Land Reform and Productivity: Evidence from the Dissolution of the French Monasteries*

Arnaud Deseau†

October 31, 2025

Abstract

This article studies how the confiscation and auction of Church land during the French Revolution affected agricultural productivity. I construct a new dataset on the revenues and locations of more than 1,500 monasteries in 1768 to measure local exposure to monastic land reallocation. I find that areas more exposed to the land reallocation experienced higher agricultural productivity in the mid-19th century. I trace these gains to the creation of larger and less fragmented farms, which facilitated mechanization and the substitution of family labor with hired specialized labor. The results suggest that market-based land reforms can generate persistent productivity growth by improving the allocation of land and labor. More broadly, the findings provide historical evidence that land reforms helped European agriculture to overcome the misallocation issue and offer lessons for contemporary land policy in developing economies.

Keywords: Land Reform, Productivity, French Revolution, Monasteries, Farm Size

JEL Codes: O13, O40, Q15, N53

*I am grateful to Hugues Annoye, Simone Bertoli, Guillaume Blanc, Pierre de Callataÿ, Eric Chaney, Paul Chopelin, Francesco Cinnirella, David de la Croix, Guillaume Daudin, Yannick Dupraz, Alice Fabre, Martín Fernández-Sánchez, Raphaël Franck, Tanguy le Fur, Oded Galor, Cecilia García Peñalosa, Paula Gobbi, Joseph Gomes, Philip T. Hoffman, Anne Jollet, Hélène Latzer, Preston Martin Perluss, Deirdre McCloskey, Stelios Michalopoulos, Nuno Palma, Luca Pensieroso, Èric Roca Fernández, Marc Sangnier, Mara Squicciarini, Peter Solar, Uwe Sunde, David Weil, Jacob Weisdorf and Alexis Wilkin for their valuable comments and suggestions. I also thank participants at the 2025 EHES Conference in Hohenheim; the 2025 WEHC in Lund; the 24th LAGV Days in Marseille; the 2025 Workshop in Economic History at ENS Lyon; the 2025 ADRES Job Market Conference in Strasbourg; the 2024 LORDE Conference in Grenoble; the 2023 DEM Workshop on Ageing, Culture and Comparative Development in Luxembourg; the 2022 Conference on Religion, Culture and Economic Growth in Historical Perspective in Louvain-la-Neuve; the 2022 Conference on the Economic Consequences of the Age of Liberal Revolutions, 1810-1848 in Lisbon; the 2022 WEHC in Paris; the 2021 Conference on « Les Biens Nationaux » : Une Révolution ? XVIIIe – XXIe siècle in Poitiers, and seminars at University of Clermont-Ferrand, Aix-Marseille School of Economics, Catholic University of Louvain, Brown University and University of Namur. I also thank Sébastien Angonnet, Bernard Bodinier and Cédric Chambru for sharing their data with me and for their valuable comments. I acknowledge financial support from the French government under the "France 2030" investment plan managed by the French National Research Agency Grant ANR-17-EURE-0020, and by the Excellence Initiative of Aix-Marseille University - A*MIDEX.

†Aix-Marseille University, CNRS, AMSE, Marseille, France. 5 Boulevard Maurice Bourdet CS 50498 F-13205 Marseille cedex 1, France (e-mail: arnaud.deseau@univ-amu.fr).

[...] the Benedictine abbey of Saint-Germain [...] is the richest abbey in France; the abbot has 300,000 livres a year (£13,125). I lose my patience at such revenues being thus bestowed; consistent with the spirit of the tenth century, but not with that of the eighteenth. What a noble farm would the fourth of this income establish! What turnips, what cabbages, what potatoes, what clover, what sheep, what wool! Are not these things better than a fat ecclesiastic? If an active English farmer was mounted behind this abbot, I think he would do more good to France with half the income than half the abbots of the kingdom with the whole of theirs.

Arthur Young (1792), Travels in France During the Years 1787, 1788 & 1789.

1 Introduction

Growth in agricultural productivity has long been viewed as essential for economic development and structural change (Lewis, 1955; Rostow, 1990; Gollin et al., 2002). Yet, despite the availability of modern inputs, agricultural productivity remains low in most developing countries. A growing body of literature attributes this gap to the misallocation of productive resources, reflected in the dominance of small, family-operated farms.[1] While misallocation is now recognized as a central constraint on modern agricultural productivity, its historical origins and the policies that helped advanced economies overcome it remain less well understood. As Polanyi (2001, p. 325) argued, the "commercialization of the soil" was a crucial step toward efficient land allocation; in particular, he highlighted that the "secularization of church lands was [...] one of the chief means of the ordered transference of land into the hands of private individuals."

This article examines a major historical episode of market-based land reallocation and its effect on agricultural productivity and farm size. I study the confiscation and auction of Church land during the French Revolution, known as the *Vente des Biens Nationaux* (the Sale of Na-

[1] See Restuccia and Rogerson (2013, 2017) for a review of the literature on production factors misallocation.

tional Properties). Between 1790 and 1795, about 6% of the French land was transferred from the Church to the few rich bourgeois and farmers who were able to win the auctions.

In my analysis, I focus specifically on monasteries, which held a substantial share of Church land and possessed some of the largest farms (Bodinier and Teyssier, 2000). To capture the local intensity of the land reallocation coming from monasteries, I construct a measure of monastic income exposure based on the newly collected revenues and geographic locations of more than 1,500 monasteries in 1768. Additional historical data at both the monastery and district levels validate monastic income exposure as a meaningful measure of the intensity of monastic land reallocation.

I find that *arrondissements* with higher intensity in the reallocation of monastic lands experienced greater agricultural productivity in the mid-19th century.[2] My preferred specification suggests that doubling monastic income exposure in 1768 increased wheat yields in 1852 by about 8 percent. The main source of concern in interpreting these results is that the pre-Revolution distribution of monastic land or income was correlated with factors affecting agricultural productivity. I employ several strategies to alleviate this concern. First, my results account for critical potential confounding characteristics, such as agricultural suitability, ruggedness and urban population levels in 1750. I also show the robustness of my main results to other potential confounders including market potential, the confiscation of land owned by *émigrés*, upper-tail human capital, literacy and religiosity. Further, my preferred specifications include region fixed effects to exploit the within-region variation in monastic income exposure.[3] Finally, I provide pre-trends evidence, showing that *arrondissements* with higher monastic income exposure did not experience faster urbanization growth than their counterparts in the years before the French Revolution.

What accounts for the positive relationship between monastic land reallocation and agricultural productivity in the mid-19th century? Building on recent work on farm size and resource

[2] An *arrondissement* is the first-level subdivision of the French NUTS3 unit level called *départements*.
[3] The regions are the French NUTS1 entities.

misallocation in developing countries, as well as historical evidence of land fragmentation in pre-Revolutionary France, I first examine the impact of the *Vente des Biens Nationaux* on farm size and land fragmentation. Using *département* and *arrondissement*-level data from the *Enquête Agricole* of 1852 and 1862, and from Legoyt (1843), I show that areas with higher intensity of monastic land reallocation had, by the mid-nineteenth century, larger and less fragmented farms.

I then explore two additional mechanisms linking farm size to agricultural productivity: (i) mechanization and (ii) labor organization. Mechanization spread gradually across France during the first half of the nineteenth century, as only large landowners could afford the cost of modern equipment. Consistent with this view, data from the *Enquête Agricole* of 1852 show that areas more exposed to monastic land reallocation invested more heavily in agricultural machinery, as measured by the number of scarifiers and extirpators. Finally, I examine changes in the composition of the agricultural labor force associated with land consolidation. Larger farms typically rely less on family labor and more on specialized male wage labor. Using data from the *Enquête Agricole* of 1852, I find that areas more affected by monastic land reallocation employed a lower share of women and children per hectare of wheat, consistent with a shift toward a more specialized and market-oriented labor force.

My research contributes to the literature on the productivity effects of land reforms. Existing studies show mixed results, depending on the type of land reform. For example, land-ceiling reforms are found to have a negative effect on agricultural productivity in India (Ghatak and Roy, 2007) and the Philippines (Adamopoulos and Restuccia, 2020), whereas market-assisted land reforms are found to increase agricultural productivity in Malawi (Mendola and Simtowe, 2015). I contribute directly to the scant literature studying the productivity effects of land reform in a historical context, and I present a case study of successful market-assisted land reform.

The most closely related study is that by Finley et al. (2021), who use Church land confiscations of the *Vente des Biens Nationaux* to assess the role of transaction costs in delaying the

reallocation of property rights. They find a positive effect on agricultural productivity that dissipated over the 19th century. While I focus on the same event and similar mechanisms, my research makes several original contributions. First, I focus on a specific class of Church-related entity, monasteries, that accounts for most Church-held land before the Revolution (Bodinier and Teyssier, 2000). Second, I introduce new data that can be used as a proxy for the land reallocation triggered by the *Vente des Biens Nationaux* for the entire French territory at the *arrondissement* level.[4] Finley et al. (2021) use data from Bodinier and Teyssier (2000) that covers only about 40% of the French *arrondissements*. Finally, I explore other complementary mechanisms such as land consolidation and labor organization.

My research also contributes to the literature on the relationship between inequality, investment and economic development. Galor and Moav (2004) argue for the non-monotonic role of equality in the process of development. When growth is driven by physical capital accumulation, equality is detrimental to economic development, diverting resources from individuals with a high propensity to save. By contrast, when growth is driven by human capital accumulation, equality promotes economic development. Most of the literature has focused on the detrimental effect of land inequality on human capital provision and its consequences in the context of the Second Industrial Revolution (Galor et al., 2009; Cinnirella and Hornung, 2016; Goñi, 2022). I show evidence the positive effect of land inequality on economic development in the First Industrial Revolution, that is when basic education of the labor force was not yet a condition for economic growth (Galor and Moav, 2006).[5] Consistent with this view, I provide evidence that, up to the first half of the 19th century, the reallocation of monastic lands triggered both an increase in land ownership inequality and an increase in physical capital

[4]This is also notable because the majority of studies looking at the determinants of French comparative development in the 19th century are conducted at the *département* level (one NUTS level above the *arrondissement*). For instance, Diebolt et al. (2017), de la Croix and Perrin (2018) and Franck and Galor (2021) study the interactions between education, fertility and long-run development at the *département* level.

