Devotion and Development:

Religiosity, Education, and Economic Progress in 19th-Century France*

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Abstract

This paper uses a historical setting to study when religion can be a barrier for diffusion of knowledge and economic development, and through which mechanism. I focus on 19th-century Catholicism and analyze a crucial phase of modern economic growth, the Second Industrial Revolution (1870-1914) in France. In this period, technology became skill-intensive, leading to the introduction of technical education in primary schools. At the same time, the Catholic Church was promoting a particularly anti-scientific program, and opposed the adoption of a technical curriculum. Using data collected from primary and secondary sources, I exploit pre-existing variation in *intensity* of Catholicism (i.e., religiosity) among the different French districts. I show that, despite a stable spatial distribution of religiosity over time, more religious districts had lower economic development *only* during the Second Industrial Revolution, but not before. Schooling appears to be the key mechanism: in more Catholic areas there was a slower introduction of the technical curriculum, and instead a push for religious education. Religious education, in turn, was negatively associated with industrial development about 10-15 years later, when school-aged children would enter the labor market, and this negative relationship was more pronounced in skill-intensive industrial sectors.

JEL: J24, N13, O14, Z12

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1 Introduction

While globalization renders new ideas and technological progress increasingly accessible across the world, the rate of adoption varies substantially among countries. Several fields in economics have identified different factors, such as trade or political institutions, affecting diffusion of knowledge and economic development (see, for instance, Keller, 2004; Abramitzky and Sin, 2014). However, little is known about the role of culture in this process[1] – what is challenging is to measure culture and to find a context in which to study its interaction with the adoption of "useful knowledge."[2]

In this paper, I study one dimension of culture – religion – and I use a historical setting to examine when it can impair knowledge diffusion and economic development, and through which mechanism.[3] Specifically, I focus on 19th-century Catholicism, and analyze a crucial phase of modern economic growth, the Second Industrial Revolution (1870-1914) in France.[4] In this period, Western economies experienced, for the first time, a rapid and large-scale adoption of transformative, skill-intensive technologies.[5] The provision of technical education to the masses in primary school became an essential component of the industrialization process (Galor and Moav, 2006). At the same time, the Catholic Church was promoting a conservative and anti-scientific program, and acted as a barrier for the introduction of the technical curriculum, while pushing for religious content of schooling. This tension was particularly strong in France, where the economy saw a spectacular scientific and economic development, and the relationship between the Church and science had been exacerbated by the events of the 1789 French Revolution. Importantly, while 98% of the French population was Catholic – making it unlikely that my results are confounded by religious heterogeneity – there was large pre-existing variation in the *intensity* of Catholicism (which I refer to as "religiosity"). In my empirical analysis, I exploit this variation to study the differential diffusion of technical education and industrial development among the different departments (districts).

Using a rich dataset, assembled from several primary and secondary sources, I show that the more religious departments had lower industrial development only during the Second Industrial Revolution, but not before. I shed light on the underlying mechanism and suggest that the type of education (secular

[1] Many studies have analyzed the role of culture vs. institutions and tried to disentangle the two. I follow Alesina and Giuliano (2015) and refer to culture as a set of beliefs and values, and to institutions as formal institutions only.

[2] Following Mokyr (2002), I refer to "useful knowledge" as knowledge that is "economically useful," i.e., necessary for economic development. This could also include knowledge embodied in technological innovations.

[3] The 2009 Gallup survey shows that 95% of the population in countries with a per-capita income lower than $2,000 gave a positive answer to the question: "Is religion an important part of your daily life?". This percentage is as high as 65% for the United States (Crabtree, 2010).

[4] In the 19th century, Catholicism had embraced a particularly conservative and anti-scientific attitude – different from Catholicism in other periods of time or regions.

[5] During the First Industrial Revolution (1750-1850) the upper tail of the skill distribution was crucial for industrial development and workers skills mattered less (Mokyr, 2005; Squicciarini and Voigtländer, 2015). The technology-skill complementarity emerged only in the second phase of industrialization (Goldin and Katz, 1998; Galor and Moav, 2006).

vs. Catholic) was key, in that it determined whether the skills needed to operate the new industrial technology were adopted.

Specifically, my main measure of Catholic intensity is the share of refractory clergy in 1791. This represents the share of French clergy that did not swear the oath of allegiance to the *Civil Constitution* – promoted by the revolutionary government – but instead confirmed loyalty to the Catholic Church.[6] The share of refractory clergy reflected religiosity at the local level, since accepting or rejecting the oath was a community-level choice rather than a clergyman's personal decision (Tackett, 1986). To further validate this measure of religiosity, I use six other indicators, capturing different dimensions of Catholic intensity, and I provide evidence of a stable spatial distribution of religiosity over time. Figure 1, for instance, shows that departments with higher religiosity in 1791 also had higher Sunday Church attendance in the 1950s.

I then study the relationship between religiosity and several industrial and economic outcomes, during the First and during the Second Industrial Revolution. This relationship is negative and significant only during the Second Industrial Revolution (see Figure 2), but not before. Moreover, a difference-in-differences analysis shows that the more religious departments have significantly lower industrial employment in the post-1870 period. These findings imply that preexisting variation in religiosity started to matter only when skill-intensive technologies were introduced.[7]

Furthermore, I also shed light on a potential mechanism explaining this relationship, and analyze the role of religious vs. secular education for diffusion of skills. Indeed, in the late 19th century, the role of human capital in the industrialization process changed dramatically: contrary to the First Industrial Revolution – when the upper tail of the skill distribution was crucial for industrial development and workers skills mattered less (Mokyr, 2005; Squicciarini and Voigtländer, 2015) – the more sophisticated industrial machineries of the Second Industrial Revolution increasingly relied on the technical skills of much of the workforce to be operated, installed, and maintained (Galor and Moav, 2006). As a consequence, the French State took an active role in primary education, promoting a more technical curriculum to form a skilled labor force. Importantly, while educational policies were implemented at the national level, when there was scope for flexibility, local culture played a key role. I find that the share of Catholic schools increased in the more religious areas, when the two education systems (secular vs. religious) started to differ. Historical record suggests that this is driven by the preference of Catholic parents for religious education of their children, when this was threatened by the introduction of a secular and technical curriculum (Harrigan, 2001). Importantly, these results provide one of the

[6]The *Civil Constitution of the Clergy* was one of the most controversial laws passed by the National Constituent Assembly. It entailed drastic reforms to the Church structure. For more details see Section 3.1.

[7]This is similar to Acemoglu, Johnson, and Robinson (2002), who show that pre-existing institutional differences in European colonies mattered when investment-based technologies became available.

first empirical pieces of evidence to a large theoretical literature on cultural transmission and backlash of identity (see, for instance, Bisin and Verdier, 2001; Carvalho, 2013).

Then, using detailed panel data on education and industrialization from 1861 to 1911, I show that the share of Catholic schools is negatively and significantly associated with employment in industry and wages in manufacturing about a decade later. Specifically, "moving" from the 10th to the 90th percentile of the share of Catholic schools distribution would lead to a 7% decrease in the share of industrial employment (relative to a mean of 25% with a standard deviation of 10%). Thus, the type of schools (and the content of education) seems to be crucial for the diffusion of "useful knowledge," for the formation of a skilled labor force, and for industrial and economic development. I run several robustness checks: I use different lags for the share of Catholic schools and I find that the relation between the type of education and economic outcomes is stronger between 10 and 15 years later, i.e., when school children enter the labor market. Using the share of Catholic schools as my outcome variable, I show that economic development does not predict the type of education a decade later. Both findings help me exclude concerns of reverse causality. Moreover, my results are robust to the inclusion of potentially confounding factors that are not captured by department and year fixed effects. Then, using data by industrial sector and workers' cohort, I find that the "religiously-educated" cohorts are less likely to be employed in innovative sectors – probably because they lacked the skills needed to operate the more innovative and complex industrial technologies. Thus, even if I cannot fully rule out potential unobserved heterogeneity, these findings suggest that I am capturing the effect of the type of education on economic outcomes.

Finally, I do not argue that schooling is the only mechanism explaining the negative relation between religiosity and economic development during the Second Industrial Revolution. Historical evidence suggests that the anti-scientific and anti-modern program of the Church reached several aspects of people's lives – for instance, local clergymen strongly opposed the introduction of vaccinations, birth control, as well as the use of electricity in Churches (Minois, 1991). While I provide some evidence for this and show that the more religious departments had a lower rate of vaccinations per capita and higher fertility,[8] I also find that a large part of the relation between religiosity and economic development is explained by education and acquisition of human capital.[9]

Importantly, my results do not show that the relationship between religiosity and economic outcomes is inherently negative. Rather, it varies over time depending on the interaction between religious

[8]This could represent a broader aspect of conservatism. In Appendix A, I show that while religiosity is related to different measures of conservatism, conservatism is not associated with lower economic development after 1870. This suggests that the negative relation between religiosity and economic development is due to the anti-scientific dimension of Catholicism, rather than to conservatism as such.

[9]The Sobel-Goodman mediation test, for instance, shows that more than 40% of the relationship between religiosity and industrial employment is mediated by the *growth* in the share of Catholic schools over the 1851-1901 period.

norms and the knowledge needed to industrialize and grow in each specific stage of development. Here, I am focusing on a period in which Catholicism embraced a particularly anti-scientific attitude (1789-1914):[10] even within this period, religiosity is not associated with economic development in the first half of the 19th century, i.e., during the First Industrial Revolution when the upper tail of the skill distribution was crucial for the industrialization process. The more Catholic departments started to lag behind *only* during the Second Industrial Revolution, when religion became a friction for the diffusion of skills needed to be economically successful.

When interpreting my findings, one concern could be that the spatial distribution of religiosity may be related to other factors, also affecting economic development. In the empirical analysis, I take into account several potentially confounding characteristics (such as, earlier economic development, the presence of the nobility and of the entrepreneurial minority, as well as language heterogeneity, population density, and urban population) and I show that these do not affect my results. Moreover, the panel analysis – shedding light on a key mechanism through which religiosity could affect development – and a large body of historical evidence further suggest that my findings are unlikely to be driven by other confounding factors.

By analyzing the role of religiosity for the diffusion of knowledge, this paper contributes to a large literature on the relationship between religion and economic outcomes, starting with the pioneering work of Max Weber (1905). Specifically, it relates to those studies examining how religion may hamper or favor economic development through the human capital channel.[11] However, most authors analyze the effects of belonging to a particular religious affiliation. For instance, Becker and Woessmann (2009) and Botticini and Eckstein (2012) examine Protestantism and Judaism respectively. In both cases, the authors argue that the better economic outcomes achieved by Protestants or Jews, compared to Catholics, were due to investment in human capital (and, more specifically, to investment in literacy).[12] Compared to this literature, I make several contributions. First, I show that the relation between religiosity and economic outcomes can vary over time, depending on the interaction between religious norms and the economically useful knowledge in each specific stage of development.[13] Moreover,

[10] During the 17th and 18th century, for instance, there was no clear opposition of Catholicism toward sciences: several clergymen were eminent scientists and members of the Enlightenment. For details, see Section 2.2

[11] Other studies look at how religion affect development through other factors as, for instance, work ethic (Weber, 1905) or trust (Putnam, 1993; Guiso, Sapienza, and Zingales, 2003). For an overview on the literature on the economics of religion, see Iannaccone (1998).

[12] Even though the main objective of literacy was religious (and not economic), it could still have positive spillovers on economic activities, by allowing correspondence, written contracts, computations, and book-keeping (Mokyr, 2016). Interestingly, Cantoni (2015) finds no effects of Protestantism on economic growth, and Boppart, Falkinger, Grossmann, Woitek, and Wüthrich (2013) show that the beneficial effects of Protestantism over Catholicism on educational production depend on the sociocultural conditions, and become weaker or disappear in a non-conservative milieu.

[13] Historically, Mokyr (2011) documents the changing relation between religion and economic outcomes. He suggests that the Jewish, usually an economically successful minority, were underrepresented during the First Industrial Revolution

while most studies point to literacy (quantity of education) as the main mechanism through which religion affects human capital formation and, in turn, economic progress, I show that religiosity can also affect the content (quality) of education, as well as openness to innovative activities. Finally, I exploit variation in the *intensity* of religion, in contrast to the spread of religion as such.[14] This paper also contributes to those studies examining the role of worker skills for economic development (see, for instance, Galor, 2011). Importantly, it suggests a channel for the differential formation of human capital across regions. Religiosity, can hinder the accumulation of human capital and be a barrier for economic development when technology becomes skill-intensive. Furthermore, while studies focusing on the Second Industrial Revolution use school rate or literacy as a measure for worker skills (Galor and Moav, 2006; Becker, Hornung, and Woessmann, 2011), I show that distinguishing between quantity (school rate) and content of education can explain economic outcomes also in this earlier period – in line with research on modern data (see, for instance, Hanushek and Kimko, 2000).

Moreover, this paper relates to the literature on the role of local norms for the spreading of ideas and economic development. Empirical studies include Munshi and Rosenzweig (2006) who focus on informal institutions (i.e., the caste-based networks) and Abramitzky and Sin (2014) who study formal institutions (i.e., the collapse of the Communist regime).[15] This paper adds to this literature by considering religiosity as a potential hindering factor for diffusion of knowledge and economic development. Finally, it contributes to a larger literature examining the interaction between culture and economic development through channels like trust, generalized morality, family ties, or long-term relatedness between populations (Guiso, Sapienza, and Zingales, 2006; Tabellini, 2008, 2010; Alesina and Giuliano, 2010; Spolaore and Wacziar, 2012). It suggests another mechanism: culture, and more specifically religiosity, interacts with economic development by shaping adoption of knowledge and accumulation of human capital.

The remainder of the article is organized as follows: Section 2 explains the historical background. The data are described in Section 3. Section 4 presents the empirical results. Section 5 concludes.

2 Historical Background

– since, in this period, Judaism opposed the diffusion of "useful knowledge". Theoretically, Bénabou, Ticchi, and Vindigni (2013) look at the interplay between religious beliefs and scientific discoveries over time. The only empirical work on the changing interaction between religion and scientific outcomes is by Chaney (2015). This paper shows how an institutional change in the Islamic world in the 12th century lead to a decline in scientific production. However, it analyzes the pre- and post- institutional change (without exploiting variation in religiosity) and focuses on scientific production only.

[14] Contrary to cross-country studies examining the relationship between religiosity and economic development (see, for instance, Barro and McCleary, 2003), my results are unlikely to be confounded by institutional heterogeneity since France was a very centralized State.

[15] Theoretically, Romer (2010) and Jones and Romer (2010) show how country-specific norms influence the rate of adoption of new ideas and contribute to the variation in economic development among countries.

2.1 The Second Industrial Revolution in France

French economic growth began to accelerate in the mid-18th century and by mid-19th century France was "a centre of invention and diffusion for modern technologies" (Crouzet, 2003, p.234). During the Second Industrial Revolution – usually dated from 1870 to 1914 – the French economy experienced a spectacular scientific and economic development, industrial production grew rapidly and constantly and, with the *Belle époque* (1890-1914), France became an important economic leader.

The Second Industrial Revolution differed from the earlier phase of industrialization (in the late 18th and early 19th centuries) in two main respects. First, the interaction between science and technology accelerated. The localized progresses of the First Industrial Revolution spread to many more sectors and products, and pathbreaking inventions were introduced (Mokyr, 1999).[16] While some of these inventions – such as the electricity network and pharmaceutic products – were completely new, others were the results of advances of existing technology – railroads, for instance, were substantially improved and new sources of power (the Diesel engine and the electrical locomotives) started to be used. In both cases, the whole population (including the middle and working classes) was exposed, like never before, to technological and scientific progress (Mokyr, 1999): railroads, telegraph networks, gas, and water supply – that in an embryonic stage were already in place before 1870 – were drastically expanded.[17] Similarly, electrical power, synthetic materials, and pharmaceutical products entered the daily life of a large number of people.[18] Thus, "the Second Industrial Revolution turned the large technological system from an exception to a commonplace" (Mokyr, 1999, p.2).

The second difference with the earlier period of industrialization concerns the role of human capital. During the First Industrial Revolution the upper tail of the skill distribution was crucial for the industrial takeoff, while worker skills had a limited role in the production process – these were mostly "tacit skills," transmitted in the master-apprentice relationship (Mitch, 1993; Allen, 2003; Mokyr, 2005; Squicciarini and Voigtländer, 2015). In the last third of the 19th century instead, formal knowledge (including math and sciences) began to matter. The more complex and sophisticated industrial machineries increasingly relied on skilled workers in order to be operated: the dynamo technology and the subsequent electrification of industry led to the introduction of new instruments, such as conveyors, traveling cranes, and other devices that required more skilled labor (Goldin and Katz, 1998; Caselli,

[16] The chemical sector, for instance, saw the adoption of several new produces, such as fertilizers, synthetic materials (including industrial rubber and synthetic plastic), artificial dyes, disinfectants and antiseptics.

[17] In 1870, French national railways covered about 17,000km. By 1913, they reached almost 41,000km (i.e., an increase of 133%). In Britain, over the same period, railways expanded from 22,000km to 32,000km (i.e., an increase of 46%).

[18] For instance, France was the "leading country" in medicinal research. During the 19th, public medicinal laboratories were founded to manufacture and distribute vaccines (Achilladelis and Antonakis, 2001). Among them, the *Institut Pasteur* represents an exemplary case: founded in 1887, it largely contribute to the extension of vaccination against rabies and smallpox among the population.

1999).[19] Moreover, technical skills became particularly important for the installation and maintenance of these machineries: electricians, machinists, and technicians needed to be able to read and to understand instructions, and to have basic notions of algebra, geometry, as well as mechanical drawing, and dexterity.

2.2 Catholicism and science

The French Revolution (1789) marked a turning point for the relation between Catholicism and science. In the decades before 1789, the Catholic Church had a complex, but generally positive attitude toward scientific and technical progress, that was seen as part of an harmonious divine plan made by God for the human race. Several clergymen were eminent members of the Enlightenment: the Abbé Jean-Antoine Nollet, involved in the earliest public experiments with electricity, was also the mentor of famous scientists, such as Lavoisier and Monge; similarly, Francois Rozier, "a clergyman whose vocation was the enlightenment" was the publisher of the *Observations sur la Physique, sur l'Histoire Naturelle, et sur les Arts* (Mokyr, 2005).[20] At the same time, Popes Benedict XIV (1740-1758) and Clement XIV (1769-1774) were known as "friends of science" (Minois, 1991).[21]

With the French Revolution and the anti-clerical and anti-conservative program promoted by the revolutionary government (expressed in the *Civil Constitution of the Clergy* as well as in the persecution of clergymen during the Reign of Terror), an open war between the supporters of the traditional order, embodied in the Catholic Church, and the supporters of the new order, representing secular and scientific thinking, started. This was exacerbated by the French invasion of Italy (carried out under the flag of the Enlightenment) and by the complex relationship between Napoleon and Pope Pius VII. The reaction of the Church was brutal and, in the second decade of the 19th century, Rome embraced an extremely anti-modern and anti-scientific attitude: all French laws and norms were abolished, the use of electricity and vaccinations prohibited, 700 new cases of heresy were introduced and the imprisonments and executions of liberals increased sharply. Science became the scapegoat for the revolutionary events and was accused of being false and misleading. Neutrality was not an option in this context:

[19] The introduction of assembly lines (and thus the de-skilling of the production process) in some of the successful sectors of the Second Industrial Revolution, is a later phenomenon. For instance, until 1910, division of labor was minimal in the automobile industry (Caselli, 1999).

