in Figure 5, which plots the number of children per woman in France and in England and Wales over time. There is particularly strong divergence between the two countries from the 1760s onwards. Since year is measured as of the birth of the first child, and the reproductive period typically spans less than a decade at most, this shows that a significant portion of the decline occurred before the French Revolution, further indicating that the factors influencing this demographic shift were already in place prior to the socio-political changes of the Revolution.

Additionally, although the crowdsourced data indicates a slightly earlier and faster start to the decline than previously suggested, it remains reasonably consistent with the findings of Cummins (2009, 2012), who identified the decline beginning in 1776, and with family reconstitution studies by Henry (1972*a*,*b*, 1978); Henry and Houdaille (1973); Houdaille (1976), which observed a noticeable decline in fertility starting in the 1770s, as discussed above.[13]

[13]The timing of the decline implies that the French Revolution likely sustained, but didn't initiate it. My paper

In less than forty years, the average number of children per woman in France declined to three and a half, while the average English woman was giving birth to almost six children, reflecting the persistence of the Malthusian mechanism in England, as in the rest of the world, for another century. Despite the Industrial Revolution bringing increased short-run prosperity to England, the additional wealth acquired was primarily allocated towards expanding family size. Before the fertility decline, in 1750, France had a population of approximately 25 million inhabitants, while England had 5.5 million. Had the population of France grown at the same rate as England's, there would be about 250 million French people today.

4 The loss of influence of the Catholic Church

Having established the timing of the fertility decline, I provide some historical background on the Catholic Church in France, document its waning influence in the eighteenth century, advance the hypothesis that it caused the fertility decline, and discuss methods of fertility control, including the Church's views on these methods.

4.1 Some historical background

This subsection explores France's religious history, essential for grasping both the historical context and the process of secularization, which will be elaborated upon in the concluding remarks. During medieval times, France was depicted as "the eldest daughter of the Roman Catholic Church," with its kings holding the title "Rex Christianissimus" or 'most Christian king', and its people referred to as "God's chosen people" (Burleigh, 2005, p. 23). Protestantism only ever marginally spread, reaching an estimated 10 percent of the population in the mid-sixteenth century, the majority of whom were Huguenots.

After the Council of Trent (1545–63) initiated the Counter Reformation, French Catholics and Protestants fought a series of civil wars, the French Wars of Religion, culminating with the massacre of thousands of Protestants on Saint Bartholomew's Day in 1572 and a prolonged struggle with the Catholic League of France, or Holy League, a religious and political alliance whose aim was to eradicate Protestants from France. To secure his ascension to the throne, Henry IV even renounced Protestantism and was forced by the Holy League to convert to Catholicism, for the second time, in 1593. Throughout this period, the Counter Reformation remained particularly strong in France, with the persecution and forced conversion of Protestants (Chartier, 1991; Van Kley, 1996).[14]

While the Catholic Church's monopoly gave rise to the unchallenged diffusion and consolidation of the Counter Reformation, spearheaded by the Jesuits, as in the rest of the world, France also witnessed the emergence of Jansenism, a rigorist Catholic movement particularly

explores secularization as a potential cause, possibly influencing both the initial demographic shift and the Revolution, and therefore the later part of the fertility decline as well. The findings of Gay, Gobbi and Goñi (2023), on the role played by inheritance change after the French Revolution, support this interpretation.

[14]The promulgation of the Edict of Nantes in 1598 temporarily ended the French Wars of Religion by granting French Protestants substantial rights and freedom of religion. However, in 1685, Louis XIV revoked the Edict of Nantes with the Edict of Fontainebleau, effectively ending religious toleration. The edict deprived Protestants of all religious and civil liberties and ordered the destruction of Protestant churches as well as policies of persecution and forced conversion.

critical of religious and political elites. Advocating predestination, limited sacraments, and penitence, Jansenists appealed to the masses by translating the Bible into French, against the Council of Trent's interdiction, challenging the Catholic elites, in particular the Jesuits, and embracing Gallicanism, a movement promoting the separation of the Church of France from the authority of the pope and a divine-right monarchy (Maire, 1998, 2019).

Jansenists faced strong opposition from political and religious elites, with the demolition of the Abbey of Port Royal des Champs, the center of Jansenism in France, by Louis XIV in 1709 and the condemnation of 101 Jansenist views in the *Unigenitus* papal bull in 1713. This triggered important religious conflicts, with Jesuit bishops and high clergy often denying sacraments and burial in consecrated ground to those who did not provide a proof of submission to the papal bull, *billets de confession*, and political conflicts, where parliaments, in particular that of Paris, and the low clergy sided with Jansenists against the monarchy and the Jesuits (Friedrich, 2022; Perez, 1999; Van Kley, 1975).

4.2 Aggregate-level evidence on secularization

At least since de Tocqueville (1856), we know that a large process of secularization took hold in France in the mid-eighteenth century, before the French Revolution. However, documenting the loss of influence of the Catholic Church is challenging since the best available data on devotion, easter attendance, is only measured two centuries after–in 1966 (Boulard, 1966). Although there are good proxies of the devotion of the elites before that (see Andersen and Bentzen, 2022), such data on the devotion of the *masses* hardly exists, in a country where more than 80 percent of the population was rural. Additionally, most of the existing evidence is anecdotal as there is only very limited comparable data available,even in the cross-section.[15]

Using a variety of secondary data sources, I discuss the process of secularization, with the waning influence of the Church and strong anti-clericalism. I gather data from and shed light on the work of historians who have extensively documented the decline of Church influence through regional-level case-studies. I focus on Provence, which used to be one of the most religious regions of France (Agulhon and Coulet, 2018) and even hosted the papacy in Avignon, yet became a stronghold of secularization (Vovelle, 1973).

I document the transition to secular attitudes and beliefs using data on bequests, legacies for perpetual masses, offerings to the church, and requests for burials in holy places, as well as on the number of invocations of God, Jesus Christ, the Virgin Mary, and various saints in wills from Vovelle (1973). The data includes the universe of wills during the eighteenth century in a comprehensive sample of villages and cities. Although wealthier individuals were slightly more likely to leave a will, this is the best available data, and Vovelle (1973) shows they were left by individuals of all social classes and sometimes by more than 80 percent of

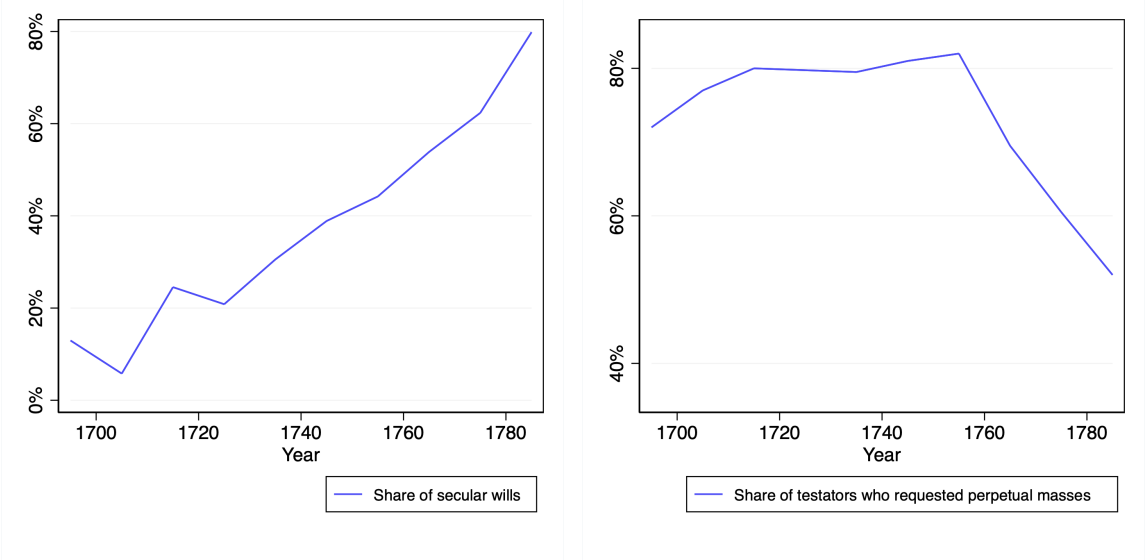
[15] Additionally, capturing changes in devotion with changes in the use of religious names, as in Andersen and Bentzen (2022), may result in a number of issues since important variations in devotion are only associated with negligible changes in the use of religious names. For example, Figure 5 of Andersen and Bentzen (2022) shows that the probability of having a religious name increases from 64 to 68 percent when moving from a secular region like Provence (Basses-Alpes) to a religious region like Alsace (Bas-Rhin). Basses-Alpes has about 20 percent refractory clergy, and similar figures for easter attendance, while Bas-Rhin has about 90 percent for both.

the population.[16]

The use of wills as an indicator of the intensity of the devotion of those who left them goes back to Ariès (1974); Chaunu (1978). Chaunu (1978) finds remarkably similar results in parts of Paris. Using similar data and approaches, Hoffman (1984), Norberg (1985), and Dinet (1991) also find substantial secular changes in the rural parts of the diocese of Lyon, in the diocese of Grenoble, and in Burgundy in the eighteenth century. In Brittany, which remains strongly Catholic, evidence that such a change occurred is indeed much more limited (Bois, 1960; Tingle, 2012).

Figure 6: Secularization

Note: This figure displays the share of testators using secular language in the opening statements of their wills (Panel A) and the share of testators who requested perpetual masses (Panel B) in Provence from 1690 to 1789. Source: Vovelle (1973).



(Panel A) Secular language

(Panel B) Perpetual masses

Figure 6, Panel A, displays the share of secular wills over time. The data shows that attitudes and beliefs towards death changed radically in the course of the eighteenth century. For example, Darnton (1978) explains that "In the late seventeenth and early eighteenth centuries, testators consistently described themselves as adherent of the holy, apostolic Roman Catholic Church, who were prepared to meet their Maker, God the Creator, and Jesus Christ, His Son, by whose death and passion they hoped to be pardoned for their sins and to join the saints and angels in the Celestial Court of Paradise. ... By the 1780s most Provençal wills had reduced the traditional formula to a single clause: '*Having recommended his soul to God*'. The Virgin Mary and saintly intercessors were gone, the Celestial Court emptied of angels. Christ himself had receded into the background, while God the Father sometimes took the form of 'Divine Providence'. Many wills had become totally secularized, and some

[16]If anything, the data is expected to underestimate the loss of influence of the Church since the upper classes remained more devoted (see Vovelle, 1973, and Appendix Figure A4, Panel A).

even described death as '*the indispensable tribute that we owe to Nature*'" (p. 126).