[5]Related to that literature and my focus on French agricultural productivity, Bignon and García-Peñalosa (2021) show that a tariff on cereals (the *Méline* tariff of 1892) reduced primary school enrollment and increased fertility, thus slowing French economic development and industrialization in the second-half of the 19th century.

and agricultural productivity.

Finally, my research also relates to a broader literature analyzing the economic consequences of the secularization of society through the dissolution of Church-related entities such as monasteries. In particular, my study is closely related to those of Heldring et al. (2021) and Cantoni et al. (2018), who analyze the economic consequences of the 16th-century dissolution of English and German monasteries, respectively. In both cases, the authors argue that the dissolution of monasteries caused an efficient reallocation of resources from religious to secular purposes, thereby promoting economic development. I contribute to this literature by exploring the economic consequences of the dissolution of the monasteries in France. Although in a different context and epoch, I reach similar conclusions to those in Heldring et al. (2021) and Cantoni et al. (2018), showing that the dissolution of French monasteries and the privatization of their lands promoted economic development.

The next section provide historical background, including an overview of the changes in French agricultural productivity and landholding patterns before and after the French Revolution. In Section 3, I introduce my measure of monastic landholdings, explain my empirical strategy, and discuss the main threats regarding identification. I present and discuss my main results on the effect of land reallocation on agricultural productivity in Section 4. In Section 5, I explore the mechanisms driving my results, and Section 6 is the conclusion.

2 Historical Background

In this section, I provide some historical background on French agriculture, monastic landholdings and the *Vente des Biens Nationaux*. I begin by discussing the evolution of French agricultural productivity and landholding patterns before and after the Revolution. Then, I discuss the importance of monastic land before the Revolution and the changes prompted by the *Vente des Biens Nationaux* in terms of farm size.

2.1 Agricultural Productivity and Landholding Patterns Before and After the French Revolution

French agricultural productivity rose consistently during the first half of the 19th century. Newell (1973), analyzing the historical series compiled by Toutain (1961), shows that the French agricultural output per worker started to rise in the 1820s. By contrast, in the pre-revolutionary and the Napoleonic periods agricultural productivity was stagnant (Newell, 1973; Allen, 2000; Hoffman, 2000).[6] The overall rise in agricultural productivity was rapid; Bairoch (1988) estimates average annual growth of 1.1% between 1830 and 1880. This is higher than the rate of growth in the United Kingdom (0.7%) and the European average (0.6%) over the same period. The strong rise in agricultural productivity was seen across all French *départements* and all major crop types, however, there were remarkable differences across regions (Newell, 1973). For instance, between 1800 and 1862, labor productivity in wheat production, as measured by man-days per hectolitre, increased 10pp faster in the north of France than in Brittany (Grantham, 1993).

Historians have two main hypotheses to explain the rise of French agricultural productivity during the first half of the 19th century: (i) technical innovations and (ii) organizational changes. In respect of the first, this period is marked by several important agricultural innovations that dispersed gradually within France. More efficient crop rotation systems replaced the three-field or two-field rotation systems practiced in the Middle-Ages.[7] More powerful fertilizers were also available, such as Peruvian guano and, from the 1840s, artificial fertilizers. This period was also marked by the gradual adoption of the first agricultural machines, for example, threshers and harvesters.

Despite the importance of these innovations, their slow dispersion meant that it was some

[6] Hoffman (2000) finds very low growth in total factor productivity in agriculture before the Revolution, of the order of 0.1% per year at most.

[7] In particular, these new systems replace fallow land with artificial prairies (*prairies artificielles*) of forage crops such as clover, alfalfa or sainfoin. This fixes nitrogen in the soil while providing forage for farm animals, and is a more effective fertilizer than manure.

time before they reached all parts of France. The cost, as well as resistance to change, seem to have presented significant obstacles to innovation adoption for a large share of agricultural exploitations. Sée (1927) estimates that it was only in the second half of the 19th century that these technical innovations were in use across all of France.

The low investment in technological improvements and productivity differences within France after the Revolution can also be explained by landholding patterns. Pre-Revolution France was characterized by the dominance of small landowners. Peasants, while being 90% of the landowners, owned only about 40% of the French land before the Revolution (Sée, 1925). Hoffman (2000) notes that in the village of Goincourt, north of Paris, only 3% of the farmers owned more than 10 hectares in 1717; 96% owned less than 2 hectares. Similar patterns are found in 18th century Normandy and southern France, and in the north of France, a heavily agricultural region, 60-70% of peasants owned less than one hectare (Lefebvre, 1972, p.37).[8]

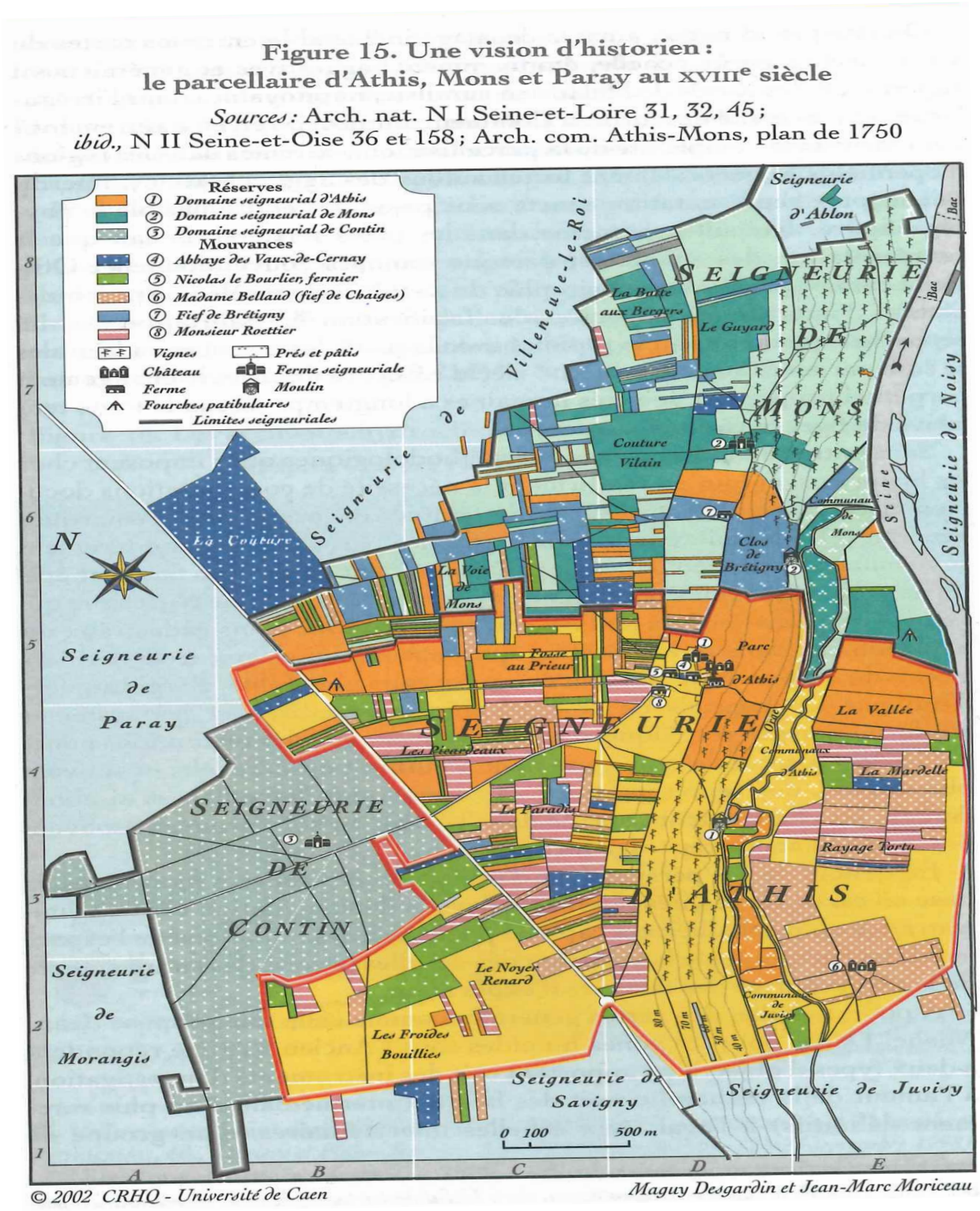
It was not simply that landowners owned very small lots. Another thing that kept agricultural productivity low before the Revolution was the fragmentation of landholdings. Most holdings were not contiguous, and farmers owned numerous small parcels of a few hectares each. Figure 1 illustrates the pre-Revolution land fragmentation by showing the agricultural plots in the village of Athis-Mons in the Essonne *département* in 1750 (Moriceau, 2002). Each color indicates a different owner, revealing considerable land fragmentation.

The influence of small landowners on French agriculture remained strong after the French Revolution. The first comprehensive data on landholdings after the Revolution shows that in 1862 half of all agricultural exploitations were smaller than 5 hectares. However, it is also worth noting that there was substantial variation in landholding patterns across *départements*, notably at the top of the distribution: the same source indicates that, in the mid-19th century, 25% of the farms were larger than 10 hectares, which is a threshold size for a large holding.

Large and consolidated farms were key to raising agricultural productivity for several rea-

[8] Vigneron (2008) gives similar figures for the Cambrésis and Lille province with properties of less than one hectare representing more than 50% of the landholdings in 1751.