[20] Even before the Enlightenment, there are exemplary cases of clergymen devoted to science, such as the Minim order monk Marin Mersenne (1588-1648), an important mathematician that made influential contributions in acoustics or the ordained priest Pierre Gassendi (1592-1655), a mathematician and astronomer who was the first to document Mercury's transit before the sun. More generally, the Society of Jesus was largely involved in sciences (Ashworth, 1986) and has been defined as "the most important contributor to...experimental physics in the seventeenth century" (Heilbron, 1979, p.2).

[21] Benedict XIV was interested in medicine and studied the cases of hysteria and epilepsy. He strongly promoted scientific research at the University of Rome and he was so popular in the intellectual community all over Europe that Voltaire even wrote the *Mahomet* as homage to his openness to science. A similar attitude was embraced by Clement XIV who, in one of his letters, regretted not to have had enough time to study physics, and even suppressed the Jesuit order in 1773 – this was later restored in 1814.

religion and science were now lined up in the two opposite battlefields – for reasons beyond their intrinsic nature (Minois, 1991).

The conservative program of the Church in Rome quickly spread in all Catholic regions in Europe, and especially in France. With the Bourbon Restoration (1814-1830), this became evident in many aspects of people's lives. For example, while substantial progress was made in medicine, local clergymen strongly opposed any medical advice or intervention[22]: they considered the catastrophic cholera epidemic in 1832 as God's punishment for the 1830 revolution, and organized religious processions as a remedy; they strongly opposed the efforts of the public authorities trying to introduce vaccinations and those of doctors recommending birth control (especially among the lower classes as a way to fight poverty). Similarly, religious instruction replaced scientific and technical education: the study of sciences was banned from seminaries, the production of religious books increased sharply (from 300 to 600 per year), and the clergy recovered its hegemony in primary education (Minois, 1991; Jacob, 2014).

This conservative attitude of the Church continued until the first World War, and the years between 1880 and 1914 represented the most difficult moment for the relation between science and Catholicism.[23] The adoption of new technologies introduced during the Second Industrial Revolution was largely debated in the clerical world: the newspaper *L'Ami du Clerge* (founded in 1878) would also advice the local clergy on which technological innovations could be used in the Churches and by the population, if Rome had not yet expressed a clear opinion on this.[24] Over these decades, the Catholic battle against science and modernity took also political connotations: when progressive parties came into power (especially during the Third Republic, 1870-1914) the Church confronted the French government on major societal and economic issues, especially concerning education.[25]

Finally, since the anti-scientific program of the Catholic Church was promoted at the central level, it is unlikely that 'institutional' religious differences are explaining the differential diffusion of knowledge and economic development within France – as instead Davids (2013) argues for the different

[22]Diseases and sufferance were seen as part of the God's plans for human beings that did not have to interfere, but simply accept their destiny.

[23]By the last decades of the 19th century, almost every aspects of people's life was disciplined by some religious norms, that often became paradoxical formalism: for instance, the length of fasting before the communion had to be precisely computed, the type of butter that could be eaten during the days of Penitence had to be carefully chosen, and only olive oil could be used for the lamps in the Churches (Minois, 1991).

[24]The bicycle, for instance, was considered a "dangerous instrument of female emancipation" and electric lamps could not be placed on the altar, but were allowed in other parts of the Church as far as they did not have "theatrical effects". Similarly, it would define the birth control practices as being "abominable" and the result of a "selfish and materialist civilization" (Minois, 1991).

[25]The two main exceptions are represented by the Bonaparte's empires (in 1799-1814 and 1851-70). Their policies were quite open to scientific development, but, at the same time, forthcoming to Catholicism. On the other hand, during the Third Republic, the struggle between science and religion was strongly associated with the struggle between Republicanism and Monarchism. In Table A.2, I show that religiosity is negatively associated with voting for progressive political parties.

evolution of technology and development between China and Western Europe. Thus, the variation in *intensity* of Catholicism is likely to capture variation in intensity of religious attitudes and beliefs – which, in turn, determines the degree of observance of the Catholic anti-scientific agenda and the resistance toward the adoption of "useful knowledge."

2.3 The role of schooling for diffusion of knowledge and economic development

Education represented the most controversial issue in the debate between religion and science. The Church saw schooling (and especially primary education) as a way "to rebuild the moral fibre of the lower classes, leaving behind them the accident [of the Revolution],...and [as a way] to restore the principles of stability and subordination, which had been the mark of Catholic and monarchic France" (Furet and Ozouf, 1977, p.121). During the Bourbon period, the teaching congregations proliferated and promoted an education system where morality, "religion and love of the King" had to be properly inculcated in the population (Jacob, 2014).

The situation started to change with the July Monarchy and the Loi Guizot of 1833, when the State took an active role in schooling and aimed at expanding and improving the quality of mass education. It introduced a national curriculum, that not only included religious instruction, but also notions of arithmetic, line drawing, and geography. Importantly, all teachers (secular and Catholic) were now required to have a *brevet de capacité* and every department had to maintain an *école normale* to "form teachers capable of applying innovations made in curriculum and methods... [and able to] fashion more and more enlightened, and harder working, men" (Furet and Ozouf, 1977, p.142-3).

Educational policies were implemented at the national level and enforced by a strong administrative system – also thanks to the increased geographic and economic integration. However, when there was scope for local flexibility, ideology played a central role (Grew and Harrigan, 1991). This is especially evident in the choice of Catholic vs. secular education in the second half of the 19th century. With the Loi Falloux of 1851, Catholic public schools were encouraged: Catholic teachers were now exempted from the *brevet* since a simple *lettre d'obédience* from any religious order was sufficient to qualify as teacher. Catholic schools had better physical facilities, larger schools (with more classrooms) and higher summer attendance. However, "the intellectual level of French priesthood was mediocre... and they often [turned] their backs on the modern world. In education, this was expressed in the denunciation of science as materialist, and the maintenance of the old idea of a classical-Christian utopia for the consumption of schoolchildren" (Anderson, 1975, p.116). Indeed, Catholic education was centered around the Bible and religious texts – girls' schools were particularly strict on issues concerning marriage and divorce – and very little emphasis was put on counting (Grew and Harrigan, 1991; Harrigan, 2001).[26] Also, in terms of methods, Catholic schools promoted a "partial education",

[26]Even for the case of Prussia, Becker and Woessmann (2008) document that the Catholic Church was putting partic-

focused on "reading only" (Furet and Ozouf, 1977).[27] The risk was that children in Catholic schools were "paralyzed by the boredom of Catechism, religious instruction, and reading" ...and that education was simply a "passport to the First Communion" (Gildea, 1983).

On the other hand, all secular teachers were still required to have a *brevet de capacité* and a large part of them were professionally trained in the *écoles normales*. Interestingly, the preference for clerical teachers was, first of all, a religious one (Grew and Harrigan, 1991, p.221). In 1858, the Ministry of Education concluded that "[Catholic] families were particularly interested in the development of moral and religious values by schools and believed that only religious schools could provide those values" (Harrigan, 2001, p.60).[28]

The late 1860s and the advent of the Third Republic represented a transition period, and the differences between Catholic and secular education became more pronounced: once universal education had been achieved, the new objective of the French government lied in increasing the quality and professionalization of the education system (Grew and Harrigan, 1991). These new reforms aimed at forming a more educated and skilled workforce, now crucial for the industrialization process (as explained in section 2.1). For instance, with the ministry of public education Victor Duruy (1863-69), the *écoles normales* became increasingly professional and serious.[29] Similarly, the standards for the *brevet* became more uniform and the granting of *certificat d' études* to those who had passed a final examination more widespread and recognized. This was accompanied by investments in better physical facilities and by the definitive shift of educational financing from the communal/departmental level to the national level (Gildea, 1983; Grew and Harrigan, 1991). On the other hand, Catholic primary schools were still largely run by local priests and nuns, endowed only with a *lettre d'obédiance*.[30]

Another important moment in the history of the French education system is represented by the 1881-82 Jules Ferry laws, that made public education free, compulsory, and introduced crucial changes to the curriculum.[31] Notions of law and economics, science, agriculture, industrial and manual arts,

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ularly low effort in girls' education and that in the 19th century, the gender gap in terms of school enrollment was much higher in Catholic than in Protestant counties. Moreover, women (even if less represented than men in the formal labor force) are crucial for the education of their children and transmit them their values.

[27] Importantly, reading vs. writing and arithmetic represented two different cultures (Gildea, 1983): one was "associated with literacy and religious culture, the other one with manual arts and commercial practice" (Ariés, 1962, p. 297).

[28] Catholic schools were especially preferred for girls: nuns were believed to give a better education for future mothers and wives, while there was a general hostility towards unmarried women teachers (Harrigan, 2001).

[29] The 1851 distinction between obligatory and elective subjects disappeared and the curriculum was largely improved. It now included pedagogy, geometry, physics, chemistry, natural history, history, geography, notions of agriculture and industry (with visits to the factories), bookkeeping, gymnastics, and music.

[30] In these decades, the French State tried to undermine the role of the Church in education: many republicans considered the backwardness of education – under the Church control – as one of the reasons of the defeat in the Franco-Prussian war.

[31] Other educational reforms implemented by the Republican government concerned the substitution of clerical teachers with secular ones: from 1879 teaching positions vacated by a clerical teacher had to be replaced by secular teachers, and from 1886 all new appointments had to go to secular teachers (Grew and Harrigan, 1991).

drawing, music and gymnastics were now compulsory in the primary schools' curriculum. On the other hand, despite a strong opposition from the conservatives, the teaching of religion was definitively abolished in public schools – considered key to spread progress and modern values among the population. However, the State did not interfere with private education. Importantly, as Catholic public schools were laicized, new private Catholic schools were founded to satisfy the local demand for religious education.[32] Hence, while secular education became increasingly professional, Catholic schools represented "the clearest measure of resistance to secularization" and the "bastions of a Catholic subculture in opposition to the national system of public schools" (Grew and Harrigan, 1991, p.107, 221). This dual system (Catholic vs. secular education) remained unchanged until 1901-1904 (when with the *Lois Anti-congreganistes*, all members of religious orders were prohibited to teach also in private schools), and it strongly affected the differential diffusion of technical education and acquisition of human capital among the population.

Thus, in about fifty years the French education system achieved important objectives: among them, universal education, professionalization of the teaching corps, administrative and financial centralization, and the introduction of a standard and modern school curriculum (that remained in place, without major revisions until the Second World War). On the other hand, the pace at which this process took place was extremely heterogenous among departments, and it could not be explained without discussing the strong confrontation between science and religion, and the resistance that national laws encountered at the local level.

3 Data

My analysis is performed at the French department (county) level.[33] I assembled a large dataset from several primary and secondary sources. These include seven indicators of religiosity from 1788 to the 1950s, a large variety of outcome and control variables before and during the Second Industrial Revolution, detailed panel data on schooling and industrialization from 1871 to 1911, and data on industrial employment by sector and worker cohort in 1896.

[32] There were four types of schools in 19th century France: secular public, secular private, Catholic public, and Catholic private. In 1881 Catholic schools represented the 26% of the total and 45% of them were private schools. Despite the secularization of public education, in 1901 Catholic schools still represented the 21% of the total, with private Catholic schools being founded to replace public Catholic schools – only a few Catholic public schools (less than the 4% of the total number of schools) survived until 1901, but then were finally abolished with the 1901-1904 *Lois Anti-congreganistes*.

[33] Departments were created in 1789 by the National Constituent Assembly – the legislative body formed during the French Revolution – and the idea was that the *chef-lieu* (main city) of every department had to be located at maximum 24 hours on horseback from any town in the same department. Since the borders of the French territory changed over time, my analysis excludes those departments that temporarily were not part of France during the whole period of study – I end up with a total of 82 departments. For more details, see Appendix B.

3.1 Main indicator of religiosity: share of refractory clergy

Christianity spread in France in the 2nd century A.D. and the religious foundations of the country were officially established on the Christmas Day of the year 800 A.D., when Pope Leo III crowned Charlemagne Emperor of the Holy Roman Empire. As in other part of Europe, Protestantism spread in France in the early 16th century. However, the Huguenots, i.e., the French Protestants, were strongly persecuted and in 1685 Protestantism was officially declared illegal and confined to a small minority of the population. In 1861, 98% of the French population was Catholic, making it unlikely that my results are confounded by religious heterogeneity. At the same time, there was large variation in *intensity* of Catholicism – that I will exploit in my empirical analysis.

My main indicator of religiosity is the share of refractory clergy in 1791 (Tackett, 1986). Among the several reforms voted by the National Constituent Assembly, the 1790 *Civil Constitution of the Clergy* was one of the most controversial. This was an attempt to deeply restructure the French Church, both financially and organizationally. It included the abolition of the tithes, the nationalization of the Church lands, the conversion of clergymen into functionaries of the state, as well as a drastic reduction of the number of religious corps, and the election of bishops and parish priests by the citizens. Given the strong opposition and delays encountered for its implementation, the National Assembly required the clergy to take an oath of allegiance to the *Constitution*. Importantly, this was not a clergyman's personal decision, but a community-level choice. Indeed, "almost everywhere laypeople exerted pressure on the clergy to accept or reject the oath, with the oath ceremony providing the occasion for a de facto referendum on the general religious and secular policies of the Revolution" (Tackett, 1986, p.546). As a consequence, in January 1791, the French clergy split into *nonjurors* (refractory) and *jurors* (constitutional). I will use the share of refractory clergy, i.e. the share of clergy that did not swear the oath in support of the Constitution but remained loyal to the Catholic Church, as my main indicator of religiosity at the local level.[34] On average, 43% of the total French clergy stayed loyal to the Catholic Church – with the highest percentage in the Morbihan department in Brittany (about 89%) and the lowest in the Var department in the Provence-Alpes-Côte d'Azur region (about 6%). Importantly, this indicator of religiosity is measured before my outcome variables both in the pre- and post-1870 period (see 3.2 for details), thus avoiding concerns of reverse causality, i.e., economic development affecting religiosity at the local level. Moreover, to further validate this measure, in Section 4.1, I will use other indicators of religiosity and provide evidence of a stable spatial distribution of Catholic intensity over

[34]Importantly, there was not a particularly strong punishment for the clergy not taking the oath. In a first moment, *refractory* clergymen had to be replaced and could not hold religious services. However, the Law of Toleration (May 1791) re-allowed them to hold services, as they did not voice against the *Constitution*. Finally, during the Reign of Terror (1792-93), that promoted the complete dechristianization of the country and established the "cult of reason", first the refractory and then the constitutional clergy were persecuted. The formal status of the Catholic Church was re-established in 1801 with the Concordat between Napoleon and Pope Pius VII.

time.

3.2 Cross sectional analysis: religiosity and development during the First and Second IR

3.2.1 Outcome variables

In the cross-sectional analysis, I use several economic and industrial outcomes to study the interaction between religiosity and economic development before and after 1870. For the pre-1870 period, I look at the share of people in industry in 1866 (French census) as an indicator of industrial development. Then, as measures for innovativeness at the local level, I use the share of workers in innovative sectors[35] and the number of steam engines per 1,000 in 1839-1847 (Chanut, Heffer, Mairesse, and Postel-Vinay, 2000). Finally, following a rich literature in economic history (DeLong and Shleifer, 1993; Dittmar, 2011; Squicciarini and Voigtländer, 2015), I use city population growth between 1750 and 1850 as a proxy for economic growth (Bairoch, Batou, and Chèvre, 1988). For the period of the Second Industrial Revolution, I use measures as similar as possible to the ones of the pre-1870 period, in order to better compare the level of development before and after 1870. These include the share of industrial employment in 1901 (French census), the share of workers in innovative sectors in 1896 (Enquéte Industrielle), the number of industrial machineries per 1,000 in 1901, and the growth of industrial employment from 1871 to 1901 (French census).

3.2.2 Control variables

When regressing my economic and industrial outcomes (described above) on religiosity, I control for a variety of baseline controls and potentially confounding characteristics, both before and during the Second Industrial Revolution. The baseline controls include total department population, literacy rate (measured as the percentage of men and women able to sign their wedding certificate), and school rate (measured as the share of children attending primary schools to school-aged population (5-15 years)). These data are from the Statistique Générale de la France. The other baseline controls are a dummy for departments located on the Atlantic Ocean or on the Mediterranean, capturing geographic characteristics of the departments. Finally, as measures for early access to formal knowledge, I include the (log) number of universities founded before 1750 (Jedin, Latourette, and Martin, 1970; Darby and Fullard, 1970), and the (log) number of printing presses existing between 1450 and 1500 (Febvre and Martin, 1958; Clair, 1976) .

In a second step, I include a set of potentially confounding factors (additional controls). I control for the presence of knowledge elites, measured as the density of subscribers to the Encyclopédie of Diderot and d'Alembert (Squicciarini and Voigtländer, 2015). This captures the importance of the upper tail of the skill distribution that played an important role for economic development during the

[35] For more details on the classification of sectors into "innovative" and "traditional" see Section B.1

First Industrial Revolution (Mokyr, 2005; Squicciarini and Voigtländer, 2015) and that could potentially foster industrial development also in the late 19th century, as well as promote secular values and scientific knowledge among the rest of the population. I include the share of the Huguenot population in 1861 (Mours, 1958), that despite representing only 1.7% of the total French population was largely involved in industry, trade, and finance.[36] Then, I use the number of noble families in each department from the Almanach de Saxe Gotha, the most important classification of European royalty and nobility. One concern could be that the nobility, owning the majority of the land, could hinder industrial progress and use religion to keep the population obedient while opposing the implementation of schooling reforms (see, for instance, Galor, Moav, and Vollrath, 2009). However, historically, this does not seem to be the case in the French context. First, after the French Revolution, landholding took a small-scale connotation[37] and land owners had little influence on the rural community.[38] Furthermore, given the centralization of the French state, local seigneurs had little flexibility in implementing government policies at the local level. Following Abramson and Boix (2013) and Squicciarini and Voigtländer (2015), I also control for early industrial activity: these data provide the number of mines, forges, iron trading locations, and textile manufactures prior to 1500 for each department. Then, since France was a centralized State, contrary to cross-country studies, my results are unlikely to be confounded by institutional heterogeneity. However, to proxy for local differences in the reach of central institutions, I include a dummy for departments located in *pays d'élection*, i.e., regions where the king exerted particularly strong power in fiscal and financial matters (Le Bras, 1986). Finally, I include a dummy for non-French speaking departments[39] – to take into account cultural and language differences – and I control for population density and urban population.

3.2.3 Balancedness

In Table 1, I regress my main explanatory variable, the share of refractory clergy, on my baseline and additional controls (one by one) to check whether these are correlated with religiosity. Few variables are significantly correlated with the share of refractory clergy. Among the baseline controls (col.

[36] Importantly, in the context of 19th century Switzerland, Boppart, Falkinger, and Grossmann (2014) find that Protestants outperformed Catholics not only in reading (often considered a consequence of their motive to read the Bible), but also in other cognitive skills, e.g. numeracy, more closely related to the industrialization process.

[37] The land redistribution during the French Revolution "reinforced the small-scale character of landholding in France and, by extension, the tenacious, ideologically informed sense of property ownership that would hinder attempts to achieve *remembrement* [land consolidation] in the nineteenth and early twentieth centuries" (Jones, 2012, p.113)

[38] As explained by Forster (1967, p.84-85) "Surely there was less contact between the rural community and the noble *rentier* or the noble owner...and less contact meant less local influence for the nobility". Moreover, he also argues that "the bonds of subordination ...throughout the entire society had been loosened [and].. by 1825 the erosion of the hierarchical society upon which hereditary aristocracy rested was far advanced."

[39] In my dataset, these include Corse, Finistere, Pyrenees Orientales, and Basses Pyrenees.