In the 1690s, only 13 percent of wills used secular language.[17] Interestingly, following the Great Plague of Marseille, which killed as many as 100,000 people in the 1720s, the share of secular wills temporarily decreased in places most affected by the plague. After the 1730s, secularization took hold with a significant increase in the share of secular wills. On the eve of the French Revolution, more than 80 percent of wills were secular. Despite its deeply religious past, Provence had undergone a significant decline in church influence, as further suggested by data on easter attendance in 1966 and on the presence of refractory clergy in 1791 (discussed in the next section). Historical data, such as wills in the 1690s and the extent of the Holy League in 1590 (from Black, 1996, p. 57, further discussed in the concluding remarks), attests to its religious nature in the past.

Other indicators of secularization, such as requests for requiem masses (perpetual masses for the dead), bequests, offerings to the church, invocations of the Virgin Mary, or even average weight of funeral candles, all declined significantly (Vovelle, 1973). For example, Figure 6, Panel B, shows a significant decline in requests for perpetual, requiem masses in the mid-eighteenth century. Appendix Figure A4, Panel A, shows that this change was more important for the lower classes than for the elites (Appendix Section A1.1 documents this further); while Panel B shows a similar decline in invocations of the Virgin Mary–who was of particular importance in Provence.

Vovelle (1973) argued that these declines indicate a *mutation of collective sensibility*, or a loosening of traditional religious moral constraints. He also uses the word 'dechristianization', which generated extensive discussions in the history literature. For example, Tackett (2005) argues that, although "there can be doubt that there was indeed a decline in the intensity of commitment to Christianity" (p. 149), this may have resulted from "intense anti-clericalism" (p. 150) rather than a full-blown criticism of the Christian religion. However, the fact that a significant change in attitudes towards the Church took hold, in multiple regions, before the French Revolution and around the same time as the decline in fertility suggests that it played an important role in the fertility decline.

Comparative evidence. To the best of my knowledge, although there is extremely scarce harmonized data on devotion in the eighteenth century, there is no work documenting such a loss of influence of the Church in other countries in Europe. Some regions of Germany experienced the separation of church and state following the spread of Protestantism (see Cantoni, Dittmar and Yuchtman, 2018) but France was the first country to secularize at such a scale, with a move away from the teachings of the Church and strong anti-clericalism, and in such a persistent manner (Todd, 1990).[18]

[17] This figure is likely underestimating devotion before dechristianization since, as Vovelle (1973) argues, it is mostly the result of illiteracy or clergy members deeming references to their faith too obvious.

[18] According to Todd (1990), the South of Italy and some parts of Spain were temporarily affected by some degree of secularization in the eighteenth and in the nineteenth centuries. However, not as much as France was, and these episodes were short-lived, contrary to France, where the French Revolution took place and a program of dechristianization was implemented. Additionally, these were much poorer than France at the time and did not experience an early and sustained decline in fertility, consistent with my findings on mechanisms in Section 5.2, where I show an interaction between economic forces and secularization.

4.3 Contraception

Methods of contraception. How could the French have less children if modern methods of contraception only became widely available well after the onset of the fertility decline?

Early condoms, made of linen or animal intestines and known as *redingotes d'Angleterre* ('English riding coats'), were expensive and not very common, although Casanova reported resorting systematically to them. In the eighteenth-century, the enlightened elites and bourgeoisie of France practiced libertinage, *les plaisirs de la petite oie* ('pleasures of the little goose', to refer to mutual masturbation, see Van de Walle and Muhsam (1995)), and other pleasures alike. The libertine literature was particularly widespread in France (Darnton, 1991), with works such as *Venus in the Cloister or The Nun in her Smock* (1683), *The Indiscreet Jewels* (1748) by Diderot, or *Philosophy in the Bedroom* (1775) by the Marquis de Sade. Other methods, such as chastity, delayed marriage, sodomy, abortion, or infanticide, are not particularly relevant and were not widely known (Van de Walle, 2005).

In contrast to these methods, natural means of contraception, and in particular *coitus interruptus* (withdrawal), have long been known. *Coitus interruptus* is mentioned in the Bible (Sin of Onan), but also in "the Talmud and the Muslim tradition" (Himes, 1936; Van de Walle, 2005). In the eighteenth century, it was "frequently alluded to in libertine literature" (p. 2). In France, referring to it, Jean-Baptiste Moheau (1778) famously argued, in 1778, that "already the fatal secrets *unknown to any animal but man* have penetrated in the countryside: *nature gets cheated* even in the villages," while Goudar (1756) wrote that "It is the same love of ease and convenience that is filling France with bachelors ... men who vanish from the world with all their posterity" (p. 271).

Catholic Church and contraception. The Catholic Church's position on contraception and sex gradually evolved. The Bible urges, multiple times, the faithful to "be fruitful and multiply and fill the earth" (Genesis 9:1), and the account of the sin of Onan designates both masturbation and unnatural intercourse, including *coitus interruptus*, as evil. However, although "fruitfulness is a divine reward" (Noonan, 1965, p. 31), the pronouncements of the church against contraception were often discrete and indirect (Noonan, 1965). In fact, the sexual morality promoted by the Catholic Church long faced a dilemma between the multiplicative purpose of marriage and the sinful nature of 'things of the flesh'. Yet, Noonan (1965) argues that "the value placed on human fecundity in the Old Testament as a whole is evident...fruitfulness is a divine reward" (p. 31).

The multiplicative purpose of marriage "received its strongest official approval" (Noonan, 1965, p. 276) in the *Exultate Deo* papal bull of 1439: "Through matrimony [the church] is corporally increased." Yet, it was not until after the threat of the Protestant Reformation, and the Counter Reformation, that the views of the Catholic Church permanently permanently shifted in the face of competition (Noonan, 1965).[19] Fourier (1822) argues that "religious

[19] To an increased sacramentality of marriage, and more sexual austerity outside of it. Hoffman (1984) argues that "evidence of the new sexual morality appears throughout the Counter Reformation: bans upon nudity in religious art, harsher rules against illegitimacy, prostitution, and concubinage, and more 'puritanical' standards of dress and behavior."

dogmas, more severe than in antiquity, forbid the husband certain precautions that prudence dictates: *Interdictio semen effundendi extra vas debitum*" (p.405).

There is mounting evidence that, in the eighteenth century, the clergy understood marriage and sex to be acts of procreation instead of pleasure. According to Van de Walle and Muhsam (1995), "The orthodox position available to French literati in the late sixteenth century [was that] it is considered sinful in marriage to ejaculate outside of the natural receptacle (*ex vas naturale*), and only somewhat less sinful to use 'unnatural positions'" (p. 269). Not only was *coitus interruptus* sinful, but the purpose of marriage became explicitly multiplicative. In the seventeenth century, notorious clergy members such as Francis de Sales and Pierre de Bourdeilles referred to withdrawal and other contraceptive methods and argued that '*marital fertility should not be interfered with*' (Van de Walle and Muhsam, 1995). For example, in *Les Dames galantes*, published in 1666, "Brantôme concludes that the belief that marriage is instituted for pleasure is wrong and that the greatest blessing God can send in marriage is 'a good lineage'" (Van de Walle and Muhsam, 1995, p. 269).[20]

5 Main findings across départements

5.1 The data

The refractory clergy. The main explanatory variable throughout the rest of the paper is the population weighed share of refractory clergy in 1791.[21] In July 1790, during the French Revolution, the National Constituent Assembly passed the Civil Constitution of the Clergy, which required all clergymen to swear an oath of loyalty to the secular state. The oath had to be taken "on a Sunday at the conclusion of the mass" (Decree on the clerical oath). I use the share of clergymen that did not take the oath, known as refractory clergy, in 1791 to proxy for secularization on the eve of the French Revolution. According to Tackett (1986), "the regional reactions of clergymen in 1791 can be revealing of the attitudes and religious options of the lay population with which the clergymen lived" (p. xvi). The data on the oath is constructed from the choices of more than fifty thousand parish clergymen, who made up more than 90 percent of all priests and vicars holding posts (Tackett, 1986, p. 39).

The share of refractory clergy is measured before the August 1792 decree that ordered all non-jurors to leave the country and before the War in Vendée, the Paris Commune, the Reign of Terror, and the establishment of anticlerical cults (the Cult of Reason and the Cult of the Supreme Being, among others). Moreover, before the 1792 decree, according to Tackett (1986), "the National Assembly ... allowed the continued presence of the refractory clergy." Hence, the refractory clergy in 1791 does not capture the effect of the main revolutionary events and policies of dechristianization but rather religious attitudes on the eve of the French

[20] In the early eighteenth century, the sacramentality of marriage was also increasingly criticized by the lay population—especially following the Edict of 1715 forbidding Protestants from marrying and after the controversy of the *billets de confessions* in the 1750s when the Church denied sacraments and burial in consecrated ground to Jansenists (Maire, 2019).

[21] Because it is measured at the district level, I use the district population-weighed average of the district-level share of refractory clergy in the analysis at the *département* level. I generate district boundaries with Thiessen polygons using the district capitals from Tackett (1986).

Revolution. To account for state legitimacy at the time of the French Revolution, I control for the share of deserters among conscripts in the French army between 1798 and 1805 (Forrest, 1989) throughout this section.

It is well established that the presence of refractory clergy captures devotion on the eve of the French Revolution (Franck and Johnson, 2016; Squicciarini, 2020; Tackett, 1986). According to Tackett (1986), "The map of clerical reactions in 1791 was remarkably similar to the map of religious practice in the middle of the twentieth century" (p. xv). Appendix Table A1 and Appendix Figure A6 further establish the relevance to the refractory clergy as a proxy to religiosity after secularization throughout the nineteenth and twentieth centuries, including with the best available measure of devotion, easter attendance, only available in 1966 (Boulard, 1966). In fact, it is highly unlikely that the clergy would have sworn an oath of allegiance to a secular government before secularization.

Does the refractory clergy capture secularization or pre-existing differences? While this distinction is not critical for my central argument—since documenting both an overall trend of secularization and a correlation between religiosity and fertility would be enough to suggest that secularization drove the fertility decline—there is substantial evidence suggesting that it captures secularization. Appendix Section A1.2 shows that the presence of refractory clergy does not capture pre-existing differences, and documents, in Provence, a cross-sectional correlation between the share of refractory clergy and the secularization of wills, but not with pre-existing differences. These pre-existing differences include the number of clergymen per capita, the average rate of the tithe, the number of abbeys, the duration of Jesuit presence, and the presence of Protestants, as detailed below. In the concluding remarks, I further document this pattern and even show some evidence of a reversal using data on the presence of the Holy League.