Figure 1: Land Fragmentation in the village of Athis-Mons circa 1750



Notes: This figure shows the spatial fragmentation of land ownership in the village of Athis-Mons (Essonne) circa 1750 (Moriceau, 2002).

sons. First, an increase in farm size was matched by a gradual change in the composition of the agricultural labor force, from family labor to hired specialized laborers. Indeed, small agricultural holdings traditionally relied on family labor (the head of the family, wife and children).[9] Task specialization was limited, with all members of the family performing all tasks (plowing, sowing and harvesting).

Large farms were able to employ specialists and day laborers (*journaliers*): this specialization enabled larger farms to employ fewer workers per hectare, thus increasing labor productivity. Allen (1988) shows that the change in labor-force composition and the size of farms explains the rise in labor productivity in 18th-century English agriculture. In a modern context, Adamopoulos and Restuccia (2014) also find substantial labor productivity differences by farm size using the 2007 US Census of Agriculture. In particular, they find that value added per worker is more than doubled when moving from the smallest farms (0.5-5 hectares) to what, in the present case, would be considered a large farm (30-40 hectares).[10]

Large farms are also more productive because of increasing returns to mechanization with increased farm size, reducing labor costs and increasing labor productivity. As shown by Foster and Rosenzweig (2011, 2022), in the context of India in the 2010s, large machines cannot be used at their full capacity on small farms or plots. In the present case, the relationship between farm size and mechanization is supported by the historical study of Hoffman (2000, p.36), who finds that before the Revolution farms under 5 hectares did not invest in basic capital, such as plows and horses.[11]

[9] Nuclear family members were the most common source of labor on small farms. Labor from extended family was also present, but could rarely provide sufficient labor for large farms (Hoffman, 2000, p.48).

[10] This pattern holds also in various developing countries (Cornia, 1985).

[11] Hoffman (2000, p.286) cites numerous studies showing that the median farm size associated with plow ownership was 10 hectares.

2.2 Monastic Land, the Vente des Biens Nationaux and Farm Size

Before the Revolution, monasteries (and the Church more generally) were among the largest landowners in France. Historians estimate that they owned as much as 5-6% of French land while representing only 1.8% of the adult male population in 1789 (Lecarpentier, 1908; Sée, 1925). Church and monastic lands were unevenly distributed over French territory. The detailed analysis by Bodinier and Teyssier (2000) of over 40% of French districts shows that in 1789, 4.4% of the territory of the median district was owned by monasteries and the Church.[12] The top (bottom) quartile was composed of districts with more (less) than 8% (1.9%) of their land held by monasteries and the Church, with the maximum in the district of Cambrai (40.1%) and the minimum in the district of Tartas (0.3%).

Monasteries received large parcels of agricultural land from patrons during the Middle Ages. Bodinier and Teyssier (2000, p.339) show that, at the time of the Revolution, monasteries held around 60% of Church land. A single powerful monastery could account for as much as 20 to 30 % of Church land in a district, with some notable exceptions reaching even higher figures. This was the case for the famous abbeys of Cluny (46%), Saint-Sever (32.2%), Jumièges (23.7%) and Fontevraud (21.2%) (Bodinier and Teyssier, 2000, p. 341). Bodinier and Teyssier (2000) note that, large as they are, these figures probably underestimate the abbeys' landholdings, as the abbeys also held land outside of their district of origin. For example, the Parisian abbey of Saint-Germain-des-Prés owned land across the Ile-de-France region and even in Normandy, far beyond its home constituency (Bodinier and Teyssier, 2000, p. 343).

The French Revolution brought the Church's dominance in landholding to an abrupt end. On November 2, 1789, a law was passed to confiscate and auction all Church properties, including monastic properties. This decision, largely unexpected by the public, was a way to

[12]Districts were the initial first-level subdivision of the French departments created after the Revolution. They were replaced by the *arrondissements* in 1800. Districts were more numerous than *arrondissements* (534 districts in 1790 for 364 *arrondissements* circa 1850). They were therefore smaller on average.

pay off the debts accumulated by the monarchy.[13] This historical event, known as the *Vente des Biens Nationaux* (the Sale of National Properties), saw 6% of French land and more than 170,000 buildings passing from Church to secular ownership via auction; more than 700,000 Church properties were sold. According to Lecarpentier (1908, author's translation p. 4), this was "the most important event of the Revolution".

The large reallocation of the *Vente des Biens Nationaux* enabled rich farmers and bourgeois to create large agricultural exploitations by merging their lands with those confiscated from the Church and monasteries. As underlined by Tocqueville (1967, author's translation p. 89), most of the lands "were purchased by people who already owned other lands; so that, if the property changed hands, the number of owners increased much less than one might imagine."[14] This observation has been confirmed by the detailed historical analysis of Bodinier and Teyssier (2000). In most of the districts, a small number of rich farmers and bourgeois acquired most of the land. For example, in the district of Bernay, 27 members of the grand bourgeoisie bought 39% of the Church land while representing only 4% of the buyers. Small-scale peasant farmers, on the other hand, lacked the funds to compete at auction against the wealthy bourgeois and large landholders.[15]

The *Vente des Biens Nationaux* thus also increased land inequality. We can see this in the evolution of farm-size distribution in the Artois region before and after the Revolution. A case study by Jessenne (1987) shows that the *Vente des Biens Nationaux* corresponded to an increase in the right-tail of the farm size distribution (Figure A-1 in Appendix). Notably, small agricultural holdings (between 5 and 9 hectares) completely disappear.[16]

[13] The *Vente des Biens Nationaux* is closely linked to the creation of bonds backed on the confiscated property, called *assignats*. In 1791, these bonds became a fiat currency, before collapsing due to hyperinflation. The *assignat* was finally abolished in 1797.

[14] This view is also defended notably by Lecarpentier (1908), Marion (1908) and Jaurès (1924).

[15] Another reason was that buyers had to travel to the district or *département* administrative capital to bid. Their relatively high transport costs were another friction faced by small landowners Bodinier and Teyssier (2000, p.228).

[16] Unfortunately, this study does not provide the evolution of the smallest agricultural exploitations – i.e. below 5 hectares. However, as explained in this section, there is a good chance that very small farms remained unchanged after the *Vente des Biens Nationaux* because: (i) they were not confiscated and (ii) poor landowners were not able

Figure 2: Land Consolidation and the *Vente des Biens Nationaux* in the village of Athis-Mons

Notes: This figure shows the changes in Alexandre Le Bourlier d'Orgeval's parcels before and after the French Revolution (Moriceau, 2002). His pre-Revolution landholdings are represented in blue and green, while his land acquisition through the *Vente des Biens Nationaux* is represented in red.

Figure 2, compares the land held by Alexandre Le Bourlier d'Orgeval, the largest landowner in Athis-Mons, before and after the French Revolution. The pre-Revolution landholdings are

to acquire land through the auctions.

shown in blue and green, and the land acquired through the *Vente des Biens Nationaux* is in red. The *Vente des Biens Nationaux* enabled this pre-Revolution landowner to add almost 50 hectares – a 30% increase – from the Cistercian abbey of Vaux-de-Cernay to his already sizeable estate.[17]

3 Data and Empirical Framework

In my empirical analysis, I combine various datasets at the *arrondissement* level. An *arrondissement* is the first-level subdivision of French *départements*.[18] The *arrondissements* were created in 1800 and replaced the *districts* initially created after the Revolution. Importantly, the number and boundaries of the *arrondissements* was stable during the 19th century. There were 364 *arrondissements* at the time of our analysis (circa 1850), of which 354 are in our main sample.[19] The average size of an *arrondissement* in our study was 1,435 square kilometers, with a standard deviation of 573.

I begin by presenting my main explanatory variable, monastic income exposure, as a proxy for monastic land reallocation at the *arrondissement* level. Then, I present my main estimating equation and discuss my identification strategy.

3.1 Monastic Income Exposure and Monastic Lands

My main explanatory variable is monastic income exposure in 1768 at the *arrondissement* level. I use it as a proxy for the importance of monastic landholdings in a given *arrondissement* at the time of the Revolution. Ideally, I would like to have information on the size and location of each parcel belonging to a monastery at the time of the Revolution to study the effect of land reallocation. Unfortunately, such data is scarce and only available for certain monasteries.

[17] The abbey of Vaux-de-Cernay is located 34 kilometeres away from Athis-Mons.

[18] The *départements* correspond to the NUTS3 units.

[19] The 10 missing *arrondissements* are due either to missing data from the monastic income side (the 6 Corsican *arrondissements*) or from the *Enquête Agricole* side (Bourganeuf, Béziers, Grasse and Paris).

Monastic income exposure combines data on the annual income and location of monasteries in 1768 from three sources: the *France Ecclésiastique*, the *Almanach Royal* and Lecestre (1902); see Appendix C for a complete discussion and details about monastic income data. Monastic income exposure is defined as follows:

$$Monastic\ Income\ Exposure_a = \sum_m \frac{1/d_{a,m}}{\sum_m 1/d_{a,m}} \cdot I_m \ , \tag{1}$$

with $d_{a,m}$ the kilometric distance between the centroid of *arrondissement* a and the location of monastery m, and I_m the annual income of monastery m. In this form, the monastic income exposure of *arrondissement* a is a weighted average of all monastic incomes, with weights corresponding to relative inverse distance.[20]

My measure of monastic income exposure exploits two facts about monastic landholding patterns to proxy the extent of land owned by monasteries in each *arrondissement*. First, the probability of an *arrondissement* hosting the land of a given monastery decreases with distance. Historians have pointed to the decreasing concentration of monastic properties further from the cloister (Bodinier and Teyssier, 2000; Goudot, 2006; Wilkin, 2011).[21] This is captured in (1), as monastic income exposure of a given *arrondissement* decreases with an increase in distance from a monastery ($\partial MIE_a/\partial d_{a,m} < 0$). Most monasteries were founded and endowed by the local nobility, meaning that most of the monastery's land was located in neighbouring *arrondissements*.[22] Second, the amount of land owned by a monastery in an *arrondissement* increases with monastic income. This is because monasteries were powerful landowners and derived a substantial part of their income from agriculture (see Section 2.2). This is also cap-

[20] This ensures that each monastery's income is distributed at 100% across *arrondissements*. In spirit, this is close to computing a spatially lagged variable with inverse distance and row-standardized weights, an approach widely used in the spatial econometrics literature (Anselin, 2001).