1), total department population is significantly correlated with religiosity.[40] Similarly, the coefficient on Atlantic/Mediterranean departments is positive and significant, probably reflecting the higher religiosity of Brittany, Lower Normandy, and Aquitaine.[41] On the other hand, school rate, the number of universities and the number of printing presses are not significantly correlated with the share of refractory clergy.

Next, in column 2, I show the coefficients of the individual regressions of the share of refractory clergy on the potentially confounding factors described above. The coefficient of the density of knowledge elites is insignificant and almost zero, suggesting that the enlightenment of a minority is not correlated with the level of religiosity of the rest of the population – thus making it unlikely that the presence of knowledge elites is confounding my results. Similarly, the intensity of Catholicism is not significantly correlated with the presence of the Huguenots.[42] Moreover, there is no significant relationship between religiosity and the local density of noble families. The correlation between the share of refractory clergy and pre-industrial activity is small, positive, and insignificant, making it unlikely that my results are confounded by the presence of early industrial centers. Next, there is a negative and significant correlation between the reach of central institutions, measured by the *Pays d'Elections* dummy, and the intensity of Catholicism. This suggests that religion played a more important role in those departments that were more independent from the king.[43] Finally, the dummy for departments in non-French speaking areas, population density, and urban population are insignificantly correlated with Catholic intensity. In sum, Table 1 suggests that there are a few department-level characteristics that vary with religiosity. Importantly, my results are robust to the inclusion of both the baseline and the additional controls.

3.3 Panel analysis: education and economic development

In the panel analysis I shed light on a possible mechanism through which religiosity interacts with economic development, and I study the relation between the type of education (secular vs. Catholic) and industrial development in the post-1870 period. My outcome variables are the share of industrial employment from 1871 to 1911 (French censuses) as a measure for industrial development, and wages in manufacturing from 1891 to 1906 (Statistique Général de la France, 1907) as a proxy for produc-

[40] I use department population in 1871, since this is generally considered the beginning of the Second Industrial Revolution. Using population size in other years does not change the results.

[41] This is not a problem in my case: since globalization reached its peak before the First World War, departments located on the Atlantic Ocean or on the Mediterranean Sea should have been economically more successful during this period. Moreover, excluding these regions does not affect my results.

[42] On the other hand, Huguenot density is a good predictor for the presence of knowledge elites and thus positively associated with economic development during the First Industrial Revolution. This is in line with the idea of the Huguenots being an economically successful minority (Squicciarini and Voigtländer, 2015).

[43] However, the results of my regressions are robust to the inclusion of the *Pays d'Elections* dummy and the coefficients on religiosity are very similar in magnitude to those in the baseline specification (see Table 5 and A.6).

tivity. Both variables are reported every five years. Then, using data by industrial sector and workers' cohorts from the 1896 Enquéte industrielle, I compute, for each cohort, the share of workers employed in innovative sectors.[44]

My main explanatory variable is the share of Catholic schools. In the baseline specification, I control for department level population, school rate, the number of students per school, and the total number of schools. All schooling variables are from the Statistique Générale de la France and generally reported every five years from 1851 to 1901. Then, I include potential confounding factors that are not captured by the department and year fixed effects. First, I control for the spreading of the phyloxxera that between 1863 and 1890 destroyed 40% of French vineyards and represented one of the most dramatic and devastating agricultural shocks in France (Banerjee, Duflo, Postel-Vinay, and Watts, 2010). Second, I include government extraordinary subsidies (per capita) to the different departments from 1871 to 1906. These data are from the *Bulletin des lois de la République française* and are a measure for the different amount of State resources going to the departments. To control for internal migration, I include the number of immigrants per 100 inhabitants.[45] Finally, I use the I_g Princeton index[46] as a measure of fertility (Murphy, 2015) and I control for the share of urban population (Statistique Générale de la France).

4 Empirical Results

First, using different indicators for Catholic intensity, I provide evidence of a persistent spatial distribution of religiosity over time. Then, I show that the more religious departments started to lag behind only after 1870, when the Second Industrial Revolution started, but not before. Finally, I shed light on one possible mechanism and suggest that the type of education played a key role: I find that the share of Catholic schools is negatively associated with industrial development about a decade later and that "religiously-educated" cohorts are less likely to be employed in more innovative sectors.

4.1 Local persistence of religiosity

I now use alternative indicators of religiosity to show that departments with a higher share of refractory clergy in 1791 were more religious already before the 1789 French Revolution and until the 21st century.

[44] Appendix B explains the classification into traditional and innovative sectors.

[45] Since foreign immigration to France was very limited (Daudin, Franck, and Rapoport, 2016), these only include immigrants from other French departments.

[46] This measures the ratio of births that married women in a given population actually have to the number they would have if subject to the maximal age-specific fertility schedule. This is a less coarse measure than the crude birth rate.

4.1.1 *Persistence of religiosity before and during the French Revolution: the Cahiers de Doléances*

Since the French Revolution occurred in 1789 – only two years before the 1791 clerical oath – and brought drastic changes in French society and institutions, one concern could be that it also had an impact on religiosity at the local level. I thus use data from the *cahiers de doléances* (Hyslop, 1934) and provide evidence of a locally stable distribution of Catholic intensity before and after 1789. At the eve of the Revolution, Louis XVI, confronted with a general discontent of the population, decided to call (for the first time after 1614) the Estates General, i.e., the French representative assembly. The representatives of each Estate (clergy, nobility, and third estate) in every *baillage* (electoral district) endorsed a *cahier*. This was a list of grievances and suggestions on several aspects of the social, economic, and political situation of the country. Importantly, "the *cahiers* embodied the will of the community that endorsed it" (Shapiro, Tackett, Dawson, and Markoff, 1998, p.105). Hyslop (1934) grouped the *cahiers'* contents in 49 categories. Four of these categories reflect "anti-religious" attitudes: a) demanding the democratization of the clergy; b) expressly hostile to Papal influence in the French Church; c) showing secularism; d) showing pronounced etatisme as regards the Church. For each *bailliage*, I compute the share of "anti-religious" contents in the *cahiers* of the third estate and use it as a measure of pre-1789 (anti-)religiosity.[47] Table 2 shows a negative and significant relation between the share of "anti-religious" contents in the 1789 *cahiers* and the share of refractory clergy in 1791, suggesting that those departments that were more religious before 1789 were also more religious during the French Revolution.[48]

4.1.2 *Persistence of religiosity until the 21st century*

I then look at later indicators of Catholic intensity. First, I use data on the share of readers of the newspaper *La Croix* in 1893 (Cholvy and Hilaire, 2000).[49] This was considered the Catholic newspaper *par excellence*.[50] Then, I use data on the share of Catholic schools in 1901 and the number of priests per capita in 1901 (both from the Annuaire Statistique de la France).

Finally, I have information on religiosity in the mid-21st century. Specifically, I look at Church attendance, measured as the share of people attending the Sunday Mess (Isambert and Terrenoire, 1980) and at the number of priests' ordinations per capita (Godfrin and Godfrin, 1965).[51] Table 3

[47] I focus on the *cahiers* of the third estate, since this represented 98% of the French population and thus captures local religiosity of the population.

[48] As a placebo, Table A.4 in Appendix uses the share of "anti-religious" contents in the *cahiers* of the clergy and nobility. These are not significantly correlated with religiosity in 1791, suggesting that religiosity of these minorities is different from religiosity of the rest of the population.

[49] The share of *La Croix* readers is measured as an index going from 1 to 4.

[50] Godfrin and Godfrin (1965) argue that the title and the crucifix on the first page was a way to gather the whole Catholic community. The readers were usually people who supported the Church unconditionally and that wanted to be updated on the life of the their religious community.

[51] Priests' ordinations per capita is measured as an index going from 1 to 6.

shows the results. All indicators are positively and significantly associated with the share of refractory clergy, providing evidence of a stable spatial distribution of religiosity until the 21st century – this is also in line with the literature on persistence of cultural traits (starting with Putnam, 1993). Moreover, this positive correlation further suggests that the share of refractory clergy reflects religiosity at the local level.

4.2 Religiosity negatively associated to economic development after 1870, but not before

4.2.1 Cross-sectional analysis: negative relation between religiosity and development after 1870

I now relate religiosity to a variety of outcome variables before and during the Second Industrial Revolution. I estimate equations of the form:

$$y_i = \beta \cdot R_i + \gamma \mathbf{X}_i + \varepsilon_i \,, \tag{1}$$

where R_i represents religiosity in location n; $\mathbf{X_i}$ is a vector of control variables, and ε_i is the error term. I use several outcomes y_i (described in Section 3.2) as proxies for economic development. Following my discussion in Section 2, I expect religiosity to hamper the diffusion of technical and scientific knowledge, and therefore economic development, during the Second Industrial Revolution – I thus expect $\beta < 0$ after 1870, but not before.

Table 4 shows the OLS results for the pre-1870 period. First, I use department level data and I show that the share of refractory clergy is not significantly associated with the share of people in industry in 1866 (col. 1), the share of workers in innovative sectors in 1839-47 (col. 2), and the (log) number of steam engine per 1,000 between 1839-47 (col. 3). Next, column 4 uses city population growth between 1750 and 1850 as a proxy for economic growth and shows a very similar pattern. This suggests that religiosity was not associated with economic development before the Second Industrial Revolution, i.e., before scientific and technological innovations spread among the whole population and worker skills became important for the industrialization process. Among the other controls, school rate is generally significantly and positively associated with economic development (cols 1-3).[52] Similarly, departments located on the Mediterranean Sea or on the Atlantic Ocean seem to have higher industrial and economic development (see Table A.5 in Appendix shows that the results hold when including the confounding factors listed in column 2 of Table 1).

Table 5 looks at the relationship between religiosity and economic development in the post-1870

[52] As argued in Squicciarini and Voigtländer (2015), in the period of the First Industrial Revolution (1750-1850), higher worker skills are positively associated with economic outcomes in the cross-section, but not with growth. The negative (despite not significant) coefficient in col. 4 suggests the declining importance of skilled labor (replaced by unskilled labor) during the First Industrial Revolution (see, for instance, Goldin and Katz, 1998; de Pleijt and Weisdorf, 2014; Squicciarini and Voigtländer, 2015).

period. The coefficients on the share of refractory clergy is now negatively and significantly correlated with the share of industrial employment in 1901 (col. 1), the share of workers in innovative sectors in 1893 (col. 2), the number of machineries per 1,000 in 1901 (col. 3), and the growth in the share of industrial employment between 1871 and 1901 (col. 4).[53] As in the pre-1870 period, the school rate is generally positively and significantly correlated with the different outcome variables. At the bottom of Table 5, I also report the standardized beta coefficients, showing that a one standard deviation increase in religiosity is associated, for instance, with a 0.19 standard deviations decrease in share of industrial employment and with a 0.24 standard deviations decrease in the the share of workers in innovative sectors. Specifically, "moving" from the 10th to the 90th percentile of the religiosity distribution would lead to a 6% decrease in the share of industrial employment in 1901 (relative to a mean of 30% with a standard deviation of 10%) and to a 11% decrease in the share of workers in innovative sectors in 1896 (relative to a mean of 40% and a standard deviation of 16%). The standardized beta coefficients of school rate in Table 5 are comparable to those in the pre-1870 period (see Table 4) suggesting that the "quantity" of education (in levels) was important during the First and the Second Industrial Revolution. Importantly, Table A.6 in the Appendix shows that in all specifications the coefficient on the share of refractory clergy remains significant and very similar in magnitude when including the confounding factors listed in column 2 of Table 1.[54]

4.2.2 Additional specifications

In Section A.2 of the Appendix, I perform (and discuss in more details) a number of additional checks. Table A.7 also controls for the share of clergy in the population in 1791. Importantly, Table A.8 controls for the initial level of development, by including the pre-1870 outcome variables as controls in the post-1870 regressions.[55] The regressions in Table A.9 include the share of people with secondary education in 1876.[56] In all specifications, the inclusion of these potential confounding variables does not affect the magnitude and significance of my coefficients. This sensitivity analysis suggests that any remaining omitted variable bias due to unobservables should be modest as well. This is further confirmed in Table A.11 where I take into account the role of unobservables using the Altonji, Elder, and Taber (2005) methodology. It shows that selection on unobservables would have to be at least

[53] Since data on city population growth are not available after 1850, I use growth in the share of industrial employment.

[54] While I am focusing on intensity of religion, other studies analyze how industrialization affects different religious groups differently. For instance, in the context of Egypt, Saleh (2015) shows that the first wave of state industrialization (based on the textile industry) was de-skilling for Muslim and up-skilling for Christians, while the second wave of industrialization – based on the transportation industry – was up-skilling for both groups.

[55] This addresses the concern that higher initial development leads to lower religiosity, and also to higher development later on. It also relates with the secularization hypothesis, suggesting that as societies develop, religion becomes less important in people life (see, for instance, McCleary and Barro, 2006; Barro and McCleary, 2006).

[56] I don't include this variable in the main specifications, since I want to use a consistent set of controls (pre- and post-1870) and these data are only available for the post-1870 period.

3.5 times stronger than selection on observables to explain away the relationship between the share of refractory clergy and my outcome variables – thus suggesting that is unlikely that potential unobservables characteristics are confounding my results. Finally, my findings hold when taking into account spatial autocorrelation (Table A.10).

4.2.3 Difference-in-differences: lower industrial employment in more religious areas after 1870

Moreover, since data on the share of industrial employment are available for the 1871-1911 period from the same source, I can perform a difference in differences analysis.[57] I estimate equation of the form:

$$y_{i,t} = \alpha_i + \alpha_t + \beta R_i \cdot Post1871 + \varepsilon_{it} \tag{2}$$

Table 6 shows the results. Column 1 only includes year fixed effect, column 2 adds department fixed effect, and column 3 weights regression by department level population. In all the specifications, the coefficient on the interaction between the share of refractory clergy and the *Post1871* indicator is negative and significant. This suggests that the more religious department start to significantly lag behind during the period of the Second Industrial Revolution. Specifically, "moving" from the 10th to the 90th percentile of the religiosity distribution would lead to about 4% lower share in industrial employment in the 1871-1911 period (relative to a mean share of 25% with a standard deviation of 10%).

4.3 Mechanism: religiosity, Catholic education, and economic development

I now shed light on the mechanism that can explain the negative relationship between Catholic intensity and economic/industrial development during the Second Industrial Revolution. First, I show that in the more religious departments there was a *general* aversion to scientific development and secular/modern thinking. This interpretation is in line with Bénabou, Ticchi, and Vindigni (2015) who, using data from the World Values Survey, find that greater religiosity is significantly associated with less favorable views on innovation.[58]

Then, I focus on a more *specific* channel and I suggest that primary education played a central role in linking religiosity and economic development. I will show that: 1) the more religious departments had a higher share and a higher growth in the share of Catholic schools – especially when the two education systems (Catholic and secular) started to diverge; 2) locations with higher shares of Catholic schools had lower industrial and economic development about a decade later; 3) "religiously-educated" cohorts were less likely to be employed in innovative sectors – probably because they lacked the skills

[57] I consider the year 1871 as the pre-treatment period.

[58] Guiso et al. (2003) find that religiosity is positively associated with "good" economic attitudes, i.e., economic attitudes conducive to higher per capita income and growth. However, they do not specifically examine attitudes toward scientific and technological development.

needed to operate the new technologies.

4.3.1 Stronger opposition to scientific progress and modernity in more religious areas

As explained in Section 2.2, during the 19th century, the Catholic Church promoted an anti-modern and anti-scientific program. At the local level, this was manifested in several aspects of people's lives – examples are the opposition to vaccinations and birth control, the prohibition of the use of electricity in Churches, and the strong aversion toward secular education. Table 7 shows some evidence for this. Columns 1 and 2 use the share of vaccinated children in 1871 as dependent variable. The coefficient on the share of refractory clergy is negative and significant, even when controlling for fertility (col. 2). In terms of magnitude, a one standard deviation increase in religiosity is associated with 0.28 standard deviations decrease in share of vaccinated children. Since vaccinations were equally provided to the different departments by the central government, a lower share of vaccinated children in the more religious areas is likely to be driven by a lower demand for vaccinations.[59] Moreover, columns 3-4 show a positive correlation between religiosity and fertility – a one standard deviation increase in religiosity is associated with 0.346 standard deviations increase in fertility in 1901. These findings suggest that religiosity acted as a barrier for the diffusion of technological innovations and progressive thinking during the period of the Second Industrial Revolution.[60]

4.3.2 Preference for Catholic education in more religious areas

After providing evidence for a higher *general* resistance to technological progress and modernity in the more Catholic departments, I shed light on a more *specific* mechanism and I focus on the role of primary education. As explained in Section 2, the 1851 Loi Falloux made it easier for all clergymen to qualify as teachers. In the subsequent years the share of Catholic schools increased in the whole country (from about 17% in 1851 to 25% in 1866 – see Figure A.1) and the differences between religious and secular education emerged.[61] Then, in the late 1860s, with the increasing professionalization of secular schools, the difference between the two education systems became more pronounced.

Table 8 uses data on type of schools (Catholic vs. secular) from 1851 to 1901 and splits the period in two sub-periods: 1851-1866 and 1866-1901. Columns 1-3 show that departments with a higher

[59] On average, 83% of children would be vaccinated, but in departments like Sarthe (Pays de la Loire) or Finistere (Brittany) this percentage goes down to 28% and 33% respectively. To gauge more the corresponding magnitude, "moving" from the 25th to the 75th percentile of the religiosity distribution would lead to a 11% decrease in the share of vaccinated children – when the mean is 83% and the standard deviation is 23%.

[60] Some authors study the interaction between religious beliefs and institutional changes. For instance, Belloc, Drago, and Galbiati (2016) show that, in the context of Medieval Italy, shocks to religious beliefs (caused by earthquakes) retarded institutional transition to self-government in cities where political and religious powers were the same person.

[61] Catholic education was based on religious texts and on the "reading only" approach, and a large majority of Catholic teachers did not have any specific training. On the other hand, secular teaching corps needed a *brevet* to qualify as teachers, and several of them were trained in the *ecoles normales*. See Section 2.3 for details.

share of refractory clergy in 1791, also had a higher share of Catholic schools, especially after 1850. Then, columns 4-6 show that the more religious departments also experienced a higher growth in the share of Catholic schools – controlling for the initial share of Catholic schools. This is particularly evident in the 1866-1901 period: with a one standard deviation increase in the share of refractory clergy, the share of Catholic schools in 1901 (col. 3) increases of 0.403 standard deviations and the growth in the share of Catholic schools (in the 1866-1901 period) increases of 0.429 (col. 5) standard deviations. Interestingly, despite the strong state intervention and heavy investment in secular education during this period, the share of Catholic schools changed little across France – from about 25% in 1866 to almost 22% in 1901 (see Figure A.1).[62] However, there was a large department-level variation, with some departments experiencing an increase in the share of Catholic schools (the highest was a 80% increase in the Lozère department) and others experiencing a decrease (the highest was a 70% decrease in the Hautes-Alpes department).[63] This is also evident in Figure 3 that plots the per-period coefficients of religiosity on the share of Catholic schools (left panel), and the share of refractory clergy against the growth in the share of Catholic schools in the 1866-1901 period (right panel). Importantly, these results are in line with the historical evidence documented in Section 2, suggesting a strong preference of religious parents for Catholic education of their children – especially when the secular education system started to spread around France, threatening Catholic schooling. This provides empirical evidence to a large theoretical literature on cultural transmission and intensification of cultural identities when these are threatened (see, for instance, Bisin and Verdier, 2001; Bénabou and Tirole, 2006; Tabellini, 2008; Carvalho, 2013).[64] Finally, Table A.12 in Appendix shows very similar results when using the share of Catholic students.[65]

4.3.3 Catholic education negatively associated to economic development about a decade later

I now use data on schooling and industrialization to study the effect of Catholic vs. secular education on economic development over time. Given the panel setup of my database, I can estimate panel models with fixed effects, thus avoiding identification from unobserved time-invariant department characteristics and nation-wise common trends. Specifically, I estimate equations of the form:

$$y_{i,t} = \alpha_i + \alpha_t + \beta CS_{i,t-10} + \gamma \mathbf{X}_{i,t-10} + \varepsilon_{it} \tag{3}$$

[62] This interpretation is also supported by a recent paper from Franck and Johnson (2016), that show how the massive increase in State intervention and public spending on secular education did not affect overall enrollment in Catholic schooling in late nineteenth-century France.