Marital fertility. The primary variable of interest is the year of transition to a marital-fertility index below 50 percent of the fertility of the Hutterites (Coale and Watkins, 1986).[22] The index is available for nineteen years from 1831 to 1961, averages 0.56 in 1831 and decreases to 0.33 in 1961 (Table A1, Panel A). In pre-transition societies like England, marital fertility averages roughly two thirds of the fertility of the Hutterites. Several *départements* had already experienced a fertility decline to below 0.5 by 1831, necessitating the use of both OLS and Tobit to account for the truncated transition dates.

Controls. I account for proxies for religiosity before secularization, with the number of clergymen per capita (Tackett, 1986), the average rate of the tithe (Gagnol, 1911), the number of abbeys (BDCassini, 2017; Franck and Michalopoulos, 2017), the duration of Jesuit presence (Grendler, 2017), and the presence of Protestants (Mours, 1958).[23]

[22] I focus on marital fertility rather than overall fertility because it is the standard measure to detect the presence of fertility control achieved through parity-specific means (Coale and Watkins, 1986).

[23] The number of clergymen per capita is measured in 1791 since this is the earliest available data point. Because it is a stock, it should decline slowly and with a lag. Additionally, if it were to capture secularization, it would drive the coefficient on the share of refractory clergy to zero. I find limited evidence, quantitatively marginal, suggesting this: point estimates are slightly larger in most regressions without adding this control. The rate of the tithe is measured in 1750, the number of abbeys in 1756, and the duration of Jesuit presence in 1763, at the time of their expulsion. The

I also account for cultural factors, with a dummy that measures the presence of a printing press in 1500 (Clair, 1976; Febvre and Martin, 1958), the number of books printed in 1500 (ISTC, 2008), the log of *Encyclopédie* subscriptions per capita in the period 1776–79 as a proxy for the diffusion of the Enlightenment (Darnton, 1973), and linguistic distance from French in 1901 (Blanc and Kubo, 2024); institutional factors, with fixed effects for *pays* status (fiscal regions in *ancien régime* France which may capture pre-existing differences in state capacity and democratization, from **Wikipedia**), and the share of deserters among conscripts in the French army between 1798 and 1805 (Forrest, 1989); education, using the literacy rate of conscripts in the year of observation (SGF, 1878); pre-industrial development, with population density (BDCassini, 2017) and average soldier height before 1760 (Komlos, 2006); and contemporary development, with the log rate of urbanization (BDCassini, 2017), defined as the share of the population living in towns with more than five thousand inhabitants. Appendix Figure A7 displays the spatial distribution of some of these variables of interest.

5.2 Baseline results

Determinants of year of transition. I study the cross-sectional determinants of transition date, the first year in which marital-fertility declined below .5. I estimate Equation 1 with OLS and a Tobit model (by maximum likelihood) in order to account for the left-censoring nature of the data since about a quarter of *départements* had already transitioned in 1831. The main variable of interest is the share of refractory clergy in 1791.

$$(\text{Transition date})_i = \beta \times \text{Ref. clergy}_{i,1791} + \boldsymbol{X}_i^{'}\delta + \varepsilon_i \tag{1}$$

Table 1 reports the results, along with robust standard errors. Appendix Figure A9 plots the scatterplot and partial residual plot. A 10-percentage-point increase in the share of refractory clergy is associated with a delay in the year of transition of more than ten years. This is a particularly large effect: moving from the 25th to the 75th percentile of the distribution of refractory clergy is associated with a delay in the demographic transition of more than a standard deviation.

The estimates are stable and significant at the 1 percent level across all specifications. Specification 2 controls for proxies for religiosity before secularization in order to capture the effect of secularization. These controls include, notably, the number of clergymen per capita, the number of abbeys, and the average rate of the tithe collected by the church. Specification 3 controls for observed cultural and institutional factors. In particular, the share of deserters in the army during the French Revolution and fiscal status (*pays d'élection*, *d'Etat*, or *d'imposition*) in the *ancien régime* allow me to capture religiosity and not state legitimacy with the refractory-clergy measure. The specification also controls for linguistic distance to French (in order to capture the diffusion and adoption of new cultural norms (Spolaore and Wacziarg, 2022)) and *Encyclopédie* subscriptions (in order to capture the diffusion of the

share of protestants is measured in 1815 because the only other available year for this variable is 1670, which would not capture the effect of their expulsion in 1685. Additionally, there was very limited change in the share of protestants between 1750 and and 1815.

Table 1: Determinants of transition date

Note: This table displays the results of the cross-sectional regression of transition dates on the population-weighed share of refractory clergy in 1791. Transition date is defined as the first year with $I_g \leq .5$. Controls are described in Section 5. All observations are weighed by *département* population in 1831. Robust standard errors are reported. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	dep var: Transition date						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Refractory clergy (1791)							
Ordinary Least Squares	97.23***	98.29***	83.99***	101.07***	101.39***	101.27***	103.78***
	(13.14)	(13.42)	(13.05)	(22.54)	(21.72)	(22.49)	(22.97)
Tobit (Maximum likelihood)	118.60***	117.55***	94.30***	113.16***	112.13***	111.65***	115.26***
	(16.90)	(16.74)	(15.52)	(24.19)	(23.35)	(24.08)	(24.70)
Controls							
Religiosity (pre-secularization)		Yes	Yes	Yes	Yes	Yes	Yes
Cultural and institutional factors			Yes	Yes	Yes	Yes	Yes
Region fixed effects				Yes	Yes	Yes	Yes
Education and schooling					Yes	Yes	Yes
Pre-industrial development						Yes	Yes
Contemporary development							Yes
Mean of dep var	1863	1862	1861	1861	1861	1861	1861
Left censored observations	24	24	23	23	23	23	23
Observations	85	80	77	77	77	77	76
Adjusted R^2 (OLS)	0.40	0.40	0.55	0.61	0.63	0.61	0.60
Log likelihood (Tobit)	-322.3	-293.6	-267.9	-254.2	-253.0	-252.9	-248.6

Enlightenment and the presence of local knowledge elites, who may have had an impact on cultural change and the modernization of society as a whole). Specification 4 adds twelve region fixed effects to account for unobserved cultural or economic factors that might confound the effect of the refractory clergy. For example, ancestry may have an effect on the diffusion of modernization, while the presence of nuclear family structure might influence on fertility (Todd, 1990).[24] Specification 5 controls for literacy to account for the quantity-quality trade-off, while specifications 6 and 7 account for development. The results remain virtually unaffected.

Finally, I estimate Equation 1 for alternative definitions of transition date in Appendix Table A5: below 30, 40, 50, 60, and 70 percent of the fertility of the Hutterites. The coefficient on the refractory clergy is largest for the first year in which marital fertility dropped below 0.6, which is a level corresponding to a 10 percent decline from the average marital fertility in pre-transition Europe (about 0.65), while a decline in marital fertility below 0.5 corresponds to a drop of about 25 percent.

Magnitude. Table 2 presents standardized beta coefficients for selected determinants of transition date. I evaluate and compare the magnitude of a number of factors that may have played a role in the early demographic transition in France, including religiosity but also Encyclopedie subscriptions, linguistic distance from the French language, literacy, and development. I report the results without any controls but also, in the last column, after

[24] After including fixed effects for family structure, the estimated OLS coefficient is 95.19, still significant at the one percent level.

accounting for the full set of controls.

The first column corresponds to the first specification of Table 1. In column (2), I evaluate the role of cultural attributes and find a large and significant correlation with subscriptions to Diderot and d'Alembert's *Encyclopédie*. Decreasing the number of subscriptions per capita by one standard deviation is predicted to delay the transition date by one-third of a standard deviation, with or without controls. This is the second-largest effect after the refractory clergy in 1791 and is consistent with the pattern documented by Squicciarini and Voigtländer (2015, 2016). Yet, it is unlikely that it played a major role in the French demographic transition because Enlightenment ideas diffused throughout most of Western Europe and especially England and Scotland.

Table 2: Magnitude of the determinants of transition date

Note: This table displays the results of the cross-sectional OLS regression of transition dates on a set of variables of interest. Transition date is defined as the first year with $I_g \leq .5$. Standardized beta coefficients are reported. All observations are weighed by *département* population.
$^{+}$ $p < 0.2$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	dep var: Transition date						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Standardized beta coefficients							
Refractory clergy (1791)	0.64***						0.69***
	(0.09)						(0.15)
log 1 + Encyclopedie		-0.28**					-0.30**
		(0.11)					(0.13)
Linguistic distance to French			0.23**				0.02
			(0.09)				(0.21)
Literacy				-0.13			0.34^{+}
				(0.11)			(0.20)
Population density					-0.03		-0.08
					(0.04)		(0.23)
log 1 + urbanization						-0.03	-0.10
						(0.09)	(0.11)
Full set of controls							Yes
Observations	85	87	85	86	88	86	76
Adjusted R^2	0.40	0.07	0.04	0.01	-0.01	-0.01	0.60

Then, because religiosity could capture barriers to the diffusion of norms favoring limited fertility, rather than a direct effect of cultural differences, I look at linguistic distance from French in 1900 in (3).[25] Without controls, the effect is large and significant yet the standardized beta coefficient is more than four times smaller than that of the effect of the refractory clergy, suggesting that the main independent variable is capturing a direct effect of religiosity rather than barriers. After accounting for the full set of controls, the estimated coefficient

[25]I use data from Blanc and Kubo (2024) to leverage granular variation in linguistic distance within linguistic areas. Results are similar when using the data from Spolaore and Wacziarg (2022).

becomes null and statistically not different from zero. Finally, neither literacy, nor population density, or urbanization had a significant or large effect on the timing of transition. These results suggest that the accumulation of human capital, pre-industrial, or contemporary development were not drivers of the transition in France, in line with the evidence at the macroeconomic level.

Mechanisms. Appendix Table A6 shows the heterogeneous effect of the refractory clergy to understand potential mechanisms. I interact the share of refractory clergy in 1791 with the same selected determinants used in the previous table, and all variables are standardized—therefore the baseline coefficient for the refractory clergy in 1791 corresponds to the case where the interacted variable is evaluated at its mean. I first estimate heterogeneity with respect to Encyclopedie subscriptions, since it is possible that local elites allowed secularization to impact fertility, for example through the diffusion of the libertine literature to the general population. The effect is small and not significant. Similarly, the effect of linguistic distance and literacy is close to zero and not significant.