[21] The cloister is the main monastic building where the monks live.

[22] Nevertheless, famous monasteries received donations coming from hundreds of kilometres away. For example, the abbey of Marmoutier, one of the oldest and most famous Benedictine abbeys, had about 200 priories in the 17th century that located in 29 different *départements* (Carré de Busserolle, 1882, p. 181-191). Abbey of Marmoutier even had 5 priories located in England.

tured in (1) as the monastic income exposure of a given *arrondissement* increases with respect to monastic income ($\partial MIE_a/\partial I_m > 0$).

To validate my proxy of monastic landholdings, I perform two empirical exercises using additional historical data, one at the monastery level and one at the *arrondissement* level. In the first cross-checking exercise, I explicitly test the link between monastic income and the amount of land owned by monasteries in 1789 at the monastery level. To do so, I use data compiled by Bodinier (1988) on the number, size and type of properties owned by French monasteries in the Eure or Seine-Maritime *département* (NUTS3 level) on the eve of the Revolution.[23] From this dataset, I can calculate the number of hectares of agricultural land, woods, vineyards or wasteland owned by 45 monasteries located in the two *départements*, along with information on other economic assets such as mills, houses, markets, justice courts, and chapels.

Table D-1 in the Appendix examines the relationship between monastic income in 1768 and hectares of agricultural land owned by monasteries in 1789. Across all specifications, hectares of agricultural land appears to be a strong and robust predictor of monastic income. Hectares of agricultural land held explains half of the variation in monastic income in the bivariate regression, whereas other types of properties, such as mills, houses or barns, have little or no predictive power with respect to monastic income. This relationship also holds when considering the number of farms rather than hectares of agricultural land owned by monasteries in 1789 (Table D-2).

The second cross-check is a direct test of the ability of monastic income exposure to capture monastic landholdings at the *arrondissement* level. I use data collected by Bodinier and Teyssier (2000) on the percentage of Church land redistributed in French districts through the *Vente des Biens Nationaux*. These data are available for only 40% of the French *arrondissements* referenced in my main analysis. As established in Section 2.2, monasteries were large landowners, accounting, on average, for 60% of Church land in the various districts (Bodinier and Teyssier,

[23] I warmly thank Bernard Bodinier for having shared his data with me. The data come from his doctoral thesis and his personal notes for the Seine-Maritime *département*.

2000), and so I expect a large and positive relationship between the two variables.

I use bivariate regressions of the percentage of Church land redistributed in 1789 on monastic income exposure with different distance cutoffs to calibrate my inverse distance weights in (1). As shown in Appendix Table D-3, the fit between the percentage of Church land redistributed in 1789 and monastic income exposure is maximized for a distance cutoff of 100km.[24] This means that monastic income exposure explains half of the variation in the percentage of Church land redistributed in 1789 (column 5). Figure 3 depicts that strong bivariate relationship. The worst fit, shown in column 1, is when monastic income exposure is defined as the sum of monastic income at the *arrondissement* level ($MIE_a = \sum_{m \in a} I_m$), that is, ignoring spatial spillovers. In that case, monastic income exposure explains only 16% of the variation in the percentage of Church land redistributed in 1789.

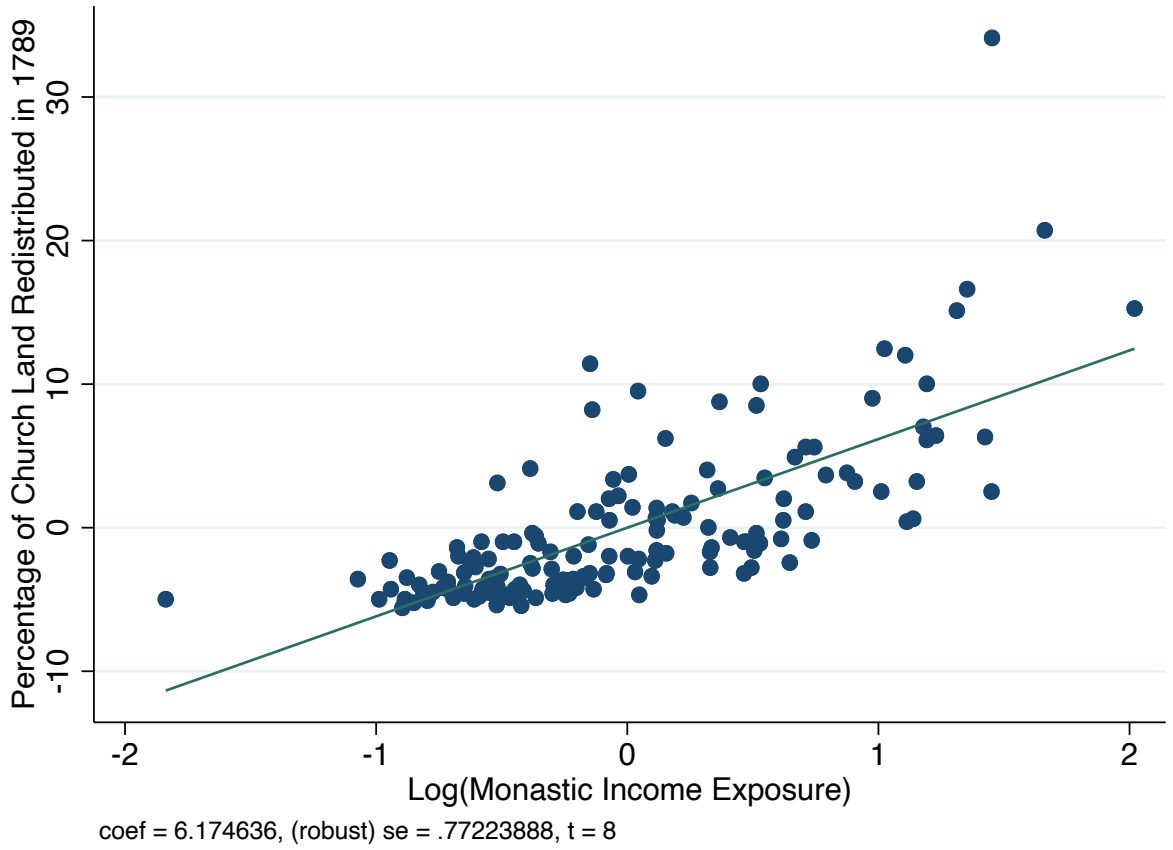
Figure 4 shows monastic income exposure for each *arrondissement* by decile. My proxy of monastic landholdings is consistent with Bodinier and Teyssier (2000, p.335), who note that Church properties were concentrated in the North-Eastern France (Brittany excluded) and, in particular, above a line from Nantes to Belfort. Significant variations within each region are accurately depicted.

I then verify whether monastic income exposure can explain the percentage of Church land redistributed in 1789 in the presence of confounding variables. For instance, *arrondissements* with fertile land for agriculture could have given more land to the Church and hosted richer monasteries. This is an endogenity issue that I address in the next section.

As set out in Table D-4 in the Appendix, monastic income exposure remains the best predictor of the percentage of Church land redistributed in 1789 across all the specifications. In particular, the correlation between monastic income exposure and the percentage of Church land redistributed in 1789 stays positive and highly significant, controlling for the agricultural potential of the land, ruggedness, urbanization, distance to bishoprics, and region fixed effects.

[24] In the rest of the paper, I will use the term monastic income exposure to designate monastic income exposure computed with (1) and a 100km cutoff.

Figure 3: Correlation between the percentage of Church Land Redistributed during the *Vente des Biens Nationaux* and Monastic Income Exposure



Notes: This figure plots the relationship between the percentage of Church land reallocated through the *Vente des Biens Nationaux* and log monastic income exposure in 1768. Residuals and coefficient estimates from Table D-3, column 5.

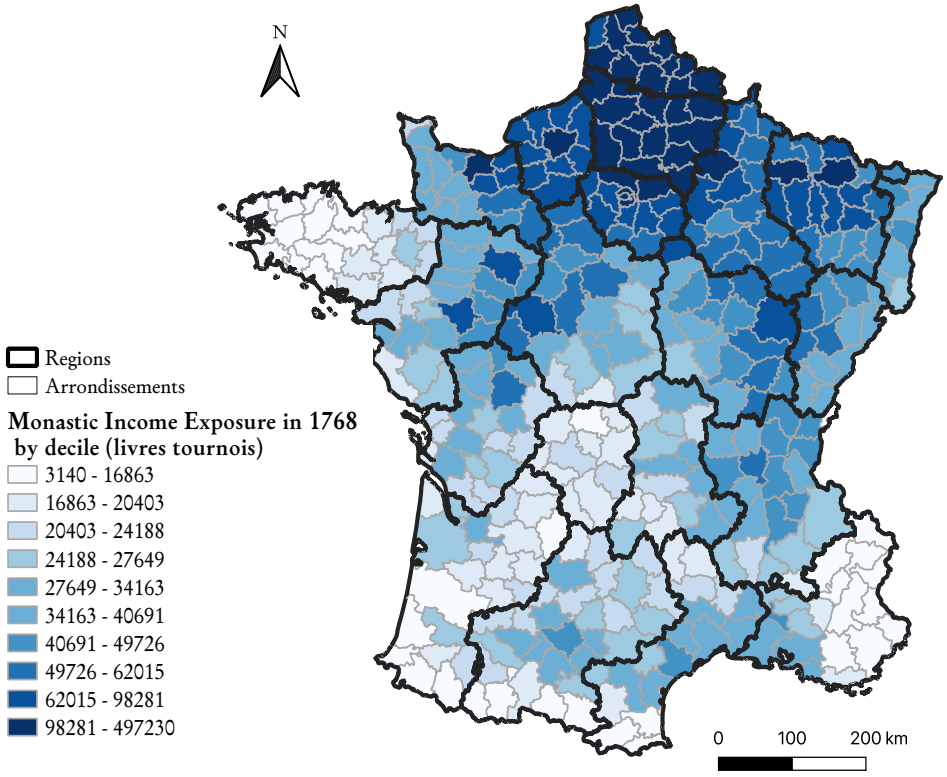
Figure A-2 shows that the relationship identified in column 6 is not influenced by outliers.