[63] The Lozère department, located in the Languedoc-Roussillon-Midi-Pyrénées region, is in the 95% percentile of the religiosity distribution. The Hautes-Alpes department, located in the Provence-Alpes-Côte d'Azur region, is instead in the 5% percentile of the religiosity distribution.

[64] To the best of my knowledge, Fouka (2016), focusing on US policies banning the use of the German language in the Unites States, represents the only empirical study showing a backlash of identity in response to assimilation policies.

[65] Since data on Catholic vs. secular students are not available for some years, I prefer using data on schools.

where y_{it} is employment in industry or wages in manufacturing, while α_i and α_t denote respectively department and time fixed effects. The main explanatory variable is the share of Catholic schools, $CS_{i,t-10}$ in $t-10$. The vector $\mathbf{X}_{i,t-10}$ includes the enrollment rate in primary schools, the (log) number of students per school, the (log) number of total schools in $t-10$, and department-level population in t. I use ten years lagged schooling variables since children in primary schools, aged between 5 and 15, will enter the labor force about ten years later (when they are aged between 15 and 25).

Table 9 reports the results for the share of employment in industry between 1871 and 1911.[66] Column 1 only includes department and year fixed effects. Column 2 also controls for school rate and department level population; column 3 adds the (log) number of students per school and the (log) number of total schools. The various specifications show that the share of Catholic schools is strongly and negatively associated with industrial employment 10 years later. This is in line with a causal interpretation where the increase in the share of Catholic schools is followed (10 years later) by a decrease in the share of employment in the industrial sector. By contrast, changes in the school rate do not seem to play a role.[67] Moreover, there is a positive relation between total department population and the share of industrial employment. The results are robust when weighting regressions by population (col. 4), and when using a first-differenced model that regresses the change in industrial employment on the change in the different explanatory variables (col. 5). Column 6 uses the share of students enrolled in Catholic schools (rather than the share of Catholic schools) and the results hold. Importantly, the coefficient on the share of Catholic schools remains strongly significant in all specifications. At the bottom of Table 9, I report the standardized beta-coefficients showing that a one standard deviation increase in the share of Catholic schools is related to about 0.23 (col. 3) standard deviations decrease in the share of industrial employment. To gauge more the corresponding magnitude, "moving" from the 10th to the 90th percentile of the distribution of the share of Catholic schools would lead to a 7% decrease in the share of industrial employment (relative to a mean of 25% with a standard deviation of 10%).

Table 10 uses (log) wages in manufacturing from 1891 to 1906 as dependent variable and it shows a very similar pattern – also when weighting the regression by department population (col. 2) and when using a first-differenced model (col. 3). The standardized beta coefficients suggest that one standard deviation increase in the share of Catholic schools is associated with 0.44 (col. 1) standard deviations decrease in (log) wages. Specifically, "moving" from the 10th to the 90th percentile of the distribution of the share of Catholic schools would lead to a 0.17 log points lower wages (relative to a mean of 1.3

[66] In the main specifications, I have 82 departments and 8 points in time. Data on industrial employment are missing for the year 1896.

[67] This could also be due to the fact that primary school enrollment had already reached very high levels in the period of study.

with a standard deviation of 0.16).[68]

4.3.4 Additional specifications

Table 11 and Table 12 address concerns of potential omitted variables bias and reverse causality, respectively.

First, while department and year fixed effects control for omitted variable bias from unobserved time-invariant department characteristics and time-specific factors, there could still be bias from omitted variables, whose department-specific change over time is correlated with changes in the share of Catholic schools and industrial employment. Table 11 controls for observable characteristics that would not be captured by the department and year fixed effects. Column 1 includes a dummy for the year when the phylloxera spread in a certain department. The phylloxera, a pest of grapevines, destroyed about one third of French vineyards between 1875 and 1889 and caused a decline in wine production by about 70% (Meloni and Swinnen, 2014). If people migrated from the countryside to urban areas, the spreading of the phylloxera could have favored a switch from the agricultural sector to the industrial sector as well as a decrease in the share of Catholic schools. Another concern could be that, especially after 1870, the Republican government strongly promoted secular education and, at the same time, provided more funding to secular-oriented departments to support industrial and economic activities. Column 2 suggests that government subsidies to the different departments are not confounding my results. Moreover, higher fertility – and thus a higher "quantity" of children – in the more Catholic areas could be associated with a higher share of Catholic schools and lower industrial employment (because of lower investment in "quality" of children – not related to the type of schooling).[69] However, controlling for fertility (col. 3) does not affect my results. Then, my findings are robust to the inclusion of changes in immigration[70] and urban population, which could potentially affect education choices as well as industrial employment (cols. 4-5). Finally, the results hold when controlling for all potential confounding factors together (col. 6). Importantly, in all regressions the coefficient on "Share Catholic Schools$_{t-10}$" is highly significant and very similar in magnitude to the baseline results of Table 9.

[68] Importantly, one could wonder whether the different effect of Catholic vs. secular education on industrial development is given by the study of a religious curriculum in Catholic schools or by the introduction of technical education in secular schools. While I do not observe a counterfactual (i.e. schools with neither religious nor technical teaching), my results, supported by historical evidence, suggest that the second hypothesis is the most likely: religiosity played an hindering role by hampering and delaying the spreading of technical education that had become crucial for industrial development during the Second Industrial Revolution.

[69] The trade off between quantity and quality trade of children is an important element explaining the transition to modern economic growth (see, for instance Galor, 2005, 2011). Becker, Cinnirella, and Woessmann (2010) use an instrumental variable approach to investigate both directions of causality and find evidence of a mutual causation between fertility and education in 19th century Prussia.

[70] One concern could be that an enlightened (secular) minority migrated away from the more Catholic to the less Catholic areas, and also fostered industrialization in the departments of destination.

Second, while using lagged explanatory variables suggests that I capture the effect from type of education to industrialization, Table 12 performs another test to further exclude the possibility of reverse causality. It uses the share of Catholic schools as dependent variable and shows that lagged industrial employment (col. 1) and lagged wages in manufacturing (col. 2) do not predict the share of Catholic schools one decade later, further supporting a causal interpretation of my findings.[71]

Moreover, I perform more robustness checks in Tables A.13, A.14, and A.15 in Appendix. First, Table A.13 uses different lags and shows that the coefficient on the share of Catholic schools is quantitatively larger and more significant when the share of Catholic schools is measured in $t-10$, $t-15$ or avg($t-10$, $t-15$). Interestingly the coefficient is smaller in magnitude and insignificant (col. 1) when my dependent and explanatory variables are both measured at time t, suggesting again that the type of education is affecting (through the diffusion of technical skills) industrial development once students enter the labor market. Then, Table A.14 uses school rate (cols. 1-2) and the share of students obtaining the *certificat d'études primaires*[72] (cols. 3-4) as dependent variables. It shows that there are no significant differences in "quantity" of education or completion of primary schools between Catholic and secular schools, thus suggesting that the type rather than the quantity of education mattered.[73] Finally, Table A.15 distinguishes between male and female schools (and industrial employment) and shows that the results by gender are very similar to those in the main specification (Table 9).

4.3.5 Religiously educated cohorts less likely to work in innovative sectors

In this section, I use data from the 1896 *Enquéte industrielle* that contains detailed information on the number of workers by industrial sector and cohort. For each cohort, I compute the share of workers in innovative sectors[74] and I relate it to the share of Catholic schools at the time when a specific cohort was attending primary school. Given the nature of the data, I can also include department and cohort fixed effects. Specifically, I estimate equations of the form:

$$y_{i,c} = \alpha_i + \alpha_c + \beta CS_{i,c} + \gamma \mathbf{X}_{i,c} + \varepsilon_{it} \tag{4}$$

where y_{ic} is the share of a worker cohort in innovative sectors, while α_i and α_c denote respectively department and cohort fixed effects. The main explanatory variable is the share of Catholic schools, in a given department, when cohort c was attending primary schools. The vector $\mathbf{X}_{i,c}$ includes enrollment

[71] Franck and Galor (2016) find a positive effect of industrialization on human capital formation. However, they look at "quantity" of human capital (such as school rate, literacy, number of teachers) in the period before the Second Industrial Revolution. This would still be in line with my findings since I focus on a later period and I study the effect of "type" of education on industrialization – when school rates had already reached very high levels.

[72] This was a diploma awarded to students upon the completion of at primary schools.

[73] This also address concerns of religiosity being a barrier for investment in quantity of human capital.

[74] For more details on the classification between innovative and traditional sectors, see Section B.1 in Appendix.

rate in primary schools, the (log) number of students per school, the (log) number of total schools, and department-level population.

Table 13 shows the results: the higher the share of Catholic schools when a cohort is in primary school, the lower the share of workers in that cohort employed in innovative industrial sectors. In terms of magnitude, a one standard deviation increase in the share of Catholic schools is associated with a 0.22 standard deviations decrease in share of workers in innovative sectors. My results hold when including schooling controls (col. 2). This suggests that "religiously-educated" cohorts were less likely to be employed in innovative sectors probably because they could not operate the more modern, skill-intensive industrial technology.[75]

4.3.6 How important is schooling in explaining the relation between religiosity and development?

My findings in Section 4.2 show that religiosity is negatively associated with economic development during the Second Industrial Revolution, but not before. After providing evidence of a *general* resistance toward the adoption of new "useful knowledge" in the more religious departments, I suggested that schooling played a key role in explaining this negative relation – and showed that Catholic education is negatively associated with industrial employment and wages about a decade later. To further shed light on the role of education in linking religiosity with economic development, I now use the baseline specifications of Table 5, and regress my economic and industrial outcomes on both religiosity and the growth in the share of Catholic schools. Table 14 shows the results. Interestingly, the coefficient of religiosity becomes much smaller and insignificant (in cols. 2 and 8), while the coefficient on the growth in the share of Catholic schools is negative and strongly significant in all specifications.[76] Moreover, the standardized beta coefficients of the growth in the share of Catholic schools are generally higher than the standardized beta coefficients of religiosity. Finally, the last row reports the results of the Sobel-Goodman mediation test. The ratios show the proportion of the total effect of religiosity on the different outcome variables transmitted *via* the growth in the share of Catholic schools: for instance, about 40% of the relationship between religiosity and industrial employment (or machineries per 1,000) is mediated by the growth in the share of Catholic schools over the 1851-1901 period. This suggests, in line with historical evidence and with my previous results, that an important part of the relation between religiosity and economic development is explained by education and acquisition of human capital.

[75] In the context of early 20th-century China, Yuchtman (2014) suggests that the traditional and modern educational tracks produced different types of human capital, and that this was important for the adoption of new technologies and for the development of a modern economy.

[76] The growth in the share of Catholic schools is computed for the period 1851-1901 in cols. 2 and 6, for the period 1851-1896 in col. 4, and for the period 1871-1901 in col. 8.

5 Conclusion

The interaction between religion and adoption of scientific and technological progress has been particularly complex throughout history, and it still is today (see Bénabou et al., 2013, for several examples). However, there is hardly any empirical evidence on when religion hampers knowledge diffusion, and therefore economic development, and through which mechanism. In this paper, I exploit variation in *intensity* of Catholicism (i.e., religiosity) within France, and examine the period of the Second Industrial Revolution (1870-1914).

I find that the relation between religiosity and economic development can vary over time depending on the interaction between religious norms and the "useful knowledge" needed to industrialize and grow in each specific stage of development. Indeed, while – using several indicators for Catholic intensity from 1788 to the mid- 21st century – I provide evidence of a stable spatial distribution of religiosity over time, I show that it started to be negatively associated with economic outcomes only during the Second Industrial Revolution, i.e. when religion became a barrier for the acquisition of "economically useful" knowledge and skills. The anti-scientific program promoted by the Church was manifested in several aspects of people's lives, and specifically, in the preference for Catholic education. I find that the share of Catholic schools increased in the more religious areas in the second half of the 19th century, when a technical curriculum was introduced in secular schools and the two education systems (secular vs. religious) started to differ. Religious education, in turn, is negatively associated with industrial development about a decade later, when school-aged children would enter the labor market, and this negative relationship is particularly pronounced in skill-intensive industrial sectors.

These findings have important implications for economic development today, since many developing countries – where religion plays a primary role in the personal and societal sphere – are also experiencing technological progress on a large scale, similar to the process of development in Western Europe during the Second Industrial Revolution. Three main implications emerge. First, the relation between religion and economic development can vary over time, and it becomes negative only when religion clashes with and hinders the adoption of the "useful knowledge" needed to industrialize and grow. Second, the *intensity* of religion plays a key role: it determines the importance given to religious norms, and the degree of resistance to innovative activities and secular knowledge, if these clash with religious values. Finally, one of the key mechanism through which religion can affect economic development is by determining the contents of education, and thus accumulation of human capital among the population.

References

Abramitzky, R. and I. Sin (2014). Book translations as idea flows: The effects of the collapse of Communism on the diffusion of knowledge. *Journal of European Economic Association 12*(6), 1453–1520.

Abramson, S. F. and C. Boix (2013). The Roots of the Industrial Revolution: Political Institutions or (Socially Embedded) Know-How? APSA 2013 Annual Meeting Paper.

Acemoglu, D., S. Johnson, and J. Robinson (2002). Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution. *Quarterly Journal of Economics 117*(4), 1231–1294.

Achilladelis, B. and N. Antonakis (2001). The Dynamics of technological innovation: the case of the pharmaceutical industry. *Research Policy 30*, 535–588.

Alesina, A. and P. Giuliano (2010). The Power of the Family. *Journal of Economic Growth 15*(2), 93–125.

Alesina, A. and P. Giuliano (2015). Culture and Institutions. *Journal of Economic Literature 4*(53), 898–944.

Allen, R. C. (2003). Progress and Poverty in Early Modern Europe. *Economic History Review 56*(3), 403–443.

Altonji, J. G., T. E. Elder, and C. R. Taber (2005). Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools. *Journal of Political Economy 113*(1), 151–184.

Anderson, R. (1975). *Education in France 1848–1870*. Clarendon Press, Oxford.

Ariés, P. (1962). *Centuries of Childhood*. New York: Alfred A. Knopf.

Ashworth, W. (1986). *God and Nature: Historical Essays on the Encounter between Christianity and Science*, Chapter Catholicism and Early Science, pp. 136–166. Berkeley: University of California Press.

Avenel, H. (1894). *Comment vote la France: dix-huit ans de suffrage universel, 1876-1893*. Librairies-imprimeries réunies.

Bairoch, P., J. Batou, and P. Chèvre (1988). *La Population des villes Europeenees de 800 à 1850: Banque de Données et Analyse Sommaire des Résultats*. Geneva: Centre d'histoire economique Internationale de l'Université de Genève, Libraire Droz.

Banerjee, A., E. Duflo, Postel-Vinay, and T. Watts (2010). Long Run Health Impacts of Income Shocks: Wine and Phylloxera in 19th Century France. *Review of Economics and Statistics 92*(4), 714–728.

Barro, R. and R. McCleary (2003). Religion and Economic Growth across Countries. *American Sociological Review 68*(5), 760–781.

Barro, R. and R. McCleary (2006). Religion and Political Economy in an International Panel. *Journal for the Scientific Study of Religion 45*(2), 149–175.

Becker, S., F. Cinnirella, and L. Woessmann (2010). The trade-off between fertility and education: evidence from before the demographic transition. *Journal of Economic Growth 15*, 177–204.

Becker, S. and L. Woessmann (2008, December). Luther and the Girls: Religious Denomination and the Female Education Gap in 19th Century Prussia. *Scandinavian Journal of Economics 110*(4), 777–805.

Becker, S. O., E. Hornung, and L. Woessmann (2011). Education and Catch-up in the Industrial Revolution. *American Economic Journal: Macroeconomics 3*(3), 92–126.

Becker, S. O. and L. Woessmann (2009). Was Weber Wrong? A Human Capital Theory of Protestant Economic History. *Quarterly Journal of Economics 124*(2), 531–596.

Belloc, M., F. Drago, and R. Galbiati (2016). Earthquakes, Religion, and Transition to Self-Government in Italian Cities. *Quarterly Journal of Economics 131*(4), 1875–1926.

Bellows, J. and E. Miguel (2009). War and Local Collective Action in Sierra Leone. *Journal of Public Economics 93*(11), 1144–1157.

Bénabou, R., D. Ticchi, and A. Vindigni (2013). Forbidden Fruits: The Political Economy of Science, Religion and Growth. Unpublished Paper. Princeton University.

Bénabou, R., D. Ticchi, and A. Vindigni (2015). Religion and Innovation. *American Economic Review: Papers & Proceedings 105*(5), 346–351.

Bénabou, R. and J. Tirole (2006). Belief in a Just World and Redistributive Politics. *Quarterly Journal of Economics 121*(2), 699–746.

Bisin, A. and T. Verdier (2001). The Economics of Cultural Transmission and the Dynamics of Preferences. *Journal of Economic Theory 97*(2), 298–319.

Boppart, T., J. Falkinger, and V. Grossmann (2014). Protestantism and Education: Reading (the Bible) and Other Skills. *Economic Inquiry 52*(2), 874–895.

Boppart, T., J. Falkinger, V. Grossmann, U. Woitek, and G. Wüthrich (2013). Under which conditions does religion affect educational outcomes? *Explorations in Economic History 50*, 242–266.

Botticini, M. and Z. Eckstein (2012). *The Chosen Few: How Education Shaped Jewish History, 70-1492*. Princeton University Press.

Bouillon, J. (1956). Les démocrates-socialistes aux élections de 1849. *Revue francaise de science politique* (1), 70–95.

Cantoni, D. (2015). The economic effects of the protestant reformation: Testing the weber hypothesis in the german lands. *Journal of the European Economic Association 13*(4), 561–598.

Carus-Wilson, E. M. (1966). *The Woollen Industry. Cambridge Economic History of Europe. Volume II*. Cambridge University Press.

Carvalho, J.-P. (2013). Veiling. *Quarterly Journal of Economics 128*(1), 337–370.

Caselli, F. (1999). Technological Revolutions. *American Economic Review 89*(1), 78–102.

Chaney, E. (2015). Religion and the Rise and Fall of Islamic Science. Unpublished Paper.

Chanut, J.-M., J. Heffer, J. Mairesse, and G. Postel-Vinay (2000). *L'Industrie franccaise au milieu du 19e siécle: les enquêtes de la statistique générale de la France*. Editions de l'école des hautes études en sciences sociales, Paris.

Cholvy, G. and Y.-M. Hilaire (2000). *Histoire religieuse de la France (1880-1914)*. Toulouse, Privat.

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

Crabtree, S. (2010). Religiosity Highest in World's Poorest Nations. GALLUP. Available at http://www.gallup.com.

Crouzet, F. (2003). The Historiography of French Economic Growth in the Nineteenth Century. *Economic History Review 62*(2), 215–242.

Darby, H. C. and H. Fullard (1970). *The New Cambridge Modern History*, Volume 14. Cambridge: Cambridge University Press.