Importantly, I find an important interaction between cultural and economic factors. The effect of the refractory clergy is twice as large when population density is one standard deviation above its mean, suggesting that pre-industrial development was a necessary condition for the decline in fertility and that, before dechristianization, individuals had more offsprings than their desired level of fertility because of the constraints imposed by the Church. Moorthy (2022) further documents this in France in a recent paper, and Coale and Watkins (1986); Spolaore and Wacziarg (2022) find a similar pattern in Europe as a whole. This result also suggest that overpopulation could have played a role, as suggested by Braudel (1986). However, I do not find the same pattern when looking at urbanization, another traditional proxy for development.

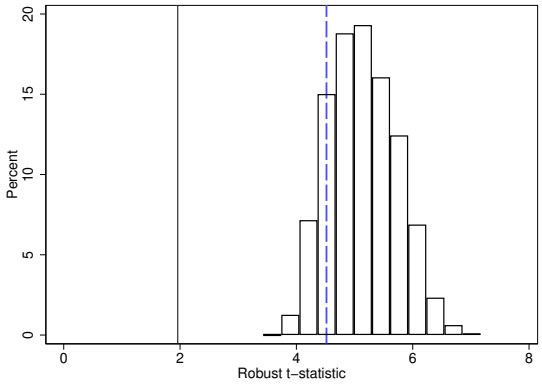
5.3 Robustness, sensitivity, variable selection, selection, and spatial correlation

Appendix 2 further discusses robustness and other concerns, including sensitivity, variable selection, selection, and spatial correlation. I first show that the refractory clergy is also associated with levels of marital fertility. Second, I estimate bounds on the correlation across $32,768$ combinations of controls using sensitivity analysis following Brodeur, Cook and Heyes (2020). Figure 7 shows the distribution of coefficient estimates and t-statistics across all these combinations of controls: not a single specification returns a coefficient either statistically or economically insignificant. Third, since the roots of secularization in France are not well understood, and other variables could influence both the refractory clergy and fertility, I rely on variable selection with double-lasso, a supervised machine-learning technique, and show that the refractory clergy is the variable that plays the most important role. Fourth, following Kelly (2019), I run thousands of simulations by replacing the independent and dependent variables with spatially correlated noise and find that only a negligible portion of these regressions returns significant coefficients. Finally, I estimate coefficients adjusted for selection on unobservables, with standard errors bootstrapped over thousands of replications

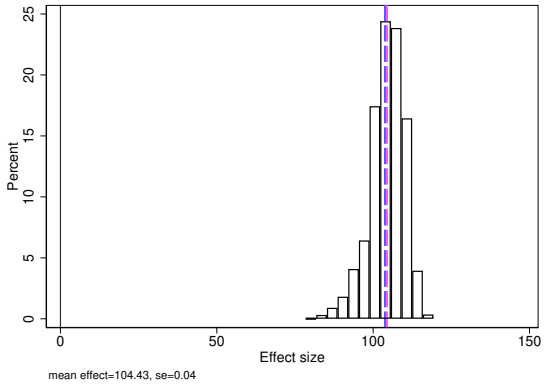
(Oster, 2016). The results suggest that the OLS coefficient is biased downward, in line with the historical evidence suggesting that secularization hit less developed regions (e.g., Provence) disproportionately and was separate from the Enlightenment.

Figure 7: Distribution of coefficient estimates and t-statistics across all combinations of controls

Note: This figure displays the results of $2^{15} = 32,768$ cross-sectional regressions of transition dates on the population-weighed share of refractory clergy and all possible combinations of controls (with region and *pays*-status fixed effects included in all specifications). Panel A displays the distribution of t-statistics, while Panel B displays the distribution of coefficients. The blue line plots the coefficient estimated in Table 1 with the full set of controls (specification 7), and the red line plots the average coefficient across all combinations. The main explanatory variable is defined as the population-weighed share of refractory clergy in 1791. Transition date is defined as the first year with $I_g \leq .5$. Controls are described in Section 5. All observations are weighed by *département* population in 1831. Robust standard errors are reported. This figure was generated using the Stata program provided by Brodeur, Cook and Heyes (2020). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$



(Panel A) t-statistic curve



(Panel B) Effect curve

6 Individual-level results

6.1 Baseline results

Empirical strategy. I rely on the genealogical data from geni.com. The data is a nationally representative sample from 1680 to 1920, as discussed in Section 3. All observations contain geocoded places of birth, marriage, and death, which allows me to match individuals with the refractory clergy in 1791 at the level of their district of birth. Figure A14 displays the towns of birth included in the fertility sample. Appendix Table A11 shows summary statistics.

I model the conditional mean of fertility in Equation 2, where $fert_{i,t}$ is the completed fertility of individual i in decade t. I exploit cross-sectional variation in fertility with decade fixed effects λ_t. Each individual is assigned the share of refractory clergy in 1791 of her district of birth $b(i)$. To account for the count nature of the dependent variable and to robustly estimate the conditional mean of fertility, I assume that fertility follows a Poisson distribution and that the log of the conditional mean of fertility is a linear function of observables. Equation 2 is

estimated with maximum likelihood, using Poisson regressions, in the bulk of the analysis.

$$(2) \quad \log \lambda_{i,t} = \beta \times \text{Ref. clergy}_{b(i),1791} + \boldsymbol{X}'_{i,t}\delta + \lambda_t \equiv \boldsymbol{z}'_{i,t}\gamma$$
$$\text{with} \quad fert_{i,t} \sim \mathcal{P}(\lambda_{i,t}) \quad \text{and} \quad \lambda_{i,t} = \lambda(\boldsymbol{z}_{i,t}) \equiv \mathbb{E}(fert_{i,t}|\boldsymbol{z}_{i,t})$$

The vector of controls includes a quadratic in the age of birth of the first child, in order to not capture delayed marriage but rather active, parity-specific controls; the number of abbeys and the duration of Jesuit presence at the district level, in order to account for religiosity before secularization; and a dummy that equals one if an individual's place of birth was coded as urban at the time, and the log of Encyclopedie subscriptions per capita in a 50 kilometers radius of the individual's place of birth, in order to account for cultural factors and development. Finally, since the dataset does not always contain both spouses, I include the two whenever possible and cluster all regressions at the couple level, thereby accounting for couples fully recorded, and I use a male dummy in order to account for possible differences in gender.

Main results. Table 3 presents the baseline results at the individual level for observations after 1760, when dechristianization and the decline in fertility started. The estimated coefficient is particularly large and stable throughout specifications, with the marginal effect of the refractory clergy in 1791 on fertility estimated to be about one. This means that individuals born in a place with only refractory clergymen are predicted to have about one more child than those born in a place without any. This is roughly the size of the decline in fertility during the second half of the eighteenth century, when the number of children ever born went from 4.5 to 3.5 in about forty years (Figure 1).

All specifications include a male dummy and decade fixed effects. Standard errors are two-way clustered at the district-of-birth and couple levels.[26] In specification 2, individual-level controls are included with a quadratic in the age at birth of the first child interacted with the male dummy: the reduction in fertility was not achieved by delayed age of marriage but rather through parity-specific controls.[27] Specification 3 adds proxies for religiosity before secularization at the district level: the presence (dummy) and number of abbeys in 1756, and the presence (dummy) and duration of Jesuit presence before 1763. In the last column, I control for a (time varying) dummy capturing the urban status of the town of birth at the time and I control for the presence (dummy) and number of knowledge elites by using *Encyclopédie* subscriptions at the district level.[28] The results are statistically significant and

[26]Information about both parents is not always available—only about 10 percent of individuals have spouses also included in the regressions.

[27]Appendix Figure A15 plots the average timespan between the births of the first and last child (Panel A) and average duration between births of children (Panel B). Lower fertility was indeed achieved mostly through parity-specific controls: there is no significant change in duration, and age of marriage only increases slightly. A previous version of the paper also included the log fertility of parents. Estimates were smaller because the fertility of parents is obviously collinear with the refractory clergy for non-migrants.

[28]It is also possible to control for soldier height before 1760, at the town-of-birth level, as a proxy for development: this increases the point estimate of the share of refractory clergy in 1791 but decreases the number of observations by one-third; hence the result is not reported here. Similarly, I can control for age at death since adult longevity may confound the effect of religiosity on fertility. Yet evidence suggests that religiosity declines with age (Lechler and Sunde, 2020), which would bias the estimates of the impact of religiosity on fertility downward. When I include age at death

Table 3: Determinants of fertility at the individual level

Note: This table displays the results of the individual-level regression of the log total number of children ever born on the share of refractory clergy in 1791. The main explanatory variable is defined as the population-weighed share of refractory clergy in 1791, at the district-of-birth level. All specifications include a male dummy and decade fixed effects. Individual-level controls include a quadratic in the age of marriage interacted with the male dummy. Religiosity (pre-secularization) controls include the number of abbeys in 1756 and the duration of Jesuit presence until 1763 (both at the district-of-birth level; plus dummies). Development and Enlightenment controls include the urban status of the town of birth in the year of birth and the log of *Encyclopédie* subscriptions in 1777 − 79 at the district level (plus a dummy for nonzero subscriptions). Two-way clustered standard errors (at the couple and district levels) are reported. Average marginal effects are reported. The results were generated using the Stata program provided by Correia, Guimarães and Zylkin (2020). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	dep var: log fertility			
	(1)	(2)	(3)	(4)
Refractory clergy (1791)	0.252***	0.297***	0.281***	0.233***
	(0.083)	(0.084)	(0.090)	(0.075)
Marginal effect of ref. clergy on fertility	0.893***	1.055***	0.997***	0.829***
Controls				
Individual-level		Yes	Yes	Yes
Religiosity (pre-secularization)			Yes	Yes
Cultural factors and development				Yes
Observations	11,887	11,728	11,728	11,727
Clusters (couples)	10,358	10,228	10,228	10,227
Clusters (districts)	440	440	440	440
Pseudo R^2	0.01	0.06	0.06	0.06

stable throughout.