3.2 Estimation Framework

My main specification estimates the cross-sectional relationship between monastic land reallocation triggered by the French Revolution and agricultural productivity in the mid-19th century.

I estimate an ordinary least squares (OLS) specification:

Figure 4: Spatial Distribution of Monastic Income Exposure



Notes: This figure plots monastic income exposure in 1768 by decile. See text for more informations on the construction of monastic income exposure.

$$Y_{a,1850} = \beta \cdot Monastic\ Income\ Exposure_{a,1768} + \gamma' \mathbf{X_a} + \alpha_r + \varepsilon_a \ , \tag{2}$$

where $a = 1, ..., N$ represents an *arrondissement*, and the dependent variable, Y, represents agricultural productivity, typically measured circa 1850. The right-hand side is composed of our variable of interest – monastic income exposure in year 1768 – proxying Revolution-era land reallocation, a vector of control variables $\mathbf{X_{a,t}}$, region fixed effects α_r, and an idiosyncratic error term ε_a. Throughout my analysis, I report robust standard errors for regression coefficients,

clustered at the *département* level. I address potential spatial correlation issues by systematically reporting Conley (1999) standard errors. In particular, I use a bandwidth of 100km together with a Bartlett kernel. Typically, I find that Conley standard errors do not differ significantly from the standard errors clustered at the *département* level.

The main concern is the potential endogenity of monastic income exposure; that is, rich monasteries may be located in places that were inherently more favorable to economic development. For instance, *arrondissements* with land that is suited for agriculture could be more productive and host richer monasteries. To address this I use several control variables to capture development differences prior to 1789. First, I explicitly take account of differences between *arrondissements* in the initial suitability of their land for agriculture using the Caloric Suitability Index of Galor and Özak (2016).

I then control for the ruggedness of the terrain using elevation data from CGIAR-CSI SRTM (Jarvis et al., 2008). Terrain ruggedness captures a broad range of factors affecting economic development, for example, transportation and trade. Importantly for my analysis, irregular terrain is difficult to farm, making land fragmentation more likely and directly impacting agricultural productivity. Third, I control for pre-revolutionary differences in economic development using urban population levels in 1750 from Buringh (2021). Fourth, in my preferred specification I include 21 region fixed effects, identifying the effect of land reallocation using the within-region variation. The 21 regions correspond to administrative boundaries prevailing before the 2015 reform; they are closer to Pre-Revolutionary French provincial boundaries.[25] Finally, I test the robustness of my main results to several other potential confounders, including market potential, confiscation of land owned by *émigrés*, upper-tail human capital, literacy and religiosity.

[25]For example, Lorraine, Alsace and Champagne are now part of the same region, whereas before 2015 they were three separate regions that corresponded more closely to the provinces before the Revolution.

4 Main Results

In presenting my main results, I first focus on the effect of land reallocation on agricultural productivity. I then test the robustness of my main results to other potential confounders and to outliers.

4.1 The Effect of Land Reallocation on Agricultural Productivity

In Table 1, I report the estimations for specification (2) using OLS. The three dependent variables used to measure agricultural productivity are wheat yields (columns 1-3), the average days required to farm one hectare of wheat (columns 4-6), and the daily agricultural wage (columns 7-9). I present the bivariate relationship for each dependent variable in columns 1,4 and 7 and then include my main control variables (columns 2, 5 and 8). Finally, I add region fixed effects to isolate the effect of land reallocation using the within-region variation (columns 3, 6 and 9).

The results show that *arrondissements* in which there was more extensive land reallocation, as proxied by monastic income exposure in 1768, experienced higher levels of agricultural productivity in 1852. The relationship remains valid across all specifications, regardless of the measure of agricultural productivity, and is economically significant. For instance, column 3 suggests that a doubling of the monastic income exposure is associated with an 8% increase in wheat yields, conditional on my main controls and region fixed effects.[26] I find similar effects using alternative measures of agricultural productivity. Columns 6 and 9 suggest that a doubling in monastic income exposure leads to a 7% decrease in the average number of days required to farm one hectare of wheat and a 6% increase in the daily agricultural wage, conditional on my main controls and region fixed effects. The magnitude of the effect is in line with Finley et al. (2021).

These results, taken together, are consistent with better land allocation among farmers fol-

[26] A doubling in monastic income exposure corresponds to a one-standard-deviation (5.76) increase in the percentage of Church land redistributed in 1789. See column 5 in Table D-4.

Table 1: The Effect of Monastic Land Reallocation on Agricultural Productivity

Dependent variable:	log(Wheat yields)			log(Days per hectare of wheat)			log(Agricultural wage)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(Monastic Income Exposure)	0.26	0.24	0.11	-0.14	-0.15	-0.10	0.15	0.18	0.09
	(0.029)***	(0.025)***	(0.044)**	(0.039)***	(0.037)***	(0.038)***	(0.055)***	(0.057)***	(0.040)**
	[0.030]***	[0.027]***	[0.040]**	[0.038]***	[0.037]***	[0.036]***	[0.058]***	[0.059]***	[0.036]**
Caloric suitability	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Ruggedness	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Urban population in 1750	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Region fixed effects	No	No	Yes	No	No	Yes	No	No	Yes
Observations	354	354	354	354	354	354	354	354	354
Adjusted R^2	0.41	0.49	0.58	0.17	0.20	0.47	0.12	0.16	0.69

Notes: This table presents OLS estimates of the effect of monastic land reallocation, proxied by monastic income exposure in 1768, on agricultural productivity in 1852 at the *arrondissement* level. I use three different measures of agricultural productivity as dependent variable: wheat yields (columns 1-3), the average number of days required to farm one hectare of wheat (columns 4-6) and daily agricultural wage (columns 7-9). See Section B of the Appendix for more details on the variables used. For each dependent variable, I first display the bivariate relationship in the first column, then I include my main set of controls (caloric suitability of the land, ruggedness and urban population levels in 1750) and finally I add region fixed effects. Standard errors clustered at the *département* level are in parentheses and Conley (1999) standard errors, with a Bartlett kernel and a cut-off distance of 100km, in brackets. * p<0.1, ** p<0.05, *** p<0.01.

lowing the *Vente des Biens Nationaux* and thus with an increase in agricultural productivity.

4.2 Robustness

In this section, I present the results of various robustness checks. Each column of Table 2 introduces the additional control variable specified at the top of that column to the main control variables and region fixed effects. The results for the dependent variables referenced in Table 1, namely wheat yields, labor days to farm one hectare of wheat, and daily agricultural wage, are set out in rows 1–3, respectively.

My main concern in this analysis is the endogeneity of monastic income and, in particular, the possibility that an omitted factor determines agricultural productivity and monastic income simultaneously before and after the Revolution. In columns 1 and 2, this issue is addressed using two different measures of economic development at the time of the French Revolution. First, market potential, by representing the potential demand for agricultural products, can influence both monastic income and farmers' incentives to supply agricultural products efficiently. I tackle this issue by constructing a measure of the market potential of each *arrondissement* at the time of the Revolution. In 1794, at the time of the French Revolution, there was a comprehensive census which captured data on the French population and the size of French municipalities. This is a powerful measure of economic development and I use it as a control in column 1.[27] This is a powerful measure of economic development since it is a comprehensive assessment of the size of French municipalities at the time of the French Revolution; it is included as a control in column 1. In column 2, I introduce an alternative measure of the level of economic development in 1789. Using data from Daudin (2010) and following Franck and Galor (2022), I proxy early market integration by computing the number of firms that sold their products

[27] I define market potential for *arrondissement* a as the distance-weighted sum of the population of all French cities: $MP_a = [\sum_j 1/d_{ac} \cdot Pop_c]$, where Pop_c is the population of city c in 1794 and d_{ac} is the kilometric distance between the centroid of *arrondissement* a and city c. I consider as a city all municipalities with 1,000 or more inhabitants in 1794. When population is not available for year 1794, I use information of the next census of 1800. This is the case for only 2.3% of French municipalities.