Daudin, G., R. Franck, and H. Rapoport (2016). The cultural diffusion of the fertility transition: evidence from internal migration in 19th century France. IZA Discussion Paper 9945.

Davids, K. (2013). *Religion, Technology, and the Great and Little Divergences: China and Europe Compared,*

c. 700–1800. Leiden: Brill.

de Pleijt, A. M. and J. L. Weisdorf (2014). Human Capital Formation from Occupations: The 'Deskilling Hypothesis' Revisited. CGEH Working Paper 57.

DeLong, J. B. and A. Shleifer (1993). Princes and Merchants: City Growth before the Industrial Revolution. *Journal of Law and Economics 36*, 671–702.

Dittmar, J. E. (2011). Information Technology and Economic Change: The Impact of the Printing Press. *Quarterly Journal of Economics 126*, 1133–1172.

Febvre, L. and H.-J. Martin (1958). *L'Apparition du Livre*. Paris: Albin Michel.

Forster, R. (1967, July). The Survival of the Nobility during the French Revolution. *Past and Present* (37), 71–86.

Fouka, V. (2016). Backlash: The Unintended Effects of Language Prohibition in US Schools after World War I. Working Paper.

Franck, R. and O. Galor (2016). Technology-Skill Complementarity in the Early Phase of Industrialization. IZA DP No. 9758.

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

Furet, F. and J. Ozouf (1977). *Lire et écrire. L'alphabétisation des Français de Calvin à Judes Ferry*. Minuit, Paris.

Galor, O. (2005). From Stagnation to Growth: Unified Growth Theory. In P. Aghion and S. Durlauf (Eds.), *Handbook of Economic Growth*, Volume 1, Chapter 4, pp. 171–293. Elsevier.

Galor, O. (2011). *Unified Growth Theory*. Princeton University Press.

Galor, O. and O. Moav (2006). Das Human-Kapital: A Theory of the Demise of the Class Structure. *The Review of Economic Studies 73*(1), 85–117.

Galor, O., O. Moav, and D. Vollrath (2009). Inequality in Land Ownership, the Emergence of Human Capital Promoting Institutions, and the Great Divergence. *Review of Economic Studies 76*, 143–179.

Gildea, R. (1983). *Education in Provincial France, 1800–1914*. Clarendon Press.

Godfrin, J. and P. Godfrin (1965). *Une centrale de presse catholique: la Maison de la bonne presse et ses publications*. Presses universitaires de France.

Goldin, C. and L. F. Katz (1998). The Origins of Technology-Skill Complementarity. *Quarterly Journal of Economics 113*(3), 693–732.

Grew, R. and P. Harrigan (1991). *School, State, and Society: The Growth of Elementary Schooling in Nineteenth-century France – a Quantitative Analysis*. University of Michigan Press.

Guiso, L., P. Sapienza, and L. Zingales (2003). People's opium? Religion and economic attitudes. *Journal of Monetary Economics 50*, 225–282.

Guiso, L., P. Sapienza, and L. Zingales (2006). Does Culture Affect Economic Outcomes? *Journal of Economic Perspectives 20*(2), 23–48.

Hanushek, E. A. and D. D. Kimko (2000). Schooling, Labor-Force Quality, and the Growth of Nations. *American Economic Review 90*(5), 1184–1208.

Harrigan, P. (2001). Church, State, and Education in France From the Falloux to the Ferry Laws: A Reassess-

ment. *Canadian Journal of History 36*, 51–83.

Heilbron, J. (1979). *Electricity in the 17th and 18th Centuries: A Study of Early Modern Physics*. University of California Press.

Hyslop, B. (1934). *French Nationalism in 1789 According to the General Cahiers*. Cambridge University Press.

Iannaccone, L. (1998). Introduction to the economics of religion. *Journal of Economic Literature 36*(3), 1465–1496.

Isambert, F.-A. and J.-P. Terrenoire (1980). *Atlas de la pratique religieuse des catholiques en France*. Paris, Presses de la FNSP–CNRS.

Jacob, M. C. (2014). *The First Knowledge Economy*. Cambridge University Press.

Jedin, H., K. S. Latourette, and J. Martin (1970). *Atlas Zur Kirchengeschichte*. Freiburg: Herder.

Jones, C. and P. Romer (2010). The New Kaldor Facts: Ideas, Institutions, Population, and Human Capital. *American Economic Journal: Macroeconomics 2*(1), 224–245.

Jones, P. (2012). The Challenge of Land Reform in the Eighteenth- and Nineteenth-Century France. *Past and Present 216*(1), 107–142.

Keller, W. (2004). International Technology Diffusion. *Journal of Economic Literature 42*(3), 752–782.

Le Bras, H. (1986). *Les Trois France*. Odile Jacob-Le Seuil.

McCleary, R. and R. Barro (2006). Religion and economy. *Journal of Economic Perspectives 20*(2), 49–72.

Meloni, G. and J. Swinnen (2014). The Rise and Fall of the World's Largest Wine Exporter – And Its Institutional Legacy. *Journal of Wine Economics 9*(1), 3–33.

Minois, G. (1991). *L' Église et la science*. Paris, Fayard.

Mitch, D. (1993). The Role of Human Capital in the First Industrial Revolution. In J. Mokyr (Ed.), *The British Industrial Revolution: An Economic Perspective*, pp. 267–307. Boulder: Westview.

Mokyr, J. (1999). *Storia dell'economia Mondiale*, Chapter The Second Industrial Revolution, 1870–1914, pp. 219–245. Rome: Laterza.

Mokyr, J. (2002). *The Gifts of Athena: Historical Origins of the Knowledge Economy*. Princeton, NJ: Princeton University Press.

Mokyr, J. (2005). The Intellectual Origin of Modern Economic Growth. *Journal of Economic History 65*(2), 285–351.

Mokyr, J. (2011). The Economics of Being Jewish. *Critical Review 23*(1-2), 195–206.

Mokyr, J. (2016). *Culture of Growth: Origins of the Modern Economy*. Princeton University Press.

Mours, S. (1958). *Les Églises Réformées en France. Tableaux et Cartes*. Librairie Protestante.

Munshi, K. and M. Rosenzweig (2006). Traditional Institutions Meet the Modern World: Caste, Gender, and Schooling Choice in a Globalizing Economy. *The American Economic Review*, 1225–1252.

Murphy, T. (2015). Old habits die hard (sometimes) Can département heterogeneity tell us something about the French fertility decline? *Journal of Economic Growth 20*, 177–122.

Nuvolari, A. and V. Tartari (2011). Bennet Woodcroft and the value of English patents, 1617–1841. *Explorations in Economic History 48*, 97–115.

Oster, E. (2013). Unobservable Selection and Coefficient Stability: Theory and Validation. NBER Working

Paper 19054.

Putnam, R. (1993). *Making Democracy Work. Civic Traditions in Modern Italy*. Princeton University Press, Princeton.

Romer, P. (2010). What Parts of Globalization Matter for Catch-Up Growth. *American Economic R 100*(2), 94–98.

Saleh, M. (2015). Taskhe Reluctant Transformation: State Industrialization, Religion, and Human Capital in Nineteenth-Century Egypt. *Journal of Economic History 75*(1), 65–94.

Shapiro, G., T. Tackett, P. Dawson, and J. Markoff (1998). *Revolutionary Demands: A Content Analysis of the Cahiers de Doléances of 1789*. Stanford University Press.

Spolaore, E. and R. Wacziar (2012). *NBER International Seminar on Macroeconomics*, Chapter Long-Term Barriers to the International Diffusion of Innovations, pp. 11–46. Chicago: University of Chicago Press.

Sprandel, R. (1968). *Das Eisengewerbe im Mittelalter*. A. Hiersemann.

Squicciarini, M. and N. Voigtländer (2015). Human Capital and Industrialization: Evidence from the Age of Enlightenment. *Quarterly Journal of Economics 30*(4), 1825–1883.

Statistique Général de la France (1907). *Salaires et duré du travail, coût de la vie pour certaines catégories d'ouvriers en 1906*. Paris: Imprimerie nationale.

Tabellini, G. (2008). Institutions and Culture. *Journal of the European Economic Association 6*(2–3), 255–294.

Tabellini, G. (2010). Culture and Institutions: Economic Development in the Regions of Europe. *Journal of the European Economic Association 8*(4), 677–716.

Tackett, T. (1986). *Religion, revolution, and regional culture in eighteenth-century France: The Ecclesiastical Oath of 1791*. Princeton, NJ: Princeton University Press.

Weber, M. (1905). *The Protestant Ethic and the Spirit of Capitalism*. London: Routledge.

Yuchtman, N. (2014). Teaching to the Tests: An Economic Analysis of Traditional and Modern Education in Late Imperial and Republican China. Working Paper.

FIGURES

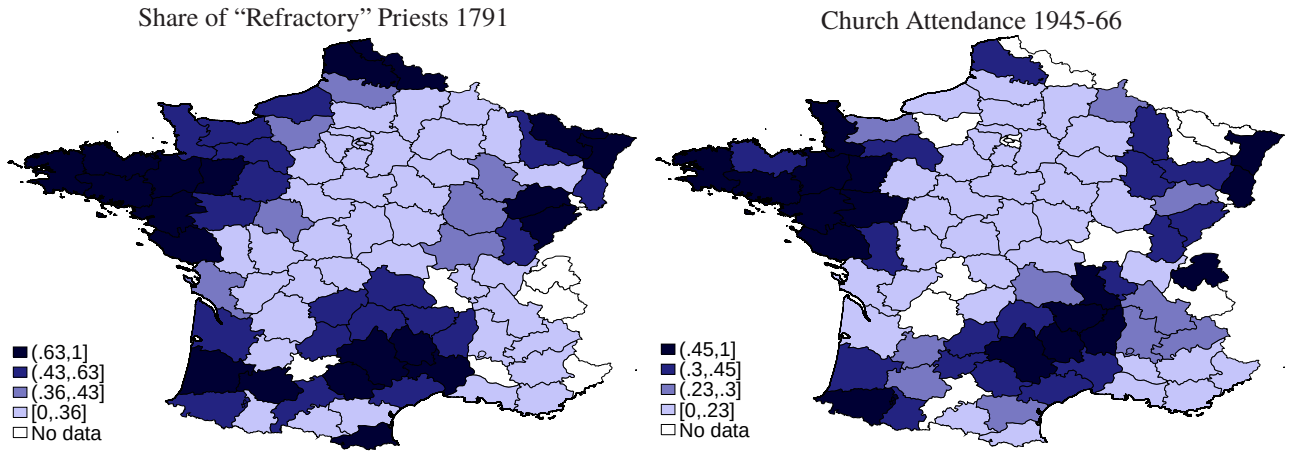

Figure 1: Religiosity in 1789 and in 1950

Notes: The left panel shows the spatial distribution of the share of refractory clergy in 1789. The right panel shows Church attendance in 1945-66. Both variables are described in detail in Section B.2.

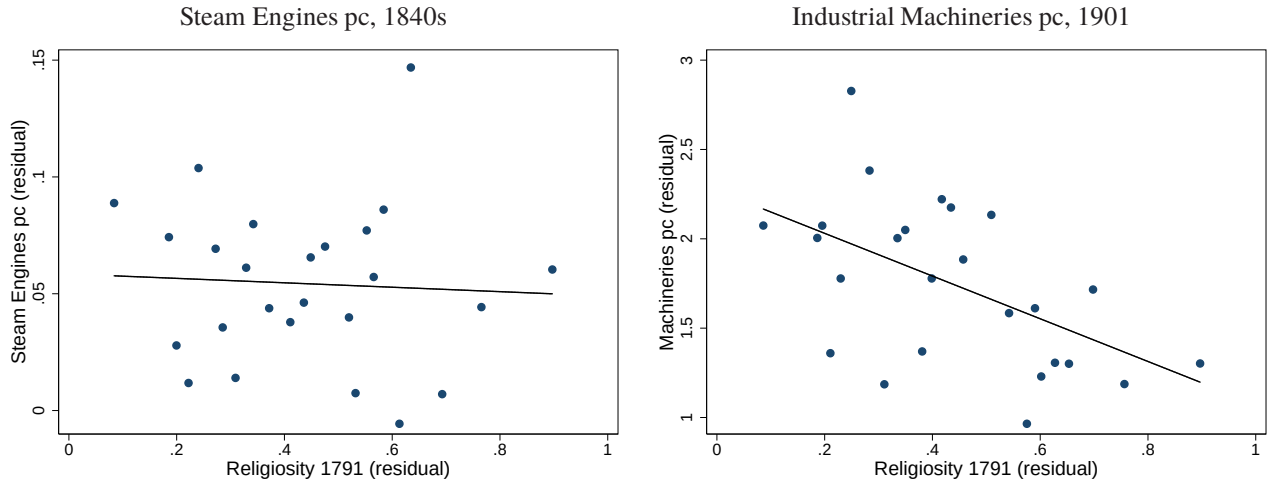

Figure 2: Religiosity and Technology Adoption

Notes: The figures plot the share of refractory clergy against the (log) number of steam engines per capita in the 1840s (left panel) and against the (log) number of industrial machineries in 1901 (right panel) – after including the baseline controls listed in Table 1 (col.1).

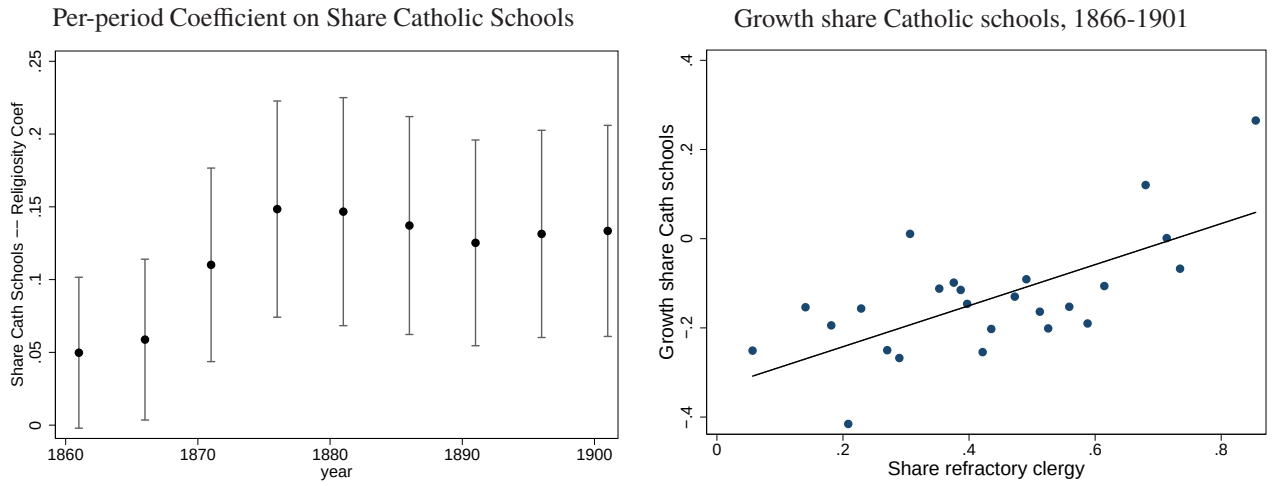

Figure 3: Religiosity and Catholic Schools

Notes: The right panel plots the per-period coefficient of religiosity on the share of Catholic schools. The bars represent 95 percent confidence intervals. The omitted year is 1851. The left panel plots the share of refractory clergy against the growth in the share of Catholic schools in the 1866-1901 period.

TABLES

Table 1: Correlations between share of refractory clergy and control variables

Baseline Controls	(1)	Additional Controls	(2)
(ln) Population 1871	0.168**	Knowledge Elites pc	-0.002
	(0.075)		(0.034)
School Rate	-0.183	Huguenots pc 1861	0.638
	(0.195)		(0.478)
Atlantic/Medit. Dept.	0.196***	Nobles pc 1850	-0.226
	(0.056)		(0.174)
Universities	0.101	Pre-Industrial Activities	0.053
	(0.076)		(0.046)
Printing Presses	0.035	Pays d'Election	-0.143**
	(0.070)		(0.058)
		Dept. non-French	0.124
			(0.146)
		Pop. Density 1871	0.152
			(0.107)
		Share Urb. 1831	-0.037
			(0.250)

Notes: The table shows the coefficients of individual regressions of share of refractory clergy on a variety of department characteristics. *Population 1871* represents (log) total department population in 1871. *School Rate* measures the ratio of students to school-age population (5 to 15 years) in 1871. *Atlantic/Medit Dept* is a dummy for departments located on the Atlantic Ocean or on the Mediterranean Sea. *Universities* is the (log) number of universities present in each department before 1750. *Printing Presses* represents the (log) number of printing presses established before 1500. *Knowledge Elites pc* is the density of subscribers to the *Encyclopedie* in 1777-1780. *Huguenots pc* represents(log) number of Huguenots per capita in 1861 and *Nobles pc 1850* reflects the (log) number of noble families per capita. *Pre-Industrial activities* is an index of pre-industrial activities in France that includes the number of mines, forges, iron trading locations, and textile manufactures before 1500. *Pays d' Election* is a dummy for departments where the king exerted particularly strong power (especially in terms of fiscal and financial matters); *Dept. non-French* is a dummy for departments located in non-French speaking areas; *Population Density* is the ratio of department population to total area, *Share Urban* is the ratio of urban population to total population. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table 2: Persistence of religiosity – before and during the French Revolution (1788-1791)

Dep. variable: Share of refractory clergy		
	(1)	(2)
Share Anti-Relig. *Cahiers*	-1.659***	-1.396***
	(0.458)	(0.521)
Controls		✓
R^2	0.21	0.29
Observations	73	70
Magnitude: Share anti-relig. *cahiers*		
stand. beta coeff.	-0.356	-0.303

Notes: All regressions are run at the department level. Controls include average literacy in 1786, a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, the (log) number of printing presses established before 1500. In addition, all specifications include (log) department population in 1800 and a dummy for Paris (Seine department). Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. The last row reports the standardized beta coefficients.

Table 3: Persistence of religiosity (1791-1950s)

Dependent var.	Share *LaCroix* Readers 1893		Priests pc 1901		Share Catholic Schools 1901		Priests Ordination 1951-60		Church Attendance 1945-66	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Share Refract. Clergy	1.086**	1.362***	0.482***	0.576***	0.135***	0.142***	3.810***	4.236***	0.449***	0.448***
	(0.493)	(0.498)	(0.150)	(0.172)	(0.045)	(0.047)	(0.708)	(0.754)	(0.071)	(0.075)
Controls		✓		✓		✓		✓		✓
R^2	0.14	0.21	0.81	0.82	0.36	0.46	0.27	0.32	0.42	0.42
Observations	79	79	68	68	79	79	73	73	72	72
Magnitude: Share refractory clergy										
stand. beta coeff.	0.240	0.301	0.198	0.236	0.327	0.344	0.529	0.588	0.653	0.651

Notes: All regressions are run at the department level. Controls include school rate in 1891 (col.1-2) and in 1901 (cols 3-10), a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, and the (log) number of printing presses established before 1500. In addition, all specifications include (log) department population in 1891 (col.1-2) and in 1901 (cols 3-10), and a dummy for Paris (Seine department). Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. The last row reports the standardized beta coefficients.