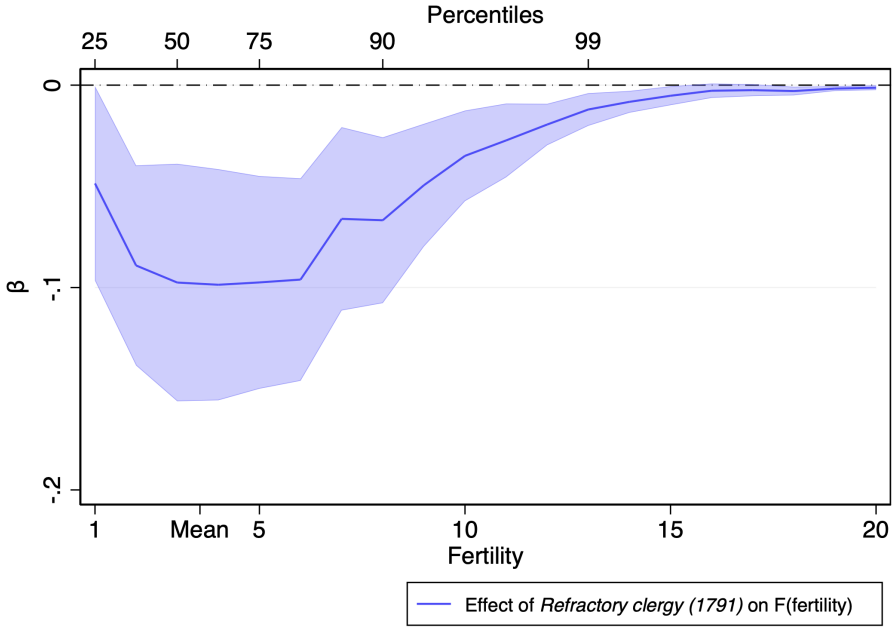
Robustness to method of estimation. Poisson regressions are appropriate for non-negative count dependent variables, yet they rely on the assumption of equality of the mean and variance. That said, the fact that the Poisson distribution is specified by only one parameter is attractive to the extent that, in the post-Malthusian period, it is likely that there was less variance as the mean fertility declined. As a result, the standard error of the estimated coefficient may be too small and significance could be overestimated. Hence, in order to evaluate the robustness of the results and to account for overdispersion, Appendix Table A12 estimates Equation 2 with OLS, overdispersed Poisson, and negative-binomial regressions. In overdispersed Poisson, the conditional variance is scaled by a parameter $\phi \equiv \chi^2_{Pearson}/p$ in order to directly account for the observed overdispersion. In negative-binomial regression, heterogeneity among individuals is accounted for by assuming that the outcome follows a negative-binomial distribution, hence adding variability that Poisson regression does not allow for. Results are essentially unchanged.

Distribution regression. Is the effect of higher religiosity uniform at all levels of fertility? I run a distribution regression in order to trace out the effect of the refractory clergy on the cumulative distribution function (CDF) of fertility, following Chernozhukov, Fernández-Val and Melly (2013). This method allows to estimate the entire conditional distribution, and, importantly, it does not require the outcome to have a smooth conditional density as

(which also results in a significant drop in the number of observations), point estimates are virtually unaffected. Results are available upon request.

Figure 8: Distribution regressions

Note: This figure displays the estimated coefficient of the regression of the the cumulative distribution function of fertility on the population-weighed share of refractory clergy in 1791, with robust standard errors, for all levels of fertility up to twenty children.



in quantile regressions. Therefore it is more adapted to the study of fertility, which is a discrete outcome. I evaluate the effect of the refractory clergy on the cumulative distribution of fertility for all observed levels, and I estimate Equation 3 with OLS, where $\mathbb{1}_{fert_{i,t}\leq f}$ is a dummy that equals one if individual i had less than f children.

$$\mathbb{1}_{fert_{i,t}\leq f} = \beta_f \times \text{Ref. clergy}_{b(i),1791} + \boldsymbol{X}'_{i,t}\delta + \lambda_i + \lambda_t + \epsilon_{i,t} \tag{3}$$

Figure 8 plots the results at different levels of fertility.[29] Increasing the share of refractory clergy in 1791 is always associated with a decrease in the number of children–but the shift in the CDF is larger for large families. The effect is indeed maximized when fertility is above the mean and median. For example, decreasing the share of refractory clergy by 100 percentage points (full secularization) is predicted to increase the probability of having less than six children by about 10 percentage points. Additionally, a property of distribution regressions is that the estimated coefficients on the CDF (with the linear-probability model) sum up to the OLS coefficient of the effect of the refractory clergy on fertility in Appendix Table A12. Hence, the distribution of coefficient fully characterizes the average effect of the refractory clergy on fertility.

[29]In order to visualize the effect of secularization on the CDF of fertility, I generate a counterfactual distribution by setting religiosity to the maximum level everywhere in Appendix Figure A16.

6.2 Accounting for unobservables

Using the genealogical data allows me to employ three different strategies to account for unobserved factors, in particular pre-existing and institutional differences, to further establish that secularization drove the decline in fertility. To the best of my knowledge, this is the first time any of these strategies are used in a historical context or for the study of the decline in fertility in France.

First, it is possible to study within-*département* variation using fixed effects. In particular, *département*-by-decade fixed effects account for time-invariant *and* time-varying unobservables at the *département* level. This is particularly important to the extent that *départements* are the main administrative units, hence exploiting within-*département* variation allows to account for most institutional differences. For example, some *départements* may have been more affected by the French Revolution than others (for example, during the War in the Vendée or during the Reign of Terror), or the crowdsourced data may be of higher quality in some periods in some *départements* in earlier years since the records are kept in online *départemental* archives, which would bias the results.[30]

Second, by extending the sample to individuals observed before dechristianization took place, it is possible to compare the effect of the refractory clergy in 1791 before and after the onset of the transition and secularization using a strategy similar to a difference-in-differences framework with continuous treatment. The effect of secularization can be identified by differencing the coefficient after the decline in fertility from that before, using 1760 as the cutoff for the onset of the decline in fertility, to show that, before the decline, places that would become secular did not differ from those that would not.

The true date of the decline in fertility is an unknown parameter that is neither discontinuous or clear-cut nor identical across space, and the distribution of religiosity before secularization is unknown. Therefore, this strategy cannot strictly be interpreted as difference-in-differences. Nevertheless, the fact that secularization and the decline in fertility were a smooth process would likely result in the underestimation of the true effect since some places were likely already treated before 1760 and difference-in-differences would rely on the assumption that it was not the case. Furthermore, by estimating the effect of the refractory clergy in 1791 on fertility before secularization, it is possible to further draw inferences about whether it captures pre-existing differences or the extent of secularization.

Finally, it is possible to study the fertility decisions of second-generation migrants while holding constant unobserved institutional characteristics of places of arrival, following Algan and Cahuc (2010); Fernández (2011); Guiso, Sapienza and Zingales (2004). This allows me to separate the effect of religious beliefs and norms passed through generations from that of confounding institutional and geographical characteristics that are location-specific. What is particularly novel in this setting is both the historical dimension and the fact that it accounts for institutional and cultural variation within the country. Indeed, the traditional approach

[30] This issue is known and has been acknowledged—for example, in Blanc and Wacziarg (2020); Henry (1972*a*,*b*, 1978); Henry and Houdaille (1973); Houdaille (1976); Séguy (2001). As a result, one would erroneously find that religious *départements* had higher fertility in the earlier years of the sample, before the Revolution, while they simply had less destruction during the French Revolution, or more thorough record-keeping.

only uses migrants surveyed recently, leverages between-country variation in place of origin, and assumes that there is no institutional variation within country in either place of origin or place of arrival. Here I leverage variation in the refractory clergy at the district-of-origin level, holding constant district-of-birth characteristics.[31]

Table 4: Determinants of fertility at the individual level: accounting for unobservables

Note: This table displays the results of the individual-level regression of the log total number of children ever born on the population-weighed share of refractory clergy in 1791 at the district-of-birth level (except in specification 5, in which it is evaluated at the district-of-birth-of-parents level and corresponds to the average level for the two parents, which ensures that individuals with a missing parent are not dropped). All specifications include the full set of controls. The baseline specification corresponds to the last specification in Table 3. Two-way clustered standard errors (at the couple and district levels) are reported in all specifications but the last. In specification 5, standard errors are four-way clustered at the district-of-birth-of-parents and parents levels (in this specification, the number of districts reported in the table is for the first parent; for the sake of simplicity I don't report the fact that there are 1,148 second parents originating from 237 districts). Average marginal effects are reported. The results were generated using the Stata program provided by Correia, Guimarães and Zylkin (2020). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	dep var: log fertility				
	(1) Baseline specification	(2) Fixed Effects	(3) Time-varying FE	(4) Diff-in-diff	(5)[a,b] Second gen migrants
Refractory clergy (1791)[a]	0.233***	0.327***	0.363***	0.052	0.210**
	(0.075)	(0.118)	(0.125)	(0.171)	(0.096)
_____ × After 1760				0.357**	
				(0.166)	
Marginal effect of ref. clergy on fertility					
Between 1680 and 1759				0.175	
Between 1760 and 1919	0.829***	1.161***	1.290***	1.718***	0.753**
Sample					
Observed between 1680 and 1919				Yes	
Observed between 1760 and 1919	Yes	Yes	Yes		Yes
Controls					
Baseline controls	Yes	Yes	Yes	Yes	Yes
Département of birth fixed effects		Yes	Yes	Yes	
Département of birth by decade fixed effects			Yes	Yes	
District of birth fixed effects					Yes
Observations	11,727	11,727	11,525	16,503	1,438
Clusters (couples[b])	10,227	10,227	10,042	14,283	1,151
Clusters (districts[b])	440	440	429	451	235
Pseudo R^2	0.06	0.08	0.11	0.13	0.14

[a]district of birth of parents in (5), [b]more details in table notes

Table 4 displays the results. The first column displays the baseline results with the full set of controls at the individual, town, and district-of-birth levels. In the second and third columns, I add, respectively, fixed effects for *département* of birth and *département* of birth by decade. Point estimates increase, as suggested by the analysis in the rest of the paper, and the marginal effect of the refractory clergy on fertility is estimated to be between 1 and 1.3 children. All results are significant at the 1 percent level. In the fourth specification, I extend the sample to all individuals observed between 1680 and 1920. Interacting the refractory clergy in 1791 with a dummy that equals one if the individual was observed after the onset of the transition in 1760 allows me to show that the results do not capture unobserved pre-

[31]In order to account for correlation among parents (less than a third of second-generation migrants had parents born in different districts from each other), I also implement multiway clustered standard errors at the parents and districts of birth of parents levels.

existing differences. I find that the refractory clergy had a null and statistically insignificant effect on log fertility before 1760. Only after it becomes associated with increased fertility, consistent with the evidence showing that the presence of refractory clergy is uncorrelated to pre-existing differences in religiosity and that places with few refractory clergy also had high fertility before.[32] For example, most French migrants to Quebec left in the seventeenth century from the regions around Paris, where most clergy later took the oath, and where fertility became lower. Yet, at the time of their arrival, these migrants were known for their high fertility (e.g., see Galor and Klemp, 2019).