Table 2: Robustness Checks

Added control:	Market Potential in 1794	Market Integration in 1790s	Urban Population in 700	% *Emigré*	Literacy in 1786	Subs. Density	% Refractory Priests	Banks in 1850	Distance to Paris	Distance to Bishoprics
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Wheat Yields	0.15	0.11	0.10	0.12	0.13	0.11	0.13	0.11	0.11	0.11
	(0.041)***	(0.044)**	(0.045)**	(0.039)***	(0.045)***	(0.044)**	(0.047)***	(0.044)**	(0.044)**	(0.044)**
	[0.037]***	[0.040]**	[0.041]**	[0.035]***	[0.040]***	[0.041]**	[0.042]***	[0.040]**	[0.040]**	[0.040]**
Days per hect.	-0.11	-0.10	-0.11	-0.10	-0.08	-0.10	-0.11	-0.10	-0.08	-0.10
	(0.039)***	(0.038)**	(0.039)***	(0.038)***	(0.033)**	(0.038)**	(0.040)**	(0.038)***	(0.038)**	(0.039)**
	[0.038]***	[0.036]**	[0.036]***	[0.036]***	[0.032]**	[0.035]**	[0.038]**	[0.036]***	[0.035]**	0.036]**
Agricultural Wage	0.05	0.08	0.08	0.09	0.10	0.08	0.08	0.08	0.05	0.09
	(0.046)	(0.039)**	(0.041)**	(0.040)**	(0.039)**	(0.039)**	(0.041)**	(0.040)*	(0.038)	(0.040)**
	[0.042]	[0.035]**	[0.037]**	[0.036]**	[0.035]**	[0.036]**	[0.036]**	[0.037]*	[0.035]	[0.036]**
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	354	354	354	354	333	354	345	354	354	354

Notes: This table presents OLS estimates of the effect of monastic land reallocation, proxied by monastic income exposure in 1768, agricultural productivity in 1852 at the *arrondissement level*. In each column, I test the sensitivity of my results to an additional control variable that is specified in the column header. See Section B of the Appendix for more details on the variables used. I use the same three dependent variables as in Table 1 to measure agricultural productivity. Each column controls for the caloric suitability of the land, ruggedness, urban population levels in 1750 and region fixed effects. Standard errors clustered at the *département* level are in parentheses and Conley (1999) standard errors, with a Bartlett kernel and a cut-off distance of 100km, in brackets. * p<0.1, ** p<0.05, *** p<0.01.

outside of their home *arrondissements* in the 1790s. As reflected in columns 1 and 2, my main results are robust to the inclusion of these two potential confounders.

Another related concern is the endogeneity of monastic locations. It is possible that early monasteries targeted locations with higher levels of development to attract more donations coming from rich patrons. In column 3, I control for urban population levels in year 700; this is the year of the earliest population figure available for France using the data from Buringh (2021).[28] My main results remain unchanged, alleviating the selection concern. In Appendix Table E-1 and E-2, I verify further the robustness of my results to that potential issue, controlling for urban population in years 800, 900, 1000 and 1100. I obtain similar results.

I also consider that the French Revolution not only confiscated and auctioned Church properties, but also *émigrés* properties. *Emigrés* were supporters of the former regime, mostly aristocrats and churchmen, who fled France at the time of the Revolution (Greer, 1951; Franck and Michalopoulos, 2017). Consequently, there is a possibility that my results are influenced by differences in the reallocation of *émigrés* land. I mitigate that concern by controlling for the share of *émigrés* in the population at the *département* level, using data from Greer (1951), as set out in column 4. My main results are unaffected.

In columns 5 and 6, I account for the possibility that my results are driven by differences in levels of human capital before the Revolution. First, upper-tail human capital, as captured by the density of *Encyclopédie* subscribers, might have affected the adoption of agricultural innovations and, as a result, agricultural productivity (Squicciarini and Voigtländer, 2015). Another possibility is that initial literacy levels were a determining factor in the adoption of agricultural innovations after the Revolution; in both cases, my main results are unaffected.

I consider the possibility of a connection between the concentration of monasteries in certain places and religiosity. This might have pushed *arrondissements* to specialize in the agricultural

[28]The year 700 also corresponds to a period when relatively few monasteries were present in France. It is before the appearance of crucial monastic reforms which will lead to the foundation of the majority of French monasteries, such as the order of Cluny (910), the Cistercians (1098) or the Premonstratensians (1120).

sector by hindering the diffusion of knowledge and innovation in other sectors. To assess that possibility, I follow Squicciarini (2020) and include as a control variable the share of refractory priests in 1791. Refractory priests were priests who refused to swear the oath of allegiance to the Civil Constitution of the newly formed French Republic. This expression of loyalty to the Catholic Church is a proxy for religiosity at the local level (Tackett, 1986). As column 7 reveals, my main results are unaffected by religiosity.

As established in Section 2.1, the diffusion of agricultural machines during the first-half of the 19th century was slow due to their cost. Consequently, access to financial services and especially credit could affect my results. To test the potential influence of financial development, I control for the number of banks operating in each *arrondissement* between 1800 and 1851; my results, shown in column 8, are relatively unaffected.

Next, I investigate whether my main results are affected by the distance of each *arrondissement* to Paris and to bishoprics in 1789. First, as noted by Tocqueville (1967), the administrative and economic dominance of Paris in relation to the rest of the country was evident as early as the 17th century. Proximity to the French capital may have simultaneously affected economic development and monastic income exposure. Second, during the *Vente des Biens Nationaux* all types of Church property were confiscated and auctioned. Even though monastic land represented the majority of confiscated properties (see Section 2.2), my results may have been influenced by the confiscation of the property of other religious institutions such as bishoprics and archbishoprics. I find that my main results are robust to the distance to Paris (column 9) and to bishoprics and archbishoprics (column 10).

Appendix E contains my additional robustness checks. First, I test the robustness of my results to the inclusion of other meaningful geographical distances capturing potential diffusion of technologies or trade opprotunities. In Table E-3, I establish that the distance to London, Fresnes-sur-Escaut and major French harbors (Rouen, Nantes, Bordeaux and Marseilles) are not confounding my main results. I then check whether my results are driven by extreme ob-

servations by rerunning my analysis and trimming the top and bottom 5% of monastic income exposure. Table E-4 shows that my main results are stable.

As an additional endogeneity test, I verify whether *arrondissements* with higher levels of monastic income exposure were on specific trends before the Revolution. My concern is that, despite the rich set of control variables employed in the main analysis, *arrondissements* with higher monastic income exposure systematically differed in key characteristics affecting economic development and were already growing faster before the Revolution i.e. that they were on a different trend than their counterparts. The only data available to assess this possibility is urban population data from Buringh (2021).

Table 3 presents regressions of rates of urban population growth in different periods on monastic income exposure in 1768. I find no systematic relationship between monastic income exposure and urban population growth prior to the French Revolution. In all specifications, the effect of monastic income exposure on urban population growth is small and not statistically significant. This is clear evidence that *arrondissements* with higher monastic income exposure were on the same general economic development path up to two centuries before the French Revolution. In particular, results in column 1 show that there is no statistically significant effect of monastic income exposure on urban population growth fifty years before the Revolution; if any, the effect seems to be small and negative.

Table 3: Monastic Income Exposure and Trends before the French Revolution

Dep. var.: Urb. Pop. Growth	1750-1800 (1)	1700-1800 (2)	1600-1800 (3)	1700-1750 (4)	1600-1750 (5)
log(Monastic Income Exposure)	-0.03	-0.00	0.00	0.02	0.07
	(0.043)	(0.067)	(0.104)	(0.054)	(0.094)
Controls	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	229	229	228	229	228
Adjusted R^2	0.12	0.15	0.10	0.06	0.04

Notes: This table presents OLS estimates of the effect of monastic income exposure in 1768 on urban population growth at the *arrondissement* level. The dependent variables are percent changes in urban population at the date specified in the column header. Each column controls for the caloric suitability of the land, ruggedness, initial urban population levels and region fixed effects. Standard errors clustered at the *département* level are in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

5 Mechanisms

I have shown that the reallocation of monastic land improved agricultural productivity. Here, I investigate mechanisms that could link land reallocation to productivity gains in agriculture. First, I examine how the reallocation of monastic land affected land inequality and land consolidation. In a second exercise, I study how this reallocation affected physical capital investments and labor force organization.

5.1 Land Inequality and Land Consolidation

The *Vente des Biens Nationaux* made it possible for rich peasants and bourgeois to increase their landholdings, exacerbating land inequality. There is no consistent data measuring land inequality and land fragmentation in the *Enquête Agricole* of 1852. The first consistent data on land inequality is available from the *Enquête Agricole* of 1862, and at the *département* rather than *arrondissement* level. From this, I compute the average farm size to gauge land inequality in the mid-19th century. As an additional variable to measure land inequality I calculate the share of large landowners in each *arrondissement*, using data from the *Enquête Agricole* of 1852. I measure land fragmentation using data from Legoyt (1843) to compute the average number

of parcels per owner at the *département* level. Even at the *département* level, the data can be useful for detecting fragmentation and persistent differences in landholdings patterns.

Table 4 reports regressions of monastic income exposure, a proxy for land reallocation, on the percentage of large landowners (columns 1-3), average farm size (columns 4-6) and the number of parcels per owner (columns 7-9). The results show that, on average, *arrondissements* with higher land reallocation had a larger proportion of large landowners and larger farms. In particular, column 3 shows that a doubling in monastic income exposure leads to a 4pp increase in the share of large landowners (30% of a standard deviation), conditional on my main controls and region fixed effects. I do not find a statistically significant effect of land reallocation on the average farm size, shown in column 6. It may be that when region fixed effects are included, there is insufficient within-region variation remaining to estimate the effect. This is plausible as farm size data are available at the *département* level, one NUTS level higher than *arrondissements*.[29] Reassuringly, the effect of land reallocation on farm size is positive and highly significant when I remove region fixed effects in column 5. The estimated effect is economically important; the results in column 5 predict that a doubling in monastic income exposure is associated with a 1.83-hectare increase in the average farm size in 1862 (36% of a standard deviation), conditional on caloric suitability of the land, ruggedness and urban population levels in 1750.

The results also indicate that *arrondissements* with higher land reallocation had less fragmented agricultural exploitations, as measured by the number of parcels per owner in 1843 (columns 7-9). Specifically, column 9 indicates that land reallocation has an economically large and statistically significant negative effect on land fragmentation. Indeed, a doubling in monastic income exposure lowers the number of parcels per owner by 1 (29% of a standard deviation).

Overall, I identify a consistent pattern indicating that the reallocation of monastic land following the French Revolution triggered an increase in land inequality and a decrease in land

[29] In my sample, I have farm size data for 85 *départements*.

fragmentation.