Table 4: No relation between religiosity and industrialization (pre-1870)

Dependent var.	Share Ind. Emp. 1866	Share Workers Mod. Sect. 1840s	Steam Eng. pc 1840s	City Growth 1750-1850
	(1)	(2)	(3)	(4)
Share Refract. Clergy	-0.034	0.141	-0.011	0.131
	(0.035)	(0.128)	(0.039)	(0.135)
School Rate	0.173***	0.131	0.057**	-0.129
	(0.041)	(0.132)	(0.023)	(0.142)
Paris	0.067	0.193**	-0.072*	0.771***
	(0.041)	(0.097)	(0.036)	(0.263)
Population	0.120***	-0.059	0.087**	-0.169**
	(0.022)	(0.070)	(0.036)	(0.077)
Atlantic/Medit. Dept.	0.003	0.155***	0.033*	0.511**
	(0.018)	(0.058)	(0.018)	(0.220)
Nr. Universities	-0.044*	-0.180**	-0.013	-0.011
	(0.025)	(0.070)	(0.029)	(0.086)
Nr. Printing Presses 1500	0.028	0.062	0.038	0.242**
	(0.024)	(0.072)	(0.023)	(0.092)
R^2	0.53	0.16	0.32	0.15
Observations	79	78	78	125
Magnitude: Standardized beta coefficients				
Share refractory clergy	-0.082	0.143	-0.032	0.093
School rate	0.393	0.126	0.159	-0.077

Notes: All regressions are run at the department level. Cols. 1-3 use school rate in 1837 and col. 4 uses literacy in 1786. The share of refractory clergy is measured at the city level in col. 4. Robust standard errors (clustered at the department level in col. 4) in parentheses. * p<0.1, ** p<0.05, *** p<0.01. The last rows report the standardized beta coefficients.

Table 5: Negative relation between religiosity and industrialization (post-1870)

Dependent var.	Share Ind. Emp. 1901	Share Workers Mod. Sect. 1896	Machineries pc 1901	Growth Share Ind. Empl 1871-1901
	(1)	(2)	(3)	(4)
Share Refract. Clergy	-0.085**	-0.164***	-1.133***	-0.554**
	(0.035)	(0.057)	(0.381)	(0.216)
School Rate	0.313***	0.331**	1.145	0.752***
	(0.112)	(0.151)	(1.251)	(0.225)
Paris	-0.123**	0.072	-3.031***	-0.174
	(0.055)	(0.081)	(0.598)	(0.421)
Population	0.161***	0.226***	1.235***	1.522**
	(0.024)	(0.036)	(0.247)	(0.581)
Atlantic/Medit. Dept.	-0.005	-0.037	-0.309	0.178
	(0.022)	(0.033)	(0.250)	(0.116)
Nr. Universities	-0.009	-0.002	-0.357	-0.004
	(0.025)	(0.040)	(0.235)	(0.132)
Nr. Printing Presses 1500	0.027	0.036	0.268	-0.085
	(0.029)	(0.040)	(0.288)	(0.114)
R^2	0.50	0.53	0.34	0.58
Observations	79	79	79	79
Magnitude: Standardized beta coefficients				
Share refractory clergy	-0.186	-0.241	-0.267	-0.250
School rate	0.257	0.200	0.100	0.245

Notes: All regressions are run at the department level. School rate is measured 10 years before the dependent variables (cols. 1-3) and in 1871 (col. 4). Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. The last rows report the standardized beta coefficients.

Table 6: Dif-in-Dif: More religious departments have lower industrial employment during the 2nd IR

Dep. var.: Share Ind. Employment, 1871-1911			
	(1)	(2)	(3)
			weighted
ShareRef*$Post2^{nd}$IR	-0.078**	-0.061**	-0.060**
	(0.035)	(0.024)	(0.024)
Department FE		✓	✓
Year FE	✓	✓	✓
R^2	0.38	0.90	0.90
Observations	624	624	624
Magnitude: Share Ref.*Post			
stand. beta coeff.	-0.196	-0.152	-0.149

Notes: All regressions are run at the department level and control by (log) total population. Col. 3 weights regression by department population. Standard errors (clustered at the department level) in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table 7: Lower adoption of technological progress and modern ideas in more religious departments

Dependent var.	Share vaccinated		Fertility	
	children 1871		1871	1901
	(1)	(2)	(3)	(4)
Share Refract. Clergy	-0.261**	-0.274**	0.561**	0.717***
	(0.130)	(0.136)	(0.272)	(0.263)
Fertility		0.027		
		(0.071)		
Controls	✓	✓	✓	✓
R^2	0.24	0.24	0.22	0.27
Observations	62	62	79	79
Magnitude: Share refractory clergy				
stand. beta coeff.	-0.270	-0.284	0.253	0.346

Notes: All regressions are run at the department level. Controls include school rate (measured 20 before the respective dependent variables), a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, and the (log) number of printing presses established before 1500. In addition, all specifications include (log) department population in the respective years and a dummy for Paris (Seine department). Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. The last row reports the standardized beta coefficients.

Table 8: Higher growth in share of Catholic school in more religious departments

Dependent var.	Share Cath. Schools			Growth Share Cath. Schools		
	1851	1866	1901	1851-1866	1866-1901	1850-1901
	(1)	(2)	(3)	(4)	(5)	(6)
Share Refract. Clergy	0.047	0.086*	0.166***	0.195	0.460***	0.857**
	(0.038)	(0.050)	(0.046)	(0.200)	(0.163)	(0.332)
Controls	✓	✓	✓	✓	✓	✓
Schooling Controls	✓	✓	✓	✓	✓	✓
R^2	0.24	0.34	0.48	0.40	0.37	0.52
Observations	79	79	79	79	79	79
Magnitude: Share refractory clergy						
stand. beta coeff.	0.132	0.189	0.403	0.101	0.429	0.305

Notes: All regressions are run at the department level. Controls include a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, and the (log) number of printing presses established before 1500. Schooling controls include school rate, the (log) number of students per school, the (log) number of total schools (all measured in the initial period in Cols. 4-6). In addition, all specifications include (log) department population (measured in the initial period in Cols. 4-6) and a dummy for Paris (Seine department). Cols 4-6 also control for the initial share of Catholic schools. Robust standard errors in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$. The last row reports the standardized beta coefficients.

Table 9: Catholic education negatively associated with industrial employment 10 years later

Dependent variable: Share Ind. Employment, 1871-1911

	(1)	(2)	(3)	(4)	(5)	(6)
				weighted	1st diff.	students
Share Cath. Schools$_{t-10}$	-0.176**	-0.236***	-0.214**	-0.178*	-0.198**	
	(0.084)	(0.079)	(0.083)	(0.098)	(0.090)	
School Rate$_{t-10}$		-0.052	0.001	0.013	-0.000	0.042
		(0.032)	(0.034)	(0.044)	(0.043)	(0.040)
Students per School$_{t-10}$			-0.050	-0.056	-0.025	-0.086*
			(0.039)	(0.048)	(0.046)	(0.045)
Total Schools$_{t-10}$			-0.040	-0.049	-0.016	-0.063
			(0.038)	(0.035)	(0.032)	(0.038)
Share Cath. Students$_{t-10}$						-0.182**
						(0.078)
Population		0.181**	0.223**	0.273***	0.229***	0.254**
		(0.075)	(0.096)	(0.093)	(0.074)	(0.097)
Department FE	✓	✓	✓	✓		✓
Year FE	✓	✓	✓	✓	✓	✓
R^2	0.88	0.89	0.89	0.92	0.33	0.90
Observations	656	656	656	656	410	574
Magnitude: Share Catholic schools						
stand. beta coeff.	-0.190	-0.255	-0.230	-0.166	-0.124	-0.225

Notes: All regressions are run at the department level. Standard errors (clustered at the department level) in parentheses. * p<0.1, ** p<0.05, *** p<0.01. The last row reports the standardized beta coefficients.

Table 10: Catholic education negatively associated with wages in manufacturing 10 years later

Dependent variable: Wages in manufacturing, 1891-1906			
	(1)	(2)	(3)
		weighted	1st Difference
Share Cath. Schools$_{t-10}$	-0.663**	-0.685*	-0.767**
	(0.324)	(0.365)	(0.322)
School Rate$_{t-10}$	0.004	-0.019	-0.011
	(0.101)	(0.105)	(0.101)
Students per School$_{t-10}$	0.073	0.146	0.130
	(0.164)	(0.149)	(0.152)
Total Schools$_{t-10}$	0.130	0.156	0.076
	(0.126)	(0.121)	(0.113)
Population$_{t-10}$	0.081	-0.076	-0.029
	(0.262)	(0.243)	(0.235)
Department FE	✓	✓	
Year FE	✓	✓	✓
R^2	0.87	0.89	0.07
Observations	323	323	159
Magnitude: Share Catholic schools			
stand. beta coeff.	-0.435	-0.443	-0.220

Notes: All regressions are run at the department level. Standard errors (clustered at the department level) in parentheses. * p<0.1, ** p<0.05, *** p<0.01. The last row reports the standardized beta coefficients.

Table 11: Catholic education negatively associated with industrial employment – confounding factors

Dependent variable: Share Ind. Employment, 1871-1911

	(1)	(2)	(3)	(4)	(5)	(6)
Share Catholic Schools$_{t-10}$	-0.214**	-0.213**	-0.214**	-0.216**	-0.212**	-0.224**
	(0.083)	(0.096)	(0.083)	(0.082)	(0.081)	(0.110)
Phylloxera Dummy$_{t-10}$	0.001					0.008
	(0.006)					(0.009)
Governm. Subsidies pc$_{t-10}$		0.127				0.124
		(0.115)				(0.123)
Fertility$_{t-10}$			-0.003			0.021
			(0.011)			(0.017)
French Immigrants$_{t-10}$				0.001		0.000
				(0.001)		(0.002)
Share Urban Pop.					0.061	0.154
					(0.169)	(0.169)
Schooling Controls	✓	✓	✓	✓	✓	✓
Department FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
R^2	0.89	0.92	0.89	0.89	0.89	0.91
Observations	656	492	656	574	410	328

Notes: All regressions are run at the department level and control for population in year t. Schooling controls include school rate, the (log) number of students per school, the (log) number of total schools in $t-10$. Standard errors (clustered at the department level) in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table 12: Reverse causality: Industrial employment and wages do not predict share of Catholic schools

Dep. variable: Share Catholic schools		
	(1)	(2)
Share Ind. Employment$_{t-10}$	0.022	
	(0.044)	
Wages in Manufacturing$_{t-10}$		0.001
		(0.040)
Schooling Controls	✓	✓
Department FE	✓	✓
Year FE	✓	✓
R^2	0.94	0.96
Observations	572	243

Notes: All regressions are run at the department level. Schooling controls include school rate, the (log) number of students per school, the (log) number of total schools in $t-10$. In addition, all specifications include (log) department population in the respective years. Standard errors (clustered at the department level) in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table 13: "Catholically-educated" cohorts less likely to be employed in innovative sectors

Dep: Share of workers in modern sectors		
	(1)	(2)
Share Cath. Schools	-0.304**	-0.514***
	(0.123)	(0.132)
Schooling Controls		✓
Department FE	✓	✓
Cohort FE	✓	✓
R^2	0.96	0.96
Observations	257	257
Magnitude: Share refractory clergy		
stand. beta coeff.	-0.211	-0.358

Notes: All regressions are run at the department level. Schooling controls include the (log) number of students per school, and the (log) number of total schools in $t-10$. In addition, all specifications control for school rate, total department population and the share of population active in industry. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. The last row reports the standardized beta coefficients.

Table 14: The importance of schooling in explaining the relation between religiosity and development

Dependent var.	Share Ind. Emp. 1901		Share Workers Mod. Sect. 1896		Machineries pc 1901		Growth Share Ind. Empl 1871-1901	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share Refract. Clergy	-0.085**	-0.051	-0.164***	-0.130*	-1.133***	-0.635*	-0.554**	-0.269
	(0.035)	(0.045)	(0.057)	(0.070)	(0.381)	(0.350)	(0.216)	(0.235)
Gr. Share Cath. Schools		-0.040*		-0.045*		-0.459**		-0.599***
		(0.020)		(0.026)		(0.225)		(0.175)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.50	0.53	0.53	0.55	0.34	0.40	0.58	0.65
Observations	79	79	79	79	79	79	79	79
Magnitude: Standardized beta coefficients								
Share refractory clergy	-0.186	-0.112	-0.241	-0.191	-0.267	-0.149	-0.250	-0.122
Gr. Share Cath. Schools		-0.245		-0.174		-0.304		-0.290
Prop. of total effect of religiosity mediated by growth in share of Catholic schools								
Sobel-Goodman mediation test		0.417		0.223		0.400		0.564

Notes: All regressions are run at the department level. Growth in the share of Catholic schools is measured in 1851-1901 (cols. 2, 6), 1851-1896 (col. 4) and in 1871-1901 (col. 8). Controls include a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, the (log) number of printing presses established before 1500, (log) department population, and a dummy for Paris (Seine department). In addition, all specifications include school rate, and the initial share of Catholic schools. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. The standardized beta coefficients are reported at the bottom of the Table. Moreover, the last row reports the results of the Sobel-Goodman mediation test. This shows whether a mediator (Gr. Share Cath. Schools) carries the influence of an explanatory variable (religiosity) to the different outcomes.

Online Appendix

Devotion and Development:
Religiosity, Education, and Economic Progress in 19th Century France

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A Additional specifications

In this section, I run a series of robustness checks.

A.1 Religiosity and conservatism

My analysis considers the conservative attitude of Catholicism as a measure of resistance to the spreading of technical and scientific knowledge, and in turn, to economic development. However, this conservative religious approach could also be correlated with a more general conservative attitude. Thus, using data from the *cahiers de doleances*, I construct the share of conservative contents in the *cahiers* of the third estate – similarly to the share of "anti-religious" contents (see section 4.1) – and use it as a proxy for a broader dimension of conservatism at the local level. These include those *cahiers*: 1) appealing to French tradition; 2) making reservation on the renunciation of privileges; 3) concerned for a regeneration of the *moeurs*; 4) asking for restriction of the press; 5) in favor of maintaining the gilds; 6) in favor of maintaining feudal justice gilds; 7) showing conservative nationalism. Table A.1 shows a negative and significant correlation between the share of "anti-religious" contents and the share of conservative contents in the *cahiers* of the third estate. All regressions control for the log number of topics listed in the *cahier* and the coefficient on the share of conservative contents remain negative and significant when including the baseline controls listed in Table 1 – suggesting that religiosity could be related to a broader conservatism attitude.

Table A.1: Religiosity positively associated to conservatism

Dep. variable: Share Anti-Relig *Cahiers*

	(1)	(2)
Share Conserv. *Cahiers*	-0.372**	-0.307*
	(0.163)	(0.159)
Controls		✓
R^2	0.12	0.17
Observations	71	71

Notes: All regressions are run at the department level. Controls include a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, the (log) number of printing presses established before 1500. In addition, all specifications include log department population in 1800, average literacy in 1786, the (log) number of topics in the *cahier*, and a dummy for Paris (Seine department). Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Moreover, as mentioned in Section 2, the struggle between religion and science also took political connotations, especially during the period of the Third Republic. Here I use several election outcomes: first, I look at the 1849 legislative elections for the parliament[1]. I use an index (going from 1 to 11) representing the votes to the Democratic Socialist party (Bouillon, 1956).[2] Then, I use the share of the votes for the Republican parties in 1876, i.e. during the period of the Third Republic (Avenel, 1894).[3] Finally, I construct the principal component of both outcomes, "PCA progressive voting." Table A.2 shows the results. In all cases, there is a negative relation between the share of refractory clergy and the share of votes for progressive parties (cols.1-6). Moreover, to rule out that these results are driven by the fact that my main measure of religiosity captures political attitude toward the French Revolution, as a robustness, cols. 7-8 use the share of anti-religious *cahiers* and the results hold – thus suggesting that religiosity was also associated to political conservatism.

Finally, in Table A.3 I use the baseline specifications of Table 5, and regress my economic and industrial outcomes on both religiosity and the share of conservative *cahiers*. The coefficient of religiosity is still negative and significant in all specifications, while conservatism is not significantly associated with economic development. This suggests that the particular anti-scientific dimension of Catholicism (not necessarily captured by a conservative attitude as such) is likely to explain the negative relation between religiosity and economic development after 1870. This is also in line with the fact that, notwithstanding the Catholic Church had embraced a strong anti-scientific and anti-progressive approach already from 1789, the more religious departments started to lag behind only when technological progress had to be spread among the population to be "economically useful".

[1]The suffrage was attained in 1848 and extended to all resident male citizens.

[2]In 1849, the Democratic Socialist party lost the elections with about 30% of the votes – The *Parti de l'Ordre* obtained instead the majority of the votes (about 50%).

[3]The Republican parties included the *Modérés et Libéraux*, the *Radicaux socialistes*, the *Radicaux*, the *Socialistes*, and the *Ralliés*. This was opposed to the reactionary coalition which included the *Monarchistes* and the *Revisionistes*.

Table A.2: Religiosity negatively associated to progressive voting

Dep. variable: votes to progressive parties

	1849 (Index)		1876 (Share)		PCA Progressive voting			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share Refract. Clergy	-3.703*	-4.516***	-0.220***	-0.186**	-1.968***	-2.075***		
	(1.905)	(1.621)	(0.074)	(0.072)	(0.631)	(0.554)		
Share Anti-Relig. *Cahiers*							5.241**	4.797*
							(2.589)	(2.519)
Controls		✓		✓		✓		✓
R^2	0.08	0.29	0.16	0.31	0.19	0.30	0.15	0.24
Observations	77	77	79	79	77	77	72	72

Notes: All regressions are run at the department level. Controls include school rate, a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, and the (log) number of printing presses established before 1500. In addition, all specifications include (log) department population and a dummy for Paris (Seine department). Columns 4, 6, and 8 also control for the election turnout in 1876. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table A.3: Negative relation between religiosity and industrialization (post-1870)

Dependent var.	Share Ind. Emp. 1901	Share Workers Mod. Sect. 1896	Machineries pc 1901	Growth Share Ind. Empl 1871-1901
	(1)	(2)	(3)	(4)
Share Refract. Clergy	-0.102**	-0.202***	-1.507***	-0.451*
	(0.043)	(0.069)	(0.403)	(0.250)
Share Conserv. *Cahiers*	-0.068	-0.211	-3.596	1.421
	(0.233)	(0.386)	(2.218)	(1.020)
Controls	✓	✓	✓	✓
R^2	0.50	0.54	0.37	0.59
Observations	72	72	72	72

Notes: All regressions are run at the department level. Controls include school rate (measured 10 years before the respective dependent variables in cols. 1-3 and in 1866 in col. 4), a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, and the (log) number of printing presses established before 1500. Col. 4 also controls for the initial share of industrial employment. In addition, all specifications include (log) department population in the respective years, and a dummy for Paris (Seine department). Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Cahiers of the clergy and of the nobility

In my analysis, I focus on the *cahiers* of the third estate, since this represented the large majority of the population and thus would be good proxy for local religiosity. However, the data on the *cahiers de Doléances* allow me to distinguish among the "opinions" of the three different estates. Thus, as a placebo, Table A.4 uses the share of "anti-religious" contents in the *cahiers* of the clergy and nobility. As expected, these are not significantly correlated with religiosity in 1791, suggesting that religiosity of these minorities is different from religiosity of the rest of the population.