Last, but not least, a major concern is that local institutions caused both secularization and the decline in fertility. To account for such unobserved geographic and institutional factors that may confound the analysis, the last column restricts the sample to second-generation migrants and includes district-of-birth fixed effects. I find that the refractory clergy in the district of the parents has a persistent and significant effect on fertility that was not location-specific, but rather related to beliefs and preferences since it transmitted intergenerationally despite a different environment. This suggests that secularization, not democratization or some institutional or legal factors, accounts for the early decline in fertility in eighteenth-century France. Importantly, it does not imply that institutions did not play a role, but rather that, if they did, it was only through the channel of secularization.

7 Concluding Remarks

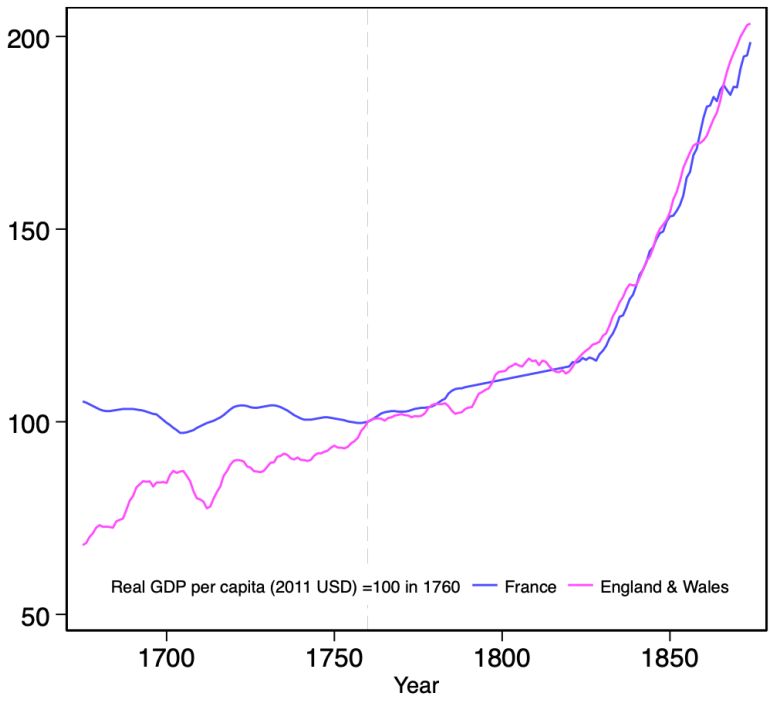
When and why fertility declined in France more than a century before the rest of Europe remain questions of enormous importance. I comprehensively document the transition, date its onset to the 1760s, and establish that secularization accounts for most of it. More generally, this paper seeks to address the role of ideas, preferences, and culture in shaping development. My findings support the hypothesis that the transition from tradition to modernity played an important role in the transition from stagnation to growth.

The fertility decline in France was a turning point in human history. It marks the first time mankind escaped Malthusian stagnation. It was also a turning point for France. Braudel (1986) argues that "the entire course of French history since then has been influenced by something that happened in the eighteenth century" and asks "did France cease to be a great power not, as is usually thought, on 15 June 1815 on the field of Waterloo, but well before that, during the reign of Louis XV when the natural birth-rate was interrupted?" (p. 190). Indeed, France was no longer the China of Europe and the dominant power in the world. Yet, Figure 9 shows that, although England was the birthplace of the industrial

[32] Appendix Figure A17, Panel A displays the difference-in-differences result graphically. In Panel B, I estimate the effect with forty-year periods. In the first period, 1680–1720, when secularization had likely not started anywhere, the estimated effect of the refractory clergy is virtually null, slightly negative, and not statistically significant. Then, in the period that immediately precedes the aggregate decline in fertility, the effect increases slightly and becomes positive, which is consistent with a smooth and heterogeneous-across-space process of secularization and with some places experiencing dechristianization earlier. The effect remains statistically insignificant before 1760. After 1760, which marks the onset of dechristianization and of the decline in fertility at the aggregate level, the refractory clergy had a positive and statistically significant effect. The size of the effect increases at the time of the second wave of decline in fertility (during industrialization) and then decreases, consistent with a process of diffusion (Spolaore and Wacziarg, 2022) or of interaction between cultural and economic forces as documented by Squicciarini (2020).

Figure 9: Accumulated economic growth

Note: This figure displays real GDP per capita (2011 USD) over time in France and in England and Wales, indexed to = 100 in 1760 to show the cumulative rate of growth over time. Sources: Bolt and van Zanden (2014); Broadberry et al. (2015); Ridolfi (2016)



revolution, the French achieved the same growth in income per capita after 1760, simply by challenging the authority of the Church and reducing fertility, therefore limiting the increase in the denominator.

What remains an open question is what caused secularization. According to the case studies of Bois (1960); Chaunu (1978); Dinet (1991); Hoffman (1984); Norberg (1985); Tingle (2012); Vovelle (1973) and the more systematic cross-sectional work of Boulard (1966); Tackett (1986), secularization took hold in the Parisian region and in Provence. These were some of the most religious places in France historically, and although Paris itself was rich, its surrounding region was not particularly wealthy while Provence was one of the poorest regions of France, speaking a different language and under different fiscal rules, suggesting that neither development nor legal factors caused the decline in Church influence. Instead, some historians hint at the idea that secularization could have been a backlash against religious powers that had both a monopoly on faith and a close connection to the monarchy and absolutism (Van Kley, 1996). Section 4.1 discusses this in more details.

For example, Braudel (1986) argues that "the drama played out in the eighteenth century was a sort of revenge on the part of the Reformation. Having hesitated, two centuries earlier, between Rome and Luther, or rather between Rome and Calvin, France had chosen Rome,

but the choice backfired" (p. 200).[33] This process appears to have have taken place in close connection with a rejection of absolutism and divine-right monarchy that prefigured the French Revolution. According to Friedrich (2022), "the power struggle between parlements and the king had become amalgamated with the old fight over Jansenism. The Parlement of Paris in particular leaned in favor of the Jansenists and stubbornly resisted a series of anti-Jansenist measures taken by Rome and Paris in 1750, which it depicted as a tyrannical abuse of power by the king, the Jesuits, and the pope." In fact, according to Van Kley (1996), "if the Revolution could, with an astonishing facility, destroy the throne and the altar, it is because Jansenism, for more than a century, had destroyed the foundations of both" (p. 505).

Table 5: Deep-rooted correlates of secularization

Note: This table displays the results of the municipality-level cross-sectional regression of easter attendance in 1966 on deep-rooted factors. easter attendance (1966) is taken from Boulard (1966). Holy League (1590) is defined as a dummy that equals one in places where the Holy League was present in 1590, taken from (Black, 1996, p. 57) (see Appendix Figure A5). The value of the salt tax (gabelle) in 1770 is taken from Giommoni and Loumeau (2023). Jansenists (1725) is the inverse hyperbolic sine of the number of Jansenist clergymen in a diocese, taken from Préclin (1929). Standardized beta coefficients are reported. All observations are weighed by population in 1961. All specifications control for the log population in 1961 and latitude and longitude. Standard errors are clustered at the district and/or at the diocese level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	dep var: Easter attendance (1966)				
	(1)	(2)	(3)	(4)	(5)
Standardized beta coefficients					
Holy League (1590)	-0.16***		0.38***		0.38***
	(-2.76)		(4.02)		(3.21)
Salt tax / gabelle (1770)		-0.40***	-0.08		-0.02
		(-6.34)	(-0.97)		(-0.15)
_____ × Holy League (1590)			-0.65***		-0.62***
			(-5.68)		(-4.00)
Jansenists (1725)				-0.38***	-0.18*
				(-3.58)	(-1.87)
Observations	33,756	33,295	33,295	33,756	33,295
Clusters (districts)	513	511	511	513	511
Clusters (dioceses)				133	132
Adjusted R^2	0.14	0.26	0.31	0.22	0.33

Table 5 provides evidence of this.[34] The first column shows that places where the Counter Reformation was dominant during the French Wars of Religion, as proxied by the presence of the Holy League in 1590, also had less easter attendance in 1966, further documenting the reversal in religiosity and suggesting a backlash against the Counter Reformation. The second column shows a particularly large negative correlation between extractive institutions in the *ancien régime* and easter attendance, supporting the hypothesis that secularization

[33]Similarly, Tackett (1986) argues that "a whole series of affaires and causes célèbres, from the repression of the convulsionnaries in the 1730's through the billets de confessions in the 1750's and the expulsion the Jesuits in the 1760's, had contributed in broadly publicizing and intensifying grievances toward the clergy" (p. 257); while Hoffman (1984) writes that "the Counter Reformation's austere morality was imposed in full force ... not surprisingly, it was rejected by people who saw nothing wrong in combining devotion and gaiety" (p. 138) and that it "had the support of the royal government and of the urban elites, who had in the past tolerated a great deal more sexual license."

[34]Appendix Table A13 documents similar patterns using the presence of refractory clergy in 1791.

was also a backlash against absolutism and divine-right monarchy. The extractiveness of institutions is measured using the *gabelle*, a system of forced taxation of salt, with a tax rate that varied widely across space (sometimes by a factor of sixty), as in Giommoni and Loumeau (2023). This tax was particularly criticized in the *cahiers de doléance* during the French Revolution (Shapiro and Markoff, 1998). Giommoni and Loumeau (2023) also find results suggesting that areas with high taxation developed particular cultural, secular norms that later persisted. The third column includes the previous variables together as well as their interaction. The sign of the coefficient on the Holy League reverses and the correlation with the *gabelle* is no longer significant, while the coefficient on the interaction term is large, negative, and statistically significant, suggesting a particularly important interplay between these two factors. In regions where the Counter Reformation held sway during the French Wars of Religion, but institutions were not extractive, e.g. Brittany, contemporary easter attendance is higher. However, it is lower in regions where the counter-reformers led extractive institutions, e.g. Paris and Provence. Finally, I document that regions with a higher number of Jansenist clergy in 1725 displayed lower religious adherence in 1966. When accounting for the interaction of the extent of the Holy League and extractive institutions, both coefficients decrease in magnitude, supporting the historical hypothesis that Jansenism played a crucial role in the backlash against the Church and monarchy.