5.2 Capital Investment

Galor and Moav (2004) argue that inequality is conducive to economic development when the prime engine of growth is physical capital accumulation. The logic is that, at early stages of development, inequality channels resources towards individuals with a higher propensity to save, fostering investment and capital accumulation. Therefore, a plausible mechanism by which agricultural productivity could have improved is higher investment in physical capital and, in particular, mechanization.

To measure investments in physical capital in the agricultural sector, I take the number of scarifiers and extirpators reported in the *Enquête Agricole* of 1852. These plowing machines were used to prepare the soil for more successful cropping by breaking up clods of earth, removing roots and weeds, and digging in manure and straw. They existed during the 18th century but diffused more broadly only after the Revolution: "The use of the extirpator in France is not very old, and its use is far from being as widespread as it should be" (Bixio, 1844, author's translation p. 200). A possible explanation for the slow diffusion of these machines was their high price.[30] Only landowners that were sufficiently large could acquire such expensive physical capital.

In Table 5, I examine the relationship between land reallocation and investment in physical capital. As shown in column 1, there is a positive and highly significant unconditional relationship between land reallocation and physical capital, as measured by the number of scarifiers and extripartors in 1852. This effect is robust across the different specifications. In particular, column 3 reveals a sizeable effect. The point estimates suggests that a doubling in monastic income exposure leads to a 52% increase in the number of scarifiers and extirpators.

[30] About one hundred francs (Bixio, 1844). In comparison, the average French agricultural laborer was earning about 175 frances a year (based on the average daily wage and average working days of male agricultural laborers reported in the *Enquête Agricole* of 1852.)

Table 4: The Effect of Monastic Land Reallocation on Land Inequality and Land Fragmentation

Dependent variable:	% Large landowners			Farm size			Parcels per owner		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(Monastic Income Exposure)	0.16	0.12	0.06	3.38	2.65	-0.39	-1.78	-1.77	-1.45
	(0.015)***	(0.018)***	(0.027)**	(0.756)***	(0.901)***	(0.905)	(0.534)***	(0.527)***	(0.599)**
	[0.017]***	[0.019]***	[0.025]**	[0.623]***	[0.759]***	[0.720]	[0.490]***	[0.493]***	[0.548]**
Caloric suitability	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Ruggedness	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Urban population in 1750	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Region fixed effects	No	No	Yes	No	No	Yes	No	No	Yes
Observations	354	354	354	354	354	354	354	354	354
Adjusted R^2	0.40	0.52	0.60	0.22	0.30	0.68	0.13	0.15	0.56

Notes: This table presents OLS estimates of the effect of monastic land reallocation, proxied by monastic income exposure in 1768, on land inequality and land fragmentation in the mid-19th century at the *arrondissement* level. I use the share of large landowners in 1852 (columns 1-3), the average size of an agricultural exploitation in 1862 (columns 4-6) and the number of parcels per owner in 1843 (columns 7-9) as dependent variables. See Section B of the Appendix for more details on the variables used. For each dependent variable, I first display the bivariate relationship in the first column, then I include my main set of controls (caloric suitability of the land, ruggedness and urban population levels in 1750) and finally I add region fixed effects. Standard errors clustered at the *département* level are in parentheses and Conley (1999) standard errors, with a Bartlett kernel and a cut-off distance of 100km, in brackets. * p<0.1, ** p<0.05, *** p<0.01.

Table 5: The Effect of Monastic Land Reallocation on Mechanization

Dependent variable:	log(Scarifiers and extirpators)		
	(1)	(2)	(3)
log(Monastic Income Exposure)	0.98	0.77	0.76
	(0.184)***	(0.206)***	(0.364)**
	[0.201]***	[0.228]***	[0.295]**
Caloric suitability	No	Yes	Yes
Ruggedness	No	Yes	Yes
Urban population in 1750	No	Yes	Yes
Region fixed effects	No	No	Yes
Observations	354	354	354
Adjusted R^2	0.09	0.12	0.21

Notes: This table presents OLS estimates of the effect of monastic land reallocation, proxied by monastic income exposure in 1768, on mechanization in 1852 at the *arrondissement* level. I use the number of scarifiers and extirpators as dependent variable. See Section B of the Appendix for more details on the variables used. I first display the bivariate relationship in the first column, then I include my main set of controls (caloric suitability of the land, ruggedness and urban population levels in 1750) and finally I add region fixed effects. Standard errors clustered at the *département* level are in parentheses and Conley (1999) standard errors, with a Bartlett kernel and a cut-off distance of 100km, in brackets. * p<0.1, ** p<0.05, *** p<0.01.

Only some types of cropping could be improved through mechanization. I investigate the importance of investment in physical capital, and therefore mechanization, for increasing agricultural productivity through a placebo test using vineyard yields. As wine production requires relatively less intensive use of physical capital than producing cereals, I expect that productivity gains were less marked for vineyards than for wheat fields.

Table 6 compares the effect of land reallocation on vineyards yields (columns 1-3) and wheat yields (columns 4-6). Columns 1 and 2 reveal a positive effect of land reallocation on vineyard yields. However, the effect is no longer significant when I add region fixed effects in column 3. By contrast, the effect of land reallocation on wheat yields is positive and highly significant across all specifications (columns 4-6). This suggests that part of the effect of land reallocation on agricultural productivity is indeed the result of investment in physical capital.

Table 6: The Effect of Monastic Land Reallocation on Productivity: Wine vs. Wheat

Dependent variable:	log(Vineyards yields)			log(Wheat yields)		
	(1)	(2)	(3)	(4)	(5)	(6)
log(Monastic Income Exposure)	0.36	0.36	0.15	0.27	0.27	0.14
	(0.048)***	(0.058)***	(0.101)	(0.035)***	(0.033)***	(0.051)***
	[0.058]***	[0.061]***	[0.106]	[0.043]***	[0.038]***	[0.047]***
Caloric suitability	No	Yes	Yes	No	Yes	Yes
Ruggedness	No	Yes	Yes	No	Yes	Yes
Urban population in 1750	No	Yes	Yes	No	Yes	Yes
Region fixed effects	No	No	Yes	No	No	Yes
Observations	279	279	279	279	279	279
Adjusted R^2	0.21	0.22	0.30	0.37	0.41	0.53

Notes: This table presents OLS estimates of the effect of monastic land reallocation, proxied by monastic income exposure in 1768, on wine and wheat yields in 1852 at the *arrondissement* level. I use two different dependent variables: wine yields (columns 1-3) and wheat yields (columns 4-6). See Section B of the Appendix for more details on the variables used. For each dependent variable, I first display the bivariate relationship in the first column, then I include my main set of controls (caloric suitability of the land, ruggedness and urban population levels in 1750) and finally I add region fixed effects. Standard errors clustered at the *département* level are in parentheses and Conley (1999) standard errors, with a Bartlett kernel and a cut-off distance of 100km, in brackets. * p<0.1, ** p<0.05, *** p<0.01.

5.3 Family Labor

As observed by Allen (1988), the rise of English labor productivity in the 18th century was partly the result of the substitution of family labor with hired, specialized labor. In particular, Allen (1988) notes that the per acre employment of women and children declined faster along farm size than that of men. To capture the gradual replacement of family labor with hired, specialized male workers on larger farms, I calculate the share of labor by women and children required to farm one hectare of wheat from the *Enquête Agricole* of 1852.

Table 7 shows that the effect of land reallocation on family labor is negative. This relationship is robust across all specifications. The results suggest that part of the positive effect of land reallocation on agricultural productivity was channelled through a decrease in family labor, as observed by Allen (1988) for 18th-century England.

Table 7: The Effect of Monastic Land Reallocation on Family Labor

Dependent variable:	% Female and child labor per hectare of wheat		
	(1)	(2)	(3)
log(Monastic Income Exposure)	-0.05	-0.05	-0.04
	(0.015)***	(0.016)***	(0.018)**
	[0.014]***	[0.015]***	[0.017]**
Caloric suitability	No	Yes	Yes
Ruggedness	No	Yes	Yes
Urban population in 1750	No	Yes	Yes
Region fixed effects	No	No	Yes
Observations	354	354	354
Adjusted R^2	0.10	0.12	0.48

Notes: This table presents OLS estimates of the effect of monastic land reallocation, proxied by monastic income exposure in 1768, on family labor in agriculture in 1852 at the *arrondissement* level. I use the share of female and child work required to farm one hectare of wheat as dependent variable. See Section B of the Appendix for more details on the variables used. I first display the bivariate relationship in the first column, then I include my main set of controls (caloric suitability of the land, ruggedness and urban population levels in 1750) and finally I add region fixed effects. Standard errors clustered at the *département* level are in parentheses and Conley (1999) standard errors, with a Bartlett kernel and a cut-off distance of 100km, in brackets. * p<0.1, ** p<0.05, *** p<0.01.

6 Conclusion

Land and labor misallocation is a critical factor contributing to the agricultural productivity gap between rich and poor countries. Yet, we still know little on how today's developed economies overcame this misallocation issue during their development process. This article provides some answers by analyzing the economic consequences of a major historical episode of market-based land reallocation that took place in France during the French Revolution (1790s): the *Vente des Biens Nationaux* (the Sale of National Properties). Through this policy, the state confiscated and auctioned all Church lands, resulting in a massive land reallocation in which about 6% of the national territory was transferred from the Church to some rich bourgeois and farmers, who were able to win most of the auctions.

Using newly collected data on the revenues and locations of more than 1,500 monasteries in 1768, I construct a measure of local exposure to monastic land redistribution to capture the intensity of the reform across *arrondissements*. I find that *arrondissements* with higher exposure to monastic land reallocation experienced significantly higher agricultural productivity in

the mid-nineteenth century. This relationship remains robust to a wide range of controls and fixed effects. I trace these productivity gains to the establishment of larger and less fragmented farms, fostering mechanization and the substitution of family labor with specialized hired workers. These findings suggest that the *Vente des Biens Nationaux* contributed to the emergence of capitalist agriculture in France by improving the allocation of land and labor. Exploring the economic and social consequences of other early modern European land reforms, especially episodes of Church land secularization, offers a promising direction for future research.