Table A.4: Religiosity of the nobility and the clergy

	Nobility		Clergy	
	(1)	(2)	(3)	(4)
Share Anti-Relig *Cahiers*	-0.084	-0.164	-0.871	-0.959
	(0.564)	(0.563)	(0.551)	(0.590)
Controls		✓		✓
R^2	0.04	0.17	0.11	0.20
Observations	64	61	65	64

Notes: All regressions are run at the department level. Controls include average literacy in 1786, a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, the (log) number of printing presses established before 1500. In addition, all specifications include log department population in 1800 and a dummy for Paris (Seine department). Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

A.2 Religiosity and industrialization: pre- and post-1870

Table A.5 and A.6 perform the same regressions of Table 4 and 5 respectively, but include a set of potentially confounding factors (listed in Table 1, col. 2). All my previous results hold and the share of refractory clergy is negatively and significantly associated to economic development during the period of the Second Industrial Revolution, but not before. Importantly, the coefficients on share of refractory clergy is very similar in magnitude to those reported in the baseline specifications. In Table A.6, among the other explanatory variables, "Pre-Industrial Activities" is significantly and positively associated to my outcome variables (cols. 1-3) and the density of knowledge elites is generally positively and significantly associated to the number of industrial machineries per capita in 1901, suggesting the importance of this enlightened minority for the adoption of the new technologies.

My main indicator of religiosity, the share of refractory clergy, is defined as the clergy that stayed loyal to the Catholic Church over the total number of clergy. However, this does not take into account how many clergymen were in the different departments. Thus, Table A.7 controls for the share of clergy in the population in 1791 (using data on total department population in 1800 from the Statistique Générale de la France). My results hold and the coefficients on share of refractory clergy in the post-1870 period is still significant and very similar in magnitude to those reported in the baseline specifications.

As explained above, one concern could be that early economic development is affecting religiosity, as well as economic outcomes during the Second Industrial Revolution. Table A.8 controls for the initial level of development, by including the pre-1870 outcome variables as controls in the post-1870 regressions. As expected, the initial level of development is positively and generally significantly correlated with economic outcomes during the Second Industrial Revolution (cols. 1-3).[4] At the same time, the coefficient on the share of refractory clergy is still negative and significant in all my specifications, suggesting that the results are not confounded by early economic development.

Table A.9 includes the share of people having secondary education. Here the concern could be that highly educated people (representing only the 0.46% of the male population) were more involved in industrialization process and also favored the spreading of secular values among the population.[5] Interestingly, the share of secondary educated people in 1876 is positively and significantly associated with my outcome variables. However, my results for the share of refractory clergy still hold to the inclusion of this other potential confounding characteristics. I don't use this information in the baseline specifications since it's only available for the post-1870 period, while in Table A.5 and A.6 I prefer

[4]The negative coefficient on "Initial Development" in col. 4 is due to the fact that the dependent variable is the growth in the share of industrial employment – thus providing some evidence for conditional convergence.

[5]This reasoning is very similar to the one made for the presence of knowledge elites. However, since knowledge elites are measured in the mid 18th century, I now include a 19th century proxy for upper tail human capital.

using a standard set of controls.

Then, Table A.10 takes into account concerns of spatial autocorrelation. In all specifications, the coefficient on share of refractory clergy is still highly significant.

After taking into account potentially confounding observable characteristics, to analyze whether unobservables are driving my results, I use the seminal work of Altonji, Elder, and Taber (2005) – later refined by Oster (2013). Rather than relying on exogenous variation, Altonji et al. (2005) suggest an alternative approach that takes the relationship between the endogenous variable and the observables as a basis to make interference on the relationship between this same endogenous variable and the unobservables. More precisely, under the assumption that unobservables and observables share similar characteristics, we can use the selection on observables to assess the potential bias from unobservables. In my case, this would imply that the variation in the outcome variables related to the observables has the same relationship with religiosity as the part of variation reflecting unobservables. More formally, I calculate how much stronger selection on unobservables, relative to observables, should be to explain away the full observed relationship between religiosity and my outcome variables. I run two regressions and compute the ratio constructed by Altonji et al. (2005) and adapted to continuous cases by Bellows and Miguel (2009). First, I estimate the coefficient on the share of refractory clergy only controlling for the baseline controls and denote the corresponding coefficient β^A. In the second regression, I add the additional controls as listed in Table 1 (col.2) and denote the coefficient on the share of refractory clergy by β^B. The Altonji et al. ratio is given by $\beta^B/(\beta^A - \beta^B)$. The larger β^B the stronger is the effect that is left after controlling for observables – and the more would unobservables have to explain in order to reduce the coefficient to zero. As for the denominator in the ratio, the smaller is the difference between β^A and β^B the less is the estimated coefficient influenced by observables, and the stronger would selection on unobservables have to be relative to selection on observables in order to completely explain away the effect. Table A.11 shows the results. First, since R-squared rises with the inclusion of more controls, it suggests that the included controls are informative (Oster, 2013). Moreover, when the ratio ($\beta^B/(\beta^A - \beta^B)$) is negative, the observable controls are on average negatively correlated with the outcome variable and it means that my OLS estimates are likely to be downward-biased (provided that the unobservables are positively correlated with the observables). In general, the Altonji et al. ratios suggest that selection on unobservables would have to be at least 3.47 times stronger than selection on observables to explain away the relationship between religiosity and the various outcome variables – thus suggesting that unobservables are unlikely to drive my results.

Table A.5: Religiosity not associated with industrialization (pre-1870) – additional controls

Dependent var.	Share Ind. Emp. 1866	Share Workers Mod. Sect. 1840s	Steam Eng. pc 1840s	City Growth 1750-1850
	(1)	(2)	(3)	(4)
Share Refract. Clergy	0.002	0.038	0.006	0.031
	(0.025)	(0.116)	(0.041)	(0.132)
Knowledge Elites pc	0.005	0.006	-0.008	0.125***
	(0.010)	(0.037)	(0.009)	(0.044)
Huguenots pc 1815	0.011	1.133	0.063	0.074
	(0.069)	(0.698)	(0.097)	(0.631)
Pre-Industrial Activities	0.033**	0.083*	0.018	0.238
	(0.014)	(0.048)	(0.014)	(0.366)
Nobles pc 1800	0.006	0.113	0.023	0.223**
	(0.033)	(0.126)	(0.037)	(0.111)
Pays d'Election	0.021	0.056	-0.024	-0.107
	(0.013)	(0.054)	(0.020)	(0.091)
Dept. non French	0.011	0.143	-0.048*	0.352***
	(0.026)	(0.088)	(0.028)	(0.094)
Pop. Density	0.076***	0.443**	0.078	
	(0.021)	(0.170)	(0.123)	
Urban Pop. 1831	0.050**	-0.117*	0.043**	
	(0.019)	(0.067)	(0.018)	
Controls	✓	✓	✓	✓
R^2	0.75	0.35	0.51	0.31
Observations	74	73	73	121

Notes: All regressions are run at the department level. The share of refractory clergy is measured at the city level in col. 4. Controls include school rate in 1837 (cols. 1-3) or literacy in 1786 (col. 4), a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, and the (log) number of printing presses established before 1500. In addition, all specifications include (log) department population and a dummy for Paris (Seine department). The presence of the nobility is measured in 1800 in cols. 1-3 and in 1750 in col. 4. Pop. Density is measured in 1866 in col. 1 and in 1831 in cols. 2-3. Robust standard errors (clustered at the department level in col. 3) in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table A.6: Religiosity negatively associated with industrialization (post-1870) – additional controls

Dependent var.	Share Ind. Emp. 1901	Share Workers Mod. Sect. 1896	Machineries pc 1901	Growth Share Ind. Empl 1871-1901
	(1)	(2)	(3)	(4)
Share Refract. Clergy	-0.070**	-0.125**	-1.041***	-0.545**
	(0.033)	(0.048)	(0.370)	(0.214)
Knowledge Elites pc	0.014	0.018	0.292**	-0.011
	(0.014)	(0.018)	(0.143)	(0.065)
Huguenots pc 1861	0.034	-0.115	-1.384	-0.641
	(0.109)	(0.220)	(1.351)	(0.783)
Pre-Industrial Activities	0.044***	0.055***	0.419**	0.132*
	(0.013)	(0.019)	(0.189)	(0.076)
Nobles pc 1850	0.032	0.022	1.513	0.563
	(0.058)	(0.095)	(0.972)	(0.365)
Pays d'Election	0.010	0.039*	0.106	-0.055
	(0.014)	(0.022)	(0.177)	(0.098)
Dept. non French	0.024	0.021	-0.461	0.273
	(0.042)	(0.058)	(0.490)	(0.294)
Pop. Density	0.061**	0.110***	-0.312	0.292**
	(0.023)	(0.035)	(0.320)	(0.140)
Urban Pop. 1831	0.066***	0.107***	-0.077	0.193
	(0.023)	(0.033)	(0.326)	(0.118)
Controls	✓	✓	✓	✓
R^2	0.70	0.73	0.48	0.70
Observations	75	75	75	75

Notes: All regressions are run at the department level. Controls are the same of those used in Table 4 and in 5, for Panel A and B respectively. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table A.7: Religiosity and industrialization (post-1870) – controlling for clergy pc in 1791

PANEL A: pre-1870				
Dependent var.	Share Ind. Emp. 1866	Share Workers Mod. Sect. 1840s	Steam Eng. pc 1840s	City Growth 1750-1850
	(1)	(2)	(3)	(4)
Share Refract. Clergy	-0.034	0.133	-0.011	0.080
	(0.035)	(0.126)	(0.040)	(0.131)
Clergy pc 1791	0.135	0.836*	0.044	0.006
	(0.143)	(0.460)	(0.120)	(0.005)
Controls	✓	✓	✓	✓
R^2	0.53	0.19	0.32	0.17
Observations	79	78	78	123
PANEL B: post-1870				
Dependent var.	Share Ind. Emp. 1901	Share Workers Mod. Sect. 1896	Machineries pc 1901	Growth Share Ind. Empl 1871-1901
	(1)	(2)	(3)	(4)
Share Refract. Clergy	-0.082**	-0.160***	-1.116***	-0.514**
	(0.037)	(0.060)	(0.376)	(0.202)
Clergy pc 1791	0.168	0.301	1.097	1.514**
	(0.144)	(0.226)	(1.855)	(0.733)
Controls	✓	✓	✓	✓
R^2	0.50	0.54	0.34	0.60
Observations	79	79	79	79

Notes: All regressions are run at the department level. Controls include school rate, a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, and the (log) number of printing presses established before 1500. Pop. Density is measured in the respective year. In addition, all specifications include (log) department population and a dummy for Paris (Seine department). Robust standard errors (clustered at the department level in col. 4 of Panel A) in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table A.8: Religiosity and industrialization (post-1870) – controlling for initial level of economic development

Dependent var.	Share Ind. Emp. 1901	Share Workers Mod. Sect. 1896	Machineries pc 1901	Growth Share Ind. Empl 1871-1901
	(1)	(2)	(3)	(4)
Share Refract. Clergy	-0.111***	-0.196***	-1.317***	-0.554**
	(0.028)	(0.059)	(0.347)	(0.216)
Earlier Development	0.640***	0.085	3.816**	-3.673***
	(0.081)	(0.057)	(1.636)	(0.460)
Controls	✓	✓	✓	✓
R^2	0.75	0.54	0.39	0.58
Observations	79	78	78	79

Notes: All regressions are run at the department level. "Earlier Development" represents the share of industrial employment in 1871 (cols. 1 and 4), the share of workers in modern sectors in 1840s (col. 2), and the (log) number of steam engines per capita (col. 3). Controls include school rate (measured 10 years before the respective dependent variables in cols. 1-3 and in 1866 in col. 4), a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, and the (log) number of printing presses established before 1500. In addition, all specifications include (log) department population in the respective years and a dummy for Paris (Seine department). Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table A.9: Religiosity and industrialization (post-1870) – controlling for share of secondary education

Dependent var.	Share Ind. Emp. 1901	Share Workers Mod. Sect. 1896	Machineries pc 1901	Growth Share Ind. Empl 1871-1901
	(1)	(2)	(3)	(4)
Share Refract. Clergy	-0.072**	-0.142***	-1.100***	-0.525**
	(0.034)	(0.053)	(0.377)	(0.199)
Share Secondary Educ. 1876	0.076**	0.133***	0.200	0.276
	(0.030)	(0.049)	(0.310)	(0.263)
Controls	✓	✓	✓	✓
R^2	0.53	0.58	0.34	0.60
Observations	79	79	79	79

Notes: All regressions are run at the department level. Controls include school rate (measured 10 years before the respective dependent variables in cols. 1-3 and in 1866 in col. 4), a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, and the (log) number of printing presses established before 1500. In addition, all specifications include (log) department population in the respective years and a dummy for Paris (Seine department). Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table A.10: Religiosity and industrialization (post-1870) – controlling for spatial autocorrelation

Dependent var.	Share Ind. Emp. 1901	Share Workers Mod. Sect. 1896	Machineries pc 1901	Growth Share Ind. Empl 1866-1901
	(1)	(2)	(3)	(4)
Share Refract. Clergy	-0.085**	-0.164***	-1.133**	-0.554***
	(0.042)	(0.061)	(0.453)	(0.197)
Controls	✓	✓	✓	✓
R^2				
Observations	79	79	79	79

Notes: All regressions are run at the department level. Controls include school rate (measured 10 years before the respective dependent variables in cols. 1-3 and in 1866 in col. 4), a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, and the (log) number of printing presses established before 1500. In addition, all specifications include (log) department population in the respective years and a dummy for Paris (Seine department). These regressions are run using the spreg Stata command * p<0.1, ** p<0.05, *** p<0.01.

Table A.11: Altonji and the role of unobservables

Dependent var.	Share Ind. Emp. 1901		Share Workers Mod. Sect. 1896		Machineries pc 1901		Growth Share Ind. Empl 1871-1901	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	R^2	ratio	R^2	ratio	R^2	ratio	R^2	ratio
Controls	0.50		0.53		0.34		0.58	
Additional Controls	0.70	4.73	0.73	3.47	0.48	11.3	0.70	58.6

Notes: The table uses the Altonji, Elder, and Taber (2005) methodology and reports the relative strength of selection on unobservables necessary to completely explain the effect of share of refractory clergy on the different outcome variables. 'Controls' and 'Additional Controls' are those listed in Table 1 (col. 1 and col. 2 respectively).

A.3 Education, religiosity, and industrialization: pre- and post-1870

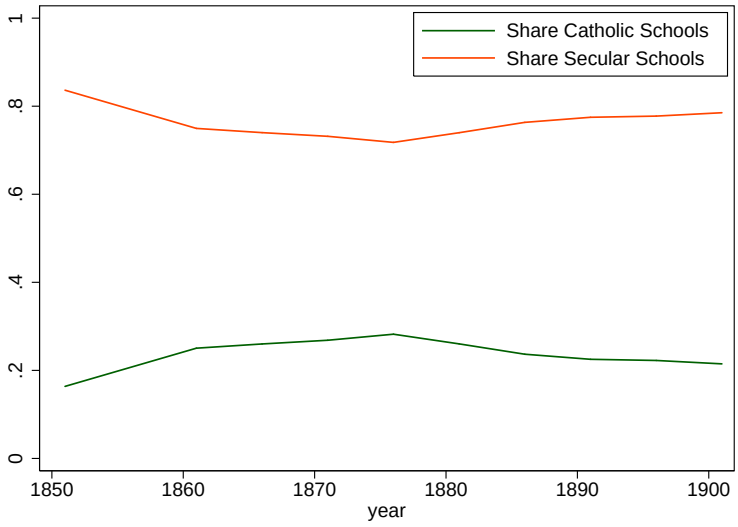

Figure A.1: Share of Catholic and secular schools, 1851-1901

Notes: The figure shows the average share of Catholic schools (green line) and secular schools (orange line) in France from 1851 to 1901.

Table A.12 uses the share of Catholic students, rather than using the share of Catholic schools. Similarly to Table 8, columns 1-3 show that departments with a higher share of refractory clergy in 1791, also had a higher share of Catholic students, especially after 1850, i.e. when the differences among the two education systems (Catholic and secular education) emerged. Importantly, columns 4-6 show that in the more religious departments there is also a higher growth in the share of Catholic students.

I now perform more robustness checks in my panel setting – when looking at the role of type (Catholic vs. secular) education for industrial development in the 1871-1911 period. In the baseline specification (Table 9), I regress the share of industrial employment in year t on the share of Catholic schools in year $t-10$. Table A.13 uses different lags for the explanatory variables. Specifically, while the share of industrial employment is always measured at time t, the Share of Catholic schools is measured in t (col.1), $t-5$ (col. 2), $t-15$ (col. 3), and an average between $t-10$ and $t-15$ (col. 4). The coefficient on the share of Catholic schools is quantitatively larger and more significant when the share of Catholic schools is measured in $t-15$ or in Avg($t-10$, $t-15$). Interestingly the coefficient is smaller in magnitude and insignificant (col. 1) when the dependent and explanatory variables are both measured at time t – suggesting that the type of education is affecting (trough the diffusion of

technical skills) industrial development once students enter the labor market.

Then, to check whether there are differences in investment in "quantity" of human capital between Catholic and secular education, Table A.14 uses school rate (cols. 1-2) and the of students obtaining the *certificat d'études primaires* (cols. 3-4) as dependent variables. It shows that there are no significant differences in "quantity" of education or completion of primary schools between Catholic and secular schools. Finally, Table A.15 uses, as dependent variable, the share of the male (col. 1) and female (col. 2) population employed in industry separately and, as explanatory variables, the share of male (col. 1) and female (col. 2) Catholic schools. In both specifications, the coefficients on the share of Catholic schools is negative and significant suggesting that the negative relation between industrial employment and Catholic education holds for both genders.

Table A.12: Religiosity and Catholic students

Dependent var.	Share Cath. Students			Growth Share Cath. Students		
	1850	1866	1901	1850-1866	1866-1901	1850-1901
	(1)	(2)	(3)	(4)	(5)	(6)
Share Refract. Clergy	0.057	0.111*	0.244***	0.225	0.378***	0.636***
	(0.055)	(0.057)	(0.050)	(0.211)	(0.106)	(0.146)
Controls	✓	✓	✓	✓	✓	✓
Schooling Controls	✓	✓	✓	✓	✓	✓
R^2	0.24	0.33	0.46	0.27	0.25	0.32
Observations	79	79	79	79	79	79

Notes: All regressions are run at the department level. Controls include a dummy for departments located on the Atlantic Ocean or on the Mediterranean sea, the (log) number of universities founded before 1750, and the (log) number of printing presses established before 1500. Schooling controls include school rate, the (log) number of students per school, the (log) number of total schools (all measured in the initial period in Cols. 4-6). In addition, all specifications include (log) department population (measured in the initial period in Cols. 4-6) and a dummy for Paris (Seine department). Cols 4-6 also control for the initial share of Catholic students. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table A.13: Catholic education and industrial employment – different lags

Dependent variable: Employment in Industry, 1871-1911				
	(1)	(2)	(3)	(4)
	time t	time $t-5$	time $t-15$	Avg$(t-10, t-15)$
Share Cath. Schools	-0.049	-0.124**	-0.159***	-0.244***
	(0.074)	(0.061)	(0.053)	(0.082)
School Rate	0.060	0.027	-0.017	0.017
	(0.050)	(0.033)	(0.043)	(0.059)
Schooling Controls	✓	✓	✓	✓
Department FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
R^2	0.87	0.88	0.90	0.91
Observations	573	655	736	573

Notes: All regressions are run at the department level. Schooling controls include school rate, the (log) number of students per school, the (log) number of total schools at the time indicated in the header. In addition, all specifications include (log) department population in the respective years. Standard errors (clustered at the department level) in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table A.14: Catholic schools and investment in HC

	School rate		Share students obtaining *certificat*	
	(1)	(2)	(3)	(4)
Share Catholic Schools$_{t-10}$	0.081	-0.046	0.015	0.017
	(0.151)	(0.079)	(0.011)	(0.011)
Schooling Controls		✓		✓
Department FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
R^2	0.75	0.89	0.86	0.85
Observations	818	817	491	408

Notes: All regressions are run at the department level. Schooling controls include the (log) number of students per school and the (log) number of total schools. Moreover, cols. 3-4 also control for school rate. In addition, all specifications include (log) department population in the respective years. Standard errors (clustered at the department level) in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table A.15: Catholic education and industrial employment – by gender

Dep. variable: Empl. in Industry, 1871-1911		
	(1)	(2)
	Male	Female
Share Cath. Schools$_{t-10}$	-0.164**	-0.175**
	(0.082)	(0.088)
Schooling Controls	✓	✓
Department FE	✓	✓
Year FE	✓	✓
R^2	0.90	0.79
Observations	656	656

Notes: All regressions are run at the department level. Schooling controls include school rate, the (log) number of students per school, the (log) number of total schools in $t-10$. In addition, all specifications include (log) department population in the respective years. Standard errors (clustered at the department level) in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

B Data: Description and Sources

B.1 Outcome Variables

My analysis is performed at the French department (county) level. Departments were created in 1789 by the National Constituent Assembly. Originally there were 83 departments. In 1815, with the end of the Napoleonic period, there were 86 departments. In 1860, also the departments of Alpes-Maritimes, Savoie and Haute-Savoie were annexed to the French territory. After the Franco-Prussian war, France lost the departments of Haut-Rhin and of Bas-Rhin (except for the Territoire de Belfort), as well as a very large area of the departments of Moselle and of Muerthe departments (the remaining part of Moselle and Meurthe were merged into Meurthe-et-Moselle). Hence, since the borders of the French territory changed over time, my analysis does not include Belfort, Meurthe, Moselle, (Meurthe-et-Moselle), Haut-Rhin, Bas-Rhin, Savoie and Haute-Savoie – I end up with a total of 82 departments.