These results are only intended to spur a discussion on the drivers of secularization, and should hopefully provide avenue for future research addressing this important question.

References

Acemoglu, Daron, Simon Johnson, and James Robinson. 2005. "The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth." *American Economic Review*, 95(3): 546–579.

Agulhon, Maurice, and Noël Coulet. 2018. *Histoire de la Provence. Que sais-je ?*, Presses universitaires de France.

Algan, Yann, and Pierre Cahuc. 2010. "Inherited Trust and Growth." *American Economic Review*, 100(5): 2060–2092.

Allen, Robert C. 2000. "Economic structure and agricultural productivity in Europe, 1300-1800." *European Review of Economic History*, 4(1): 1–26.

Alter, George C. 2019. "The Evolution of Models in Historical Demography." *The Journal of Interdisciplinary History*, 50(3): 325–362.

Andersen, Lars Harhoff, and Jeanet Bentzen. 2022. "In the Name of God! Religiosity and the Transition to Modern Growth." Working paper.

Ariès, Philippe. 1974. *Western Attitudes toward Death From the Middle Ages to the Present ; translated by Patricia M. Ranum.* Baltimore:Johns Hopkins University Press.

Bairoch, Paul. 1988. *Cities and Economic Development: From the Dawn of History to the Present, translated by Christopher Braider.* Chicago:University of Chicago Press.

Bairoch, Paul, and Gary Goertz. 1986. "Factors of Urbanisation in the Nineteenth Century Developed Countries: A Descriptive and Econometric Analysis." *Urban Studies*, 23(4): 285–305.

Bairoch, Paul, Jean Batou, and Pierre Chèvre. 1988. *The Population of European Cities, 800-1850: Data Bank and Short Summary of Results.* Geneve:Librairie Droz.

BDCassini. 2017. *Geohistoricaldata.* Paris:LaDéHiS, CRH, EHESS.

Beach, Brian, and W Walker Hanlon. 2022. "Culture and the Historical Fertility Transition." *The Review of Economic Studies.*

Black, Jeremy. 1996. *The Cambridge Illustrated Atlas of Warfare: Renaissance to Revolution, 1492-1792. Cambridge Illustrated Atlases*, Cambridge:Cambridge University Press.

Blanc, Guillaume. 2023. "Crowdsourced Genealogies." Working paper.

Blanc, Guillaume, and Masahiro Kubo. 2024. "French." Lewis Lab Working Paper 2024-01.

Blanc, Guillaume, and Romain Wacziarg. 2020. "Change and Persistence in the Age of Modernization: Saint-Germain-d'Anxure, 1730-1895." *Explorations in Economic History*, 78.

Blayo, Yves. 1975*a*. "La mortalité en France de 1740 à 1829." *Population*, 1: 123–142.

Blayo, Yves. 1975*b*. "Mouvement naturel de la population française de 1740 a 1829." *Population (French Edition)*, 30: 15–64.

Bois, Paul. 1960. *Paysans de l'Ouest.* Le Mans:Vilaire.

Bolt, Jutta, and Jan Luiten van Zanden. 2014. "The Maddison Project: collaborative research on historical national accounts." *The Economic History Review*, 67(3): 627–651.

Boulard, Fernand. 1966. *Premiers itinéraires en sociologie religieuse (2nd ed.).* Paris:Éditions Ouvrières.

Brambor, Thomas, Agustín Goenaga, Johannes Lindvall, and Jan Teorell. 2020. "The Lay of the Land: Information Capacity and the Modern State." *Comparative Political Studies*, 53(2): 175–213.

Braudel, Fernand. 1986. *The identity of France: People and production ; translated from the French by Sian Reynolds.* Vol. 2. 1990 ed., London:Collins.

Broadberry, S.N., B. Campbell, A. Klein, M. Overton, and B. van Leeuwen. 2015. *British Economic Growth 1270-1870.* Cambridge:Cambridge University Press.

Brodeur, Abel, Nikolai Cook, and Anthony Heyes. 2020. "A Proposed Specification Check for p-Hacking." *AEA Papers and Proceedings*, 110: 66–69.

Buringh, Eltjo, and Jan Luiten van Zanden. 2009. "Charting the "Rise of the West": Manuscripts and Printed Books in Europe, a Long-Term Perspective from the Sixth through Eighteenth Centuries." *The Journal of Economic History*, 69(2): 409–445.

Burleigh, Michael. 2005. *Earthly Powers: The Clash of Religion and Politics in Europe, from the French Revolution to the Great War.* New York City:HarperCollins.

Cantoni, Davide, Jeremiah Dittmar, and Noam Yuchtman. 2018. "Religious Competition and Reallocation: the Political Economy of Secularization in the Protestant Reformation." *The Quarterly Journal of Economics*, 133(4): 2037–2096.

Chartier, Roger. 1991. *The Cultural Origins of the French Revolution.* Duke University Press.

Chaunu, Pierre. 1978. *La mort à Paris, XVIe, XVIIe et XVIIIe siècles.* Paris:Fayard.

Chernozhukov, Victor, Iván Fernández-Val, and Blaise Melly. 2013. "Inference on Counterfactual Distributions." *Econometrica*, 81(6): 2205–2268.

Clair, C. 1976. *A History of European Printing.* London:Academic.

Coale, Ansley J. 1973. *The demographic transition reconsidered.* Vol. IUSSP—Proceedings of the International Population Conference, Liège, Belgium:Ordina.

Coale, Ansley J., and Susan C. Watkins. 1986. *The Decline of Fertility in Europe.* Princeton:Princeton University Press.

Correia, Sergio, Paulo Guimarães, and Tom Zylkin. 2020. "Fast Poisson estimation with high-dimensional fixed effects." *The Stata Journal*, 20(1): 95–115.

Cozzani, Marco, Saverio Minardi, Giulia Corti, and Nicola Barban. 2023. "Birth month and adult lifespan." *Demographic Research*, 49: 201–218.

Crouzet, François. 2003. "The Historiography of French Economic Growth in the Nineteenth Century." *The Economic History Review*, 56(2): 215–242.

Cummins, Neil. 2009. "Why did fertility decline?: an analysis of the individual level economics correlates of the nineteenth century fertility transition in England and France." PhD diss. London School of Economics and Political Science.

Cummins, Neil. 2012. "Marital Fertility and Wealth During the Fertility Transition: Rural France, 1750-1850." *The Economic History Review*, 66(2): 449–476.

Darnton, Robert. 1973. "The Encyclopédie Wars of Prerevolutionary France." *The American Historical Review*, 78(5): 1331–1352.

Darnton, Robert. 1978. "The History of *Mentalités*: Recent Writings on Revolution, Criminality, and Death in France." In *Structure, Consciousness, and History.* , ed. Richard Harvey Brown and Stanford M. Lyman, 112. Cambridge:Cambridge University Press.

Darnton, Robert. 1991. *Edition et sédition. L'univers de la littérature clandestine au XVIIIe siècle.* Paris:Gallimard.

Daudin, Guillaume, Raphaël Franck, and Hillel Rapoport. 2018. "Can Internal Migration Foster the Convergence in Regional Fertility Rates? Evidence from Nineteenth Century France." *The Economic Journal.*

de la Croix, David, and Faustine Perrin. 2018. "How far can economic incentives explain the French fertility and education transition?" *European Economic Review*, 108: 221–245.

Delventhal, Matthew J., Jesús Fernández-Villaverde, and Nezih Guner. 2019. "Demographic Transitions Across Time and Space." Working paper.

de Tocqueville, Alexis. 1856. *The Ancien Régime and the French Revolution (2011, edited by Jon Elster, translated by Arthur Goldhammer).* Cambridge:Cambridge University Press.

de Vries, Jan. 1984. *European urbanization 1500–1800.* London:Metheun.

Dinet, Dominique. 1991. "Une déchristianisation provinciale au XVIIIe siècle : le diocèse d'Auxerre." *Histoire, économie et société*, 4.

Febvre, Lucien, and Henri-Jean Martin. 1958. *L'apparition du livre.* Paris:Albin Michel.

Fernández, Raquel. 2011. "Does Culture Matter?" In *Handbook of Social Economics.* Vol. 1 of *Handbook of Social Economics*, , ed. Jess Benhabib, Alberto Bisin and Matthew O. Jackson, Chapter 11, 481–510. North-Holland.

Fleury, Michel, and Louis Henry. 1958. "Pour connaître la population de la France depuis Louis XIV. — Plan de travaux par sondage." *Population*, 13(4): 663–686.

Forrest, Alan. 1989. *Conscripts and Deserters: The Army and French Society During the Revolution and Empire.* Oxford:Oxford University Press.

Fourier, Charles. 1822. *Théorie de l'Unité universelle (Traité de l'association domestique-agricole ou attraction industrielle).* Paris:Bossange.

Franck, Raphaël, and Noel Johnson. 2016. "Can public policies lower religiosity? Evidence from school choice in France, 1878–1902." *The Economic History Review*, 69(3): 915–944.

Franck, Raphaël, and Stelios Michalopoulos. 2017. "Emigration during the French Revolution: Consequences in the Short and Longue Durée." National Bureau of Economic Research Working Paper 23936.

Friedrich, Markus. 2022. *The Jesuits: A History.* Princeton:Princeton University Press.

Gagnol, Paul. 1911. *La dime ecclesiastique en France au XVIIIe siecle.* Geneve:Slatkine.

Galor, Oded. 2011. *Unified Growth Theory.* Princeton:Princeton University Press.

Galor, Oded. 2022. *The Journey of Humanity: The Origins of Wealth and Inequality.* Dutton.

Galor, Oded, and David Weil. 2000. "Population, Technology, and Growth: From the Malthusian Regime to the Demographic Transition and Beyond." *American Economic Review*, 90(4): 806–828.

Galor, Oded, and Marc Klemp. 2019. "Human genealogy reveals a selective advantage to moderate fecundity." *Nature Ecology & Evolution*, 3(5): 853–857.

Galor, Oded, and Omer Moav. 2002. "Natural Selection and the Origin of Economic Growth." *The Quarterly Journal of Economics*, 117(4): 1133–1191.

Gay, Victor, Paula E. Gobbi, and Marc Goñi. 2023. "Revolutionary Transition: Inheritance Change and Fertility Decline." Working paper.

Giommoni, Tommaso, and Gabriel Loumeau. 2023. "Taxation with a Grain of Salt: The Long-Term Effect of Fiscal Policy on Local Development." Working paper.

González-Bailón, Sandra, and Tommy E. Murphy. 2013. "The effects of social interactions on fertility decline in nineteenth-century France: An agent-based simulation experiment." *Population Studies*, 67(2): 135–155.

Goudar, Ange. 1756. *Les interêts de la France mal entendus, dans les branches de l'agriculture, de la population, des finances, du commerce, de la marine, et de l'industrie. Par un citoyen.* Vol. 1, Coeur.

Grendler, Paul F. 2017. *The Jesuits and Italian Universities, 1548-1773.* Washington:Catholic University of America Press.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2004. "The Role of Social Capital in Financial Development." *American Economic Review*, 94(3): 526–556.

Henry, Louis. 1972*a*. "Fécondité des Mariages dans le Quart Sud-Ouest de la France de 1720 à 1829 (I)." *Annales*, 27(3): 612–640.

Henry, Louis. 1972*b*. "Fécondité des Mariages dans le Quart Sud-Ouest de la France de 1720 à 1829 (suite)." *Annales*, 27(4): 977–1023.

Henry, Louis. 1978. "Fécondité des Mariages dans le Quart Sud-Est de la France de 1670 à 1829." *Population*, 33(4): 855–883.

Henry, Louis, and Jacques Houdaille. 1973. "Fécondité des Mariages dans le Quart Nord-Ouest de la France de 1670 à 1829." *Population*, 28(4): 873–924.

Himes, Norman E. 1936. *Medical History of Contraception.* Baltimore:Williams and Wilkins.

HMD. 2019. *Human Mortality Database.* University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany). Available at **www.mortality.org** or **www.humanmortality.de** (data downloaded on November 30, 2019).

Hoffman, Philip T. 1984. *Church and Community in the Diocese of Lyon 1500-1789.* New Haven and London:Yale University Press.

Houdaille, Jacques. 1976. "La Fécondité des Mariages de 1670 à 1829 dans le Quart Nord-Est de la France." *Annales de Démographie Historique*, 1(1): 341–391.

ISTC. 2008. *Incunabula Short-Title Catalogue.* London:British Library.

Kaplanis, Joanna, Assaf Gordon, Tal Shor, Omer Weissbrod, Dan Geiger, Mary Wahl, Michael Gershovits, Barak Markus, Mona Sheikh, Melissa Gymrek, Gaurav Bhatia, Daniel G. MacArthur, Alkes L. Price, and Yaniv Erlich. 2018. "Quantitative Analysis of Population-Scale Family Trees With Millions of Relatives." *Science*, 360(6385): 171–175.

Kelly, Morgan. 2019. "The Standard Errors of Persistence." Working paper.

Knodel, John, and Etienne Van de Walle. 1979. "Lessons from the Past: Policy Implications of Historical Fertility Studies." *Population and Development Review*, 5(2): 217–245.

Komlos, John. 2006. "Height of French Soldiers, 1716-1784." *ICPSR*, 4363.

Lechler, Marie, and Uwe Sunde. 2020. "Aging, Proximity to Death, and Religiosity." Population and Development Review.

Maire, Catherine. 1998. *De la cause de Dieu à la cause de la Nation. Le jansénisme au XVIIIe siècle.* Gallimard.

Maire, Catherine. 2019. *L'Église dans l'État. Politique et religion dans la France des Lumières.* Paris:Gallimard.

Malthus, Thomas Robert. 1798. *An Essay on the Principle of Population.* London:J. Johnson.

McEvedy, C., and R. Jones. 1978. *Atlas of world population history.* Harmondsworth, Middlesex, England:Penguin Books Ltd.

Minardi, Saverio, Giulia Corti, and Nicola Barban. 2023. "Historical Patterns in the Intergenerational Transmission of Lifespan and Longevity: Evidence from the United States, 1700-1900." Working paper.

Moheau, Jean-Baptiste. 1778. *Recherches et considerations sur la population de la France.* Paris:Moutard.

Mokyr, Joel. 2016. *A Culture of Growth: The Origins of the Modern Economy.* Princeton:Princeton University Press.

Moorthy, Vivek. 2022. "Industrialization, Religion, and Fertility Decline in 1800s France." Working paper.

Mours, Samuel. 1958. *Les Églises Réformées en France. Tableaux et Cartes.* Paris:Librairie Protestante.

Murphy, Tommy E. 2015. "Old Habits Die Hard (Sometimes)." *Journal of Economic Growth*, 20(2): 177–222.

Noonan, John T. 1965. *Contraception (1986 ed).* Cambridge:Harvard University Press.

Norberg, Kathryn. 1985. *Rich and Poor in Grenoble, 1600-1814.* University of California Press.

Omenti, Riccardo. 2023. "Estimating fertility from online geneaologies." Work in progress.

Oster, Emily. 2016. "Unobservable Selection and Coefficient Stability: Theory and Evidence." *Journal of Business & Economic Statistics*, 1–18.

Perez, Céline. 1999. "Les Refus de sacrement d'après les Nouvelles ecclésiastiques, 1756-1789." Mémoire de maîtrise (dir. Bernard Hours), Lyon 3.

Perrin, Faustine. 2021. "On the origins of the demographic transition: rethinking the European marriage pattern." *Cliometrica*.

Préclin, Edmond. 1929. *Les jansénistes du XIIIe siècle et la constitution civile du clergé: le développement du richérisme, sa propagation dans le bas clergé, 1713-1791.* Paris:J. Gamber.

Ridolfi, Leonardo. 2016. "The French economy in the longue durée. A study on real wages, working days and economic performance from Louis IX to the Revolution (1250-1789)." PhD diss. IMT School for Advanced Studies, Lucca.

Ruggles, Steven. 1999. "The limitations of English family reconstitution: English population history from family reconstitution 1580–1837." 14(1): 105–130.

Sauvy, Alfred. 1962. *La prévention des naissances.* Paris:Presses Universitaires de France.

Schofield, Roger S. 1972. "Representativeness and family reconstitution." *Annales de Démographie Historique*, Techniques et méthodes. Actes du colloque de Florence, 1er-3 octobre 1971.

Séguy, Isabelle. 2001. *La population de la France de 1670 à 1829: l'enquête Louis Henry et ses données. Classiques de l'économie et de la population*, PAris:INED.

SGF. 1878. *Annuaire Statistique de la France.* Paris:Imprimerie Nationale.

Shapiro, Gilbert, and John Markoff. 1998. *Revolutionary Demands: A Content Analysis of the Cahiers de Doléances of 1789, with contributions by Timothy Tackett and Philip Dawson.* Stanford:Stanford University Press.

Spolaore, Enrico, and Romain Wacziarg. 2022. "Fertility and Modernity." *The Economic Journal*, 132(642): 796–833.

Squicciarini, Mara P. 2020. "Devotion and Development: Religiosity, Education, and Economic Progress in 19th-century France." *American Economic Review.*

Squicciarini, Mara P., and Nico Voigtländer. 2015. "Human Capital and Industrialization: Evidence from the Age of Enlightenment." *The Quarterly Journal of Economics*, 130(4): 1825–1883.

Squicciarini, Mara P., and Nico Voigtländer. 2016. "Knowledge Elites and Modernization: Evidence from Revolutionary France." Working paper.

Stelter, Robert, and Diego Alburez-Gutierrez. 2022. "Representativeness is crucial for inferring demographic processes from online genealogies: Evidence from lifespan dynamics." *Proceedings of the National Academy of Sciences*, 119(10): e2120455119.

Tackett, Timothy. 1986. *Religion, Revolution, and Regional Culture in Eighteenth-Century France: The Ecclesiastical Oath of 1791.* Princeton:Princeton University Press.

Tackett, Timothy. 2005. "Piété Baroque et Déchristianisation: Thirty Years Later." *French History*, 19(2): 145–151.

Tingle, Elizabeth C. 2012. *Purgatory and Piety in Brittany, 1480-1720.* Farnham:Ashgate Publishing, Ltd.

Todd, Emmanuel. 1990. *L'invention de l'Europe.* Paris:Seuil.

Van de Walle, Etienne. 2005. "Birth prevention before the era of modern contraception." *Population and Societies*, 418.

Van de Walle, Etienne, and Helmut Muhsam. 1995. "Fatal Secrets and the French Fertility Transition." *Population and Development Review*, 21(2): 261–279.

Van Kley, Dale K. 1975. *The Jansenists and the Expulsion of the Jesuits from France, 1757-1765.* New Haven, Conn.:Yale University Press.

Van Kley, Dale K. 1996. *The Religious Origins of the French Revolution: From Calvin to the Civil Constitution, 1560-1791.* New Haven and London:Yale University Press.

Vovelle, Michel. 1973. *Piété baroque et déchristianisation en Provence au XVIIIe siècle: Les attitudes devant la mort d'après les clauses des testaments.* Paris:Pion.

Weber, Eugen. 1976. *Peasants into Frenchmen: The Modernization of Rural France, 1870–1914.* Stanford:Stanford University Press.

Weir, David R. 1984. "Life Under Pressure: France and England, 1670-1870." *The Journal of Economic History*, 44(1): 27–47.

Weir, David R. 1994. "New Estimates of Nuptiality and Marital Fertility in France, 1740-1911." *Population Studies*, 48(2): 307–331.

Wrigley, E. A., R. S. Davies, J. E. Oeppen, and R. S. Schofield. 1997. *English Population History from Family Reconstitution 1580–1837. Cambridge Studies in Population, Economy and Society in Past Time*, Cambridge:Cambridge University Press.

Wrigley, Edward A. 1985*a*. "The Fall of Marital Fertility in Nineteenth-Century France: Exemplar or Exception? (Part I)." *European Journal of Population / Revue européenne de Démographie*, 1(1): 31–60.

Wrigley, Edward A. 1985*b*. "The Fall of Marital Fertility in Nineteenth-Century France: Exemplar or Exception? (Part II)." *European Journal of Population / Revue européenne de Démographie*, 1(2): 141–177.

Wrigley, Edward A., and Roger S. Schofield. 1981. *The Population History of England, 1541-1871: A Reconstruction.* London:Edward Arnold.

The online appendix for this paper can be found **here**.