Share of industrial employment

Data on the share of industrial employment (1871-1901) are from different French censuses (organized by the Statistique Générale de la France). They represent the people active in industry over the total active population. In 1871, for instance 23% of the active population was in the industrial sectors, while this percentage increased to 29% in 1911. These variable is available every five years from 1871 to 1911 (except for 1896).

Share of population in innovative sectors, 1839-47

These data are from Chanut, Heffer, Mairesse, and Postel-Vinay (2000) and represent the share of workers in innovative sectors over the total number of workers. The classification in innovative vs. traditional sectors is based on Squicciarini and Voigtländer (2015). They use the share of "inventive output" from Nuvolari and Tartari (2011), available for 21 British industrial sectors. Then, they merge the 21 British sectors with the 13 French sectors in Chanut et al. (2000) and obtain 8 consistent sectors for which they compute their innovation index as the weighted average "share of inventive output" from the British data. Using this index, they classify French sectors into "modern" and "old", based on above- vs. below-median innovation index.

Steam engines per 1,000 in 1839-1847

Data on steam engines are also from (Chanut et al., 2000). They provide this information at the arrondissement level. I aggregate it at the department level and compute the number of steam engines per 1,000. On average, there were 0.06 steam engine per 1,000 in the 1839-47 period.

City population growth, 1750-1850

Data on city population are from Bairoch, Batou, and Chèvre (1988). City population growth is computed as the log growth of city population between 1750 and 1850.

Share of workers in innovative sectors, 1896

The *Enquéte industrielle* provides data by industrial sector and workers' cohort for the 1896. I first use the share of workers in modern sectors (for all cohorts together). Then I also compute, the share of workers in modern sectors for each cohort. Cohorts are defined as workers between 15-24, 25-34, 35-44. Despite the classification into sectors of Chanut et al. (2000) is different from the one of the *Enquéte industrielle*, I make them as comparable as possible. I thus consider modern the following sectors: transformation (which include, for instance, textile and electricity) and transport. On the other hand, I classify fishing, agriculture and mines as "old" sectors.

Industrial machineries per 1,000 in 1901

Data on the number of industrial machineries per 1,000 in 1901 are from the Annuaire Statistique de la France. These include both fixed steam engines as well as locomotives. On average there were 1.8 industrial machineries per 1,000.

Share of children being vaccinated in 1871

I compute the share of children being vaccinated as the number of children being vaccinated over the total number of births. These data are from the 1871 *Rapport sur les vaccinations*.

Fertility rate

I use the I_g Princeton index as a measure of fertility. This measures the ratio of births that married women in a given population actually have to the number they would have if subject to the maximal age-specific fertility schedule. This is a less coarse measure than the crude birth rate. These data are from Murphy (2015).

Wages in manufacturing

Data on manufacturing wages in the 1891-1906 period are from the Statistique Général de la France (1907). These information are recorded every five years.

B.2 Other indicators of religiosity

Cahiers de Doléances

For each balliage and estate, Hyslop (1934) provides a list of 49 contents categories mentioned in the *cahiers de doléances*. I identify four categories reflecting "anti-religious" attitudes. For each *bailliage*, I compute the share of "anti-religious" contents in the *cahiers* of the third estate. In the same way, I

also compute the share of "anti-religious" contents in the *cahiers* of the clergy and of the nobility, as well as the share of conservative contents in the *cahiers* of the third estate.

Share of readers of the newspaper La Croix

This is an index going from 1 to 4 capturing the share of readers of the newspaper *La Croix* in 1896 (Cholvy and Hilaire, 2000).

Number of priests per capita in 1901

These data are from the Annuaire Statistique de la France. I divide the total number of priests over the department population in 1901.

Church attendance 1950s

Isambert and Terrenoire (1980) provide information on the share of people attending the Sunday Mess in the 1950s. On average 29% of the population is attending the Sunday Mess – with the highest percentage of 65% and 69% in the departments of Ille-et-Vilaine and Lozere respectively.

Priests' ordinations per capita

These data are from Godfrin and Godfrin (1965). This is an index going from 1 to 6 and capturing the priests' ordination per capita in the 1950s.

B.3 Control Variables

Baseline controls (cross-sectional analysis)

In the cross-sectional specification, the baseline controls include department level population, literacy rates, and school rates. These data are from the Statistique Générale de la France. Other controls include a dummy for departments located on the Atlantic Ocean or on the Mediterranean Sea. Following Dittmar (2011), I also control for the (log) number of universities founded before 1750 (Jedin, Latourette, and Martin, 1970; Darby and Fullard, 1970) and for the (log) number of printing presses between 1450 and 1500 (Febvre and Martin, 1958; Clair, 1976).

Knowledge elites

Data on knowledge elites are from Squicciarini and Voigtländer (2015). These represent the density of subscriptions to the Éncyclopedie of Diderot and d'Alembert and are computed as the average subscriptions per capita across all cities in a given department.

Huguenot population

Data on Huguenots are from Mours (1958). I use information on the Huguenot population residing in 1815 and 1861 in each French department. In 1861, Huguenots were about the 1.7% of the total French population. There was large department-level variation with the Huguenots representing about

30% of the population in the Gard department and only the 0.003% in the Correze department.

Noble families

Data on the number of noble families is provided by the Almanach de Saxe Gotha.[6] More specifically, I use data on *marquises*. Entries also contain information on the departments of origin of these families, as well as the dates of creation and (if applicable) extinction of the dynasty. For each department, I compute the total number of *marquis* families existing in 1800 and in 1850. Altogether, there are more than 1,000 noble families in 1800 and about 770 in 1850. Using data on department-level population in 1800 and in 1850, I then compute the number of noble families per 10,000.

Pre-industrial activities

Following Abramson and Boix (2013) and Squicciarini and Voigtländer (2015), I use data on pre-industrial centers in France. These include the total number of mines, forges, iron trading locations, and textile manufactures. I use the local density of pre-industrial activities as computed by Squicciarini and Voigtländer (2015). About half of the departments have some type of pre-industrial activities, with the highest numbers in the departments of Isère, Nord, and Pas de Calais.

Pays d'élection

While France was a centralized state already before the French Revolution, in some regions, the *pays d'élection*, the king exerted particularly strong power in fiscal and financial matters (a representative of the royal administration was directly responsible for the assessment and collection of taxes). In contrast, the *pays d'état* and the *pays d'imposition* enjoyed higher autonomy in terms of taxation. I use a dummy for departments located in *pays d'élection*. This information is from Le Bras (1986).

Non-French speaking departments

I construct a dummy for departments located in non-French speaking areas using linguistic data from http://www.lexilogos.com/france_carte_dialectes.htm. There are three main groups of romance languages in France: *langue d'oc*, *langue d'oil* (the official French), and *langue franco-provencal*. I consider all three "French". By this definition, the following dialects are "non-French": Alsacien, Basque, Breton, Catalan, and Corsican.

Population density

Data on department population and on department surface are from the Statistique Générale de la France.

[6] Available at http://en.wikipedia.org/wiki/List_of_French_marquisates#cite_note-1.

Baseline controls (panel analysis)

In the baseline specification, I control for department level population, school rate, the number of students per school, and the total number of schools. All schooling variables are from the Statistique Générale de la France and generally reported every five years from 1851 to 1901. The school rate was, on average, about 51% in 1851 and 86% in 1901. The total number of schools instead increased from about 56,400 in 1851 to 80,800 in 1901. Similarly, the number of students per school increased from 52 to 62.

Phyloxxera dummy

Between 1863 and 1890, the phyloxxera destroyed 40% of French vineyards and represented one of the most dramatic and devastating agricultural shocks in France (Meloni and Swinnen, 2014; Banerjee, Duflo, Postel-Vinay, and Watts, 2010). I use data from Banerjee et al. (2010) and, for each department, I construct a dummy for the year this was hit by the disease. In my data 35 departments were hit by the phyloxxera at different times.

Extraordinary department subsidies pc

I use data from the *Bulletin des lois de la République française* on extraordinary subsidies that the different departments received from the central government from 1871 to 1906. In my dataset, 28 departments did not receive any extraordinary subsidies over this period. I then compute subsidies per capita by dividing extraordinary subsidies by total population.

Immigration

I include the number of immigrants per 100 inhabitants from the Statistique Générale de la France. These only include immigrants from other French departments, since foreign immigration to France was very limited (Daudin, Franck, and Rapoport, 2016). In 1886, for instance, the highest share of internal migrants was in the Seine-et-Oise department (38 per 100 inhabitants) and the lowest was in the Lot department (0.5 per 100 inhabitants).

Share of urban population

Using data from the Statistique Générale de la France, I compute the share of urban population by dividing urban population over total department population.

References

Abramson, S. F. and C. Boix (2013). The Roots of the Industrial Revolution: Political Institutions or (Socially Embedded) Know-How? APSA 2013 Annual Meeting Paper.

Altonji, J. G., T. E. Elder, and C. R. Taber (2005). Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools. *Journal of Political Economy 113*(1), 151–184.

Avenel, H. (1894). *Comment vote la France: dix-huit ans de suffrage universel, 1876-1893*. Librairies-imprimeries réunies.

Bairoch, P., J. Batou, and P. Chèvre (1988). *La Population des villes Europeenees de 800 à 1850: Banque de Données et Analyse Sommaire des Résultats*. Geneva: Centre d'histoire economique Internationale de l'Université de Genève, Libraire Droz.

Banerjee, A., E. Duflo, Postel-Vinay, and T. Watts (2010). Long Run Health Impacts of Income Shocks: Wine and Phylloxera in 19th Century France. *Review of Economics and Statistics 92*(4), 714–728.

Becker, S. O. and L. Woessmann (2009). Was Weber Wrong? A Human Capital Theory of Protestant Economic History. *Quarterly Journal of Economics 124*(2), 531–596.

Bellows, J. and E. Miguel (2009). War and Local Collective Action in Sierra Leone. *Journal of Public Economics 93*(11), 1144–1157.

Biraben, J.-N. (1975). *Les hommes et la peste en France et dans les pays européens et méditerranéens*. Paris · La Haye: Mouton.

Bouillon, J. (1956). Les démocrates-socialistes aux élections de 1849. *Revue francaise de science politique* (1), 70–95.

Carus-Wilson, E. M. (1966). *The Woollen Industry. Cambridge Economic History of Europe. Volume II*. Cambridge University Press.

Chanut, J.-M., J. Heffer, J. Mairesse, and G. Postel-Vinay (2000). *L'Industrie franccaise au milieu du 19e siécle: les enquêtes de la statistique générale de la France*. Editions de l'école des hautes études en sciences sociales, Paris.

Cholvy, G. and Y.-M. Hilaire (2000). *Histoire religieuse de la France (1880-1914)*. Toulouse, Privat.

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

Darby, H. C. and H. Fullard (1970). *The New Cambridge Modern History*, Volume 14. Cambridge: Cambridge University Press.

Daudin, G., R. Franck, and H. Rapoport (2016). The cultural diffusion of the fertility transition: evidence from internal migration in 19th century France. IZA Discussion Paper 9945.

Dittmar, J. and R. Meisenzahl (2016). State Capacity and Public Goods: Institutional Change, Human Capital, and Growth in Early Modern Germany. Working Paper.

Dittmar, J. E. (2011). Information Technology and Economic Change: The Impact of the Printing Press. *Quarterly Journal of Economics 126*, 1133–1172.

Emery, R. (1962). *The friars in Medieval France*. Columbia University Press.

Febvre, L. and H.-J. Martin (1958). *L'Apparition du Livre*. Paris: Albin Michel.

Godfrin, J. and P. Godfrin (1965). *Une centrale de presse catholique: la Maison de la bonne presse et ses publications*. Presses universitaires de France.

Greengrass, M. (1987). *The French Reformation*. Blackwell, Oxford.

Hyslop, B. (1934). *French Nationalism in 1789 According to the General Cahiers*. Cambridge University Press.

Isambert, F.-A. and J.-P. Terrenoire (1980). *Atlas de la pratique religieuse des catholiques en France*. Paris, Presses de la FNSP–CNRS.

Jedin, H., K. S. Latourette, and J. Martin (1970). *Atlas Zur Kirchengeschichte*. Freiburg: Herder.

Le Bras, H. (1986). *Les Trois France*. Odile Jacob-Le Seuil.

Meloni, G. and J. Swinnen (2014). The Rise and Fall of the World's Largest Wine Exporter – And Its Institutional Legacy. *Journal of Wine Economics 9*(1), 3–33.

Mours, S. (1958). *Les Églises Réformées en France. Tableaux et Cartes*. Librairie Protestante.

Murphy, T. (2015). Old habits die hard (sometimes) Can département heterogeneity tell us something about the French fertility decline? *Journal of Economic Growth 20*, 177–122.

Nuvolari, A. and V. Tartari (2011). Bennet Woodcroft and the value of English patents, 1617–1841. *Explorations in Economic History 48*, 97–115.

Oster, E. (2013). Unobservable Selection and Coefficient Stability: Theory and Validation. NBER Working Paper 19054.

Sprandel, R. (1968). *Das Eisengewerbe im Mittelalter*. A. Hiersemann.

Squicciarini, M. and N. Voigtländer (2015). Human Capital and Industrialization: Evidence from the Age of Enlightenment. *Quarterly Journal of Economics 30*(4), 1825–1883.

Statistique Général de la France (1907). *Salaires et duré du travail, coût de la vie pour certaines catégories d'ouvriers en 1906*. Paris: Imprimerie nationale.

Sunshine, G. (2003). *Reforming French Protestantism: The Development of Huguenot Ecclesiastical Institutions, 1557–1572*. Truman State University Press.

Tackett, T. (1986). *Religion, revolution, and regional culture in eighteenth-century France: The Ecclesiastical Oath of 1791*. Princeton, NJ: Princeton University Press.

Overview of the variables used in the paper (1/2)

Variable Name	**Variable Description**	**Source**
	Indicators of Religiosity	
Share refractory clergy	share of clergy not signing the oath in favor of the Civil Constitution in 1791	Tackett (1986)
Share of (anti-)religious cahiers	share of "anti-religious" contents in the *cahiers de doleances*	Hyslop (1934)
Share of readers of *La Croix*	index (from 1 to 4) for the share of readers of *La Croix in 1896*	(Cholvy and Hilaire, 2000)
Priests per capita in 1901	number of priests divided by department population	Annuaire Statistique de la France
Share of Catholic schools in 1901	Catholic schools divided by total number of schools	Annuaire Statistique de la France
Church attendance 1950s	share of people attending the Sunday Mess in the 1950s	Isambert and Terrenoire (1980)
Priests' ordinations per capita 1850s	index (from 1 to 6) for the priests ordination per capita	Godfrin and Godfrin (1965)
	Outcome Variables	
Share industrial employment	share of people active in industry over total people active	Statistique Générale de la France
Log city growth	log of city population growth over the indicated periods	Bairoch et al. (1988)
Share of workers in innovative sectors 1839-47	workers in innovative sectors divided by total number of workers	Chanut et al. (2000)
Steam engines per 1,000	number of steam engine per 1,000 in 1839-47	(Chanut et al., 2000)
Share of workers in innovative sectors 1896	workers in innovative sectors divided by total number of workers	Enquéte industrielle 1896
Machineries per 1,000	number of steam engine per 1,000 in 1901	Annuaire Statistique de la France
Share of vaccinated children	share of children being vaccinated over total number of births	Rapport sur les vaccinations
Fertility rate	I_g Princeton fertility index	(Murphy, 2015)
Wages in manufacturing	log (wages) in manufacturing in the 1891-1906 period	(Statistique Général de la France, 1907)

Overview of the variables used in the paper (2/2)

Variable Name	**Variable Description**	**Source**
	Baseline Controls	
Atlantic/Medic Dept.	dummy equal to 1 for departments located on the Atlantic Ocean or on the Mediterranean Sea	Dittmar (2011)
Universities	(log) number of universities before 1750	Jedin et al. (1970); Darby and Fullard (1970)
Printing press in 1500	(log) number of printing presses established before 1500	Febvre and Martin (1958); Clair (1976)
Paris	dummy equal to 1 for Paris (Seine department)	
Literacy	percentage of people able to sign their wedding certificate	Statistique Générale de la France
School Rate	ratio of students to school-age population	Statistique Générale de la France
Population	log total department population	Statistique Générale de la France
	Additional Controls	
Pays d'élection	dummy equal to 1 for departments located in *pays d'éléction*	Le Bras (1986)
Pre-Industrial Activities	log of 1+ pre-industrial centers per capita	Carus-Wilson (1966); Sprandel (1968)
Nobles pc	noble families per 1,000 in 1800 and 1850	Squicciarini and Voigtländer (2015)
Huguenots pc	huguenots per capita in 1815 and 1861	Mours (1958)
Knowledge elites	density of subscriptions to the Éncyclopedie of Diderot and d'Alembert	Squicciarini and Voigtländer (2015)
Non-French speaking departments	dummy equal to 1 for departments located in non-French speaking areas	http://www.lexilogos.com/france_carte_dialectes.htm
Population density	department population divided by department surface	Statistique Générale de la France
Students per school	(log) number of students per school	Statistique Générale de la France
Number of schools	(log) number of total schools	Statistique Générale de la France
Phyloxxera	dummy equal to 1 for the year in which a department was hit by the phyloxxera	Banerjee et al. (2010)
Department subsidies pc	government extraordinary subsidies pc to the departments	*Bulletin des lois de la République française*
Immigration	number of immigrants per 100 inhabitants	Statistique Générale de la France
Share of urban population	urban population divided by total population	Statistique Générale de la France
	Data used in the robustness checks	
Share of conservative cahiers	share of conservative contents in the *cahiers de doleances*	Hyslop (1934)
Share secondary education	Population with secondary education divided by total population	Statistique Générale de la France
Share votes Demo-Socialist party	Index (from 1 to 11) on the share of votes to the Democratic-Socialist party	Bouillon (1956)
Share votes Republican party	Share of votes to the Republican parties in 1876 and 1893	Avenel (1894)