References

Adamopoulos, T. and Restuccia, D. (2014). The Size Distribution of Farms and International Productivity Differences. *American Economic Review*, 104(6):1667–1697.

Adamopoulos, T. and Restuccia, D. (2020). Land Reform and Productivity: A Quantitative Analysis with Micro Data. *American Economic Journal: Macroeconomics*, 12(3):1–39.

Allen, R. C. (1988). The Growth of Labor Productivity in Early Modern English Agriculture. *Explorations in Economic History*, 25(2):117–146.

Allen, R. C. (2000). Economic Structure and Agricultural Productivity in Europe, 1300–1800. *European Review of Economic History*, 4(1):1–25.

Anselin, L. (2001). Spatial Econometrics. A Companion to Theoretical Econometrics. *Hoboken NJ: Blackwell Publishing Ltd*.

Bairoch, P. (1988). Dix-huit Décennies de Développement Agricole Français dans une Perspective Internationale. *Économie Rurale*, 184(1):13–23.

Bignon, V. and García-Peñalosa, C. (2021). The Toll of Tariffs: Protectionism, Education and Fertility in Late 19th century France. CEPR Discussion Paper No. DP16069.

Bixio, A. (1844). *Maison Rustique du XIXe siècle*, volume 1. Paris, Librairie Agricole.

Bodinier, B. (1988). *Les Biens Nationaux dans le Département de l'Eure de 1789 à 1827*. PhD thesis, Paris 1.

Bodinier, B. and Teyssier, É. (2000). *L'Événement le plus Important de la Révolution: La Vente des Biens Nationaux (1789-1867) en France et dans les Territoires Annexés*, volume 53. Société des Études Robespierristes.

Brondel, N. (2008). L'Almanach royal, National, Impérial: Quelle Vérité, Quelle Transparence ? (1699-1840). *Bibliothèque de l'École des Chartes*, pages 15–87.

Buringh, E. (2021). The Population of European Cities from 700 to 2000: Social and Economic History. *Research Data Journal for the Humanities and Social Sciences*, 1(aop):1–18.

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

Carré de Busserolle, J.-X. (1882). *Dictionnaire Géographique, Historique et Biographique d'Indre-*

et-Loire et de l'Ancienne Province de Touraine, volume IV. Tours, impr. de Rouillé-Ladevèze.

Cassini and EHESS (2021). Des villages de Cassini aux communes d'aujourd'hui. http://cassini.ehess.fr/fr/html/index.htm.

Cinnirella, F. and Hornung, E. (2016). Landownership Concentration and the Expansion of Education. *Journal of Development Economics*, 121:135–152.

Conley, T. G. (1999). GMM Estimation with Cross Sectional Dependence. *Journal of Econometrics*, 92(1):1–45.

Cornia, G. A. (1985). Farm Size, Land Yields and the Agricultural Production Function: An Analysis for Fifteen Developing Countries. *World Development*, 13(4):513–534.

Daudin, G. (2010). Domestic Trade and Market Size in Late-Eighteenth-Century France. *The Journal of Economic History*, 70(3):716–743.

de la Croix, D. and Perrin, F. (2018). How Far Can Economic Incentives Explain the French Fertility and Education Transition? *European Economic Review*, 108:221–245.

Diebolt, C., Menard, A.-R., and Perrin, F. (2017). Behind the Fertility–Education Nexus: What Triggered the French Development Process? *European Review of Economic History*, 21(4):357–392.

Finley, T., Franck, R., and Johnson, N. D. (2021). The Effects of Land Redistribution: Evidence from the French Revolution. *The Journal of Law and Economics*, 64(2):233–267.

Foster, A. D. and Rosenzweig, M. R. (2011). Are Indian Farms Too Small? Mechanization, Agency Costs, and Farm Efficiency. *Unpublished Manuscript, Brown University and Yale University*.

Foster, A. D. and Rosenzweig, M. R. (2022). Are There Too Many Farms in the World? Labor Market Transaction Costs, Machine Capacities, and Optimal Farm Size. *Journal of Political Economy*, 130(3):636–680.

Franck, R. and Galor, O. (2021). Flowers of Evil? Industrialization and Long Run Development. *Journal of Monetary Economics*, 117:108–128.

Franck, R. and Galor, O. (2022). Technology-Skill Complementarity in Early Phases of Industrialisation. *The Economic Journal*, 132(642):618–643.

Franck, R. and Michalopoulos, S. (2017). Emigration During the French Revolution: Consequences in the Short and Longue Durée. Technical report, National Bureau of Economic

Research.

Furet, F. and Ozouf, J. (1977). *Lire et Écrire: l'Alphabétisation des Français de Calvin à Jules Ferry*. Paris, Éd. de Minuit.

Galor, O. and Moav, O. (2004). From Physical to Human Capital Accumulation: Inequality and the Process of Development. *The Review of Economic Studies*, 71(4):1001–1026.

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

Galor, O., Moav, O., and Vollrath, D. (2009). Inequality in Landownership, the Emergence of Human-Capital Promoting Institutions, and the Great Divergence. *The Review of Economic Studies*, 76(1):143–179.

Galor, O. and Özak, Ö. (2016). The Agricultural Origins of Time Preference. *American Economic Review*, 106(10):3064–3103.

Ghatak, M. and Roy, S. (2007). Land Reform and Agricultural Productivity in India: A Review of the Evidence. *Oxford Review of Economic Policy*, 23(2):251–269.

Gollin, D., Parente, S., and Rogerson, R. (2002). The Role of Agriculture in Development. *American Economic Review*, 92(2):160–164.

Goñi, M. (2022). Landed Elites and Education Provision in England: Evidence from School Boards, 1871-99. *Journal of Economic Growth*, pages 1–47.

Goudot, G. (2006). Monachisme Clunisien et Vie Rurale sous l'Ancien Régime. *Histoire Societes Rurales*, 25(1):9–35.

Grantham, G. W. (1993). Divisions of Labour: Agricultural Productivity and Occupational Specialization in Pre-Industrial France. *The Economic History Review*, 46(3):478–502.

Greer, D. (1951). The Incidence of the Emigration during the French Revolution. *Harvard Historical Monographs*, 24.

Heldring, L., Robinson, J. A., and Vollmer, S. (2021). The Long-Run Impact of the Dissolution of the English Monasteries. *The Quarterly Journal of Economics*, 136(4):2093–2145.

Hoffman, P. T. (2000). *Growth in a Traditional Society: The French Countryside, 1450-1815*. Princeton University Press.

Hoffman, P. T., Postel-Vinay, G., and Rosenthal, J.-L. (2019). Dark Matter Credit. In *Dark*

Matter Credit. Princeton University Press.

Jarvis, A., Reuter, H. I., Nelson, A., Guevara, E., et al. (2008). Hole-Filled SRTM for the Globe Version 4. *available from the CGIAR-CSI SRTM 90m Database (http://srtm. csi. cgiar. org)*, 15(25-54):5.

Jessenne, J.-P. (1987). *Pouvoir au Village et Révolution: Artois 1760-1848*, volume 6. Presses Univ. Septentrion.

Lecarpentier, G. (1908). *La Vente des Biens Ecclésiastiques pendant la Révolution Française*. F. Alcan.

Lecestre, L. (1902). *Abbayes, Prieurés et Couvents d'Hommes en France: Liste Générale d'après les Papiers de la Commission des Réguliers en 1768*. Picard.

Lefebvre, G. (1972). *Les Paysans du Nord pendant la Révolution Française*. Paris, Colin.

Legoyt, A. (1843). *La France Statistique*. Paris, L. Curmer.

Lewis, W. A. (1955). *The Theory of Economic Growth*. London, Allen & Unwin.

Marin, B. and Marraud, M. (2011). L'Enquête Agricole de 1852. *L'Atelier du Centre de Recherches Historiques. Revue Électronique du CRH*.

Mendola, M. and Simtowe, F. (2015). The Welfare Impact of Land Redistribution: Evidence from a Quasi-Experimental Initiative in Malawi. *World Development*, 72:53–69.

Moriceau, J.-M. (2002). *Terres Mouvantes: Les Campagnes Françaises du Féodalisme à la Mondialisation, 1150-1850: Essai Historique*. Fayard.

Newell, W. H. (1973). The Agricultural Revolution in Nineteenth-Century France. *The Journal of Economic History*, 33(4):697–731.

Polanyi, K. (2001). The Great Transformation. *Boston, Beacon Press*.

Restuccia, D. and Rogerson, R. (2013). Misallocation and Productivity. *Review of Economic Dynamics*, 16(1):1–10.

Restuccia, D. and Rogerson, R. (2017). The Causes and Costs of Misallocation. *Journal of Economic Perspectives*, 31(3):151–74.

Rostow, W. W. (1990). *The Stages of Economic Growth: A Non-Communist Manifesto*. Cambridge University Press.

Squicciarini, M. P. (2020). Devotion and Development: Religiosity, Education, and Economic Progress in Nineteenth-Century France. *American Economic Review*, 110(11):3454–3491.

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

Sée, H. (1925). *La France Économique et Sociale au XVIIIeme siècle*. Armand Colin.

Sée, H. (1927). *La Vie Économique de la France sous la Monarchie Censitaire (1815-1848)*. Librairie F. Alcan.

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

Tocqueville, A. d. (1967). *L'Ancien Régime et la Révolution*. Paris, Gallimard.

Toutain, J.-C. (1961). *Le Produit de l'Agriculture Française de 1700 à 1958. 2: La Croissance*. Paris, ISEA.

Vigneron, S. (2008). Les Mécanismes du Marché Foncier dans les Campagnes du Nord de la France au XVIIIe siècle. L'Exemple du Cambrésis et de la Région Lilloise. *Revue du Nord*, (2):391–428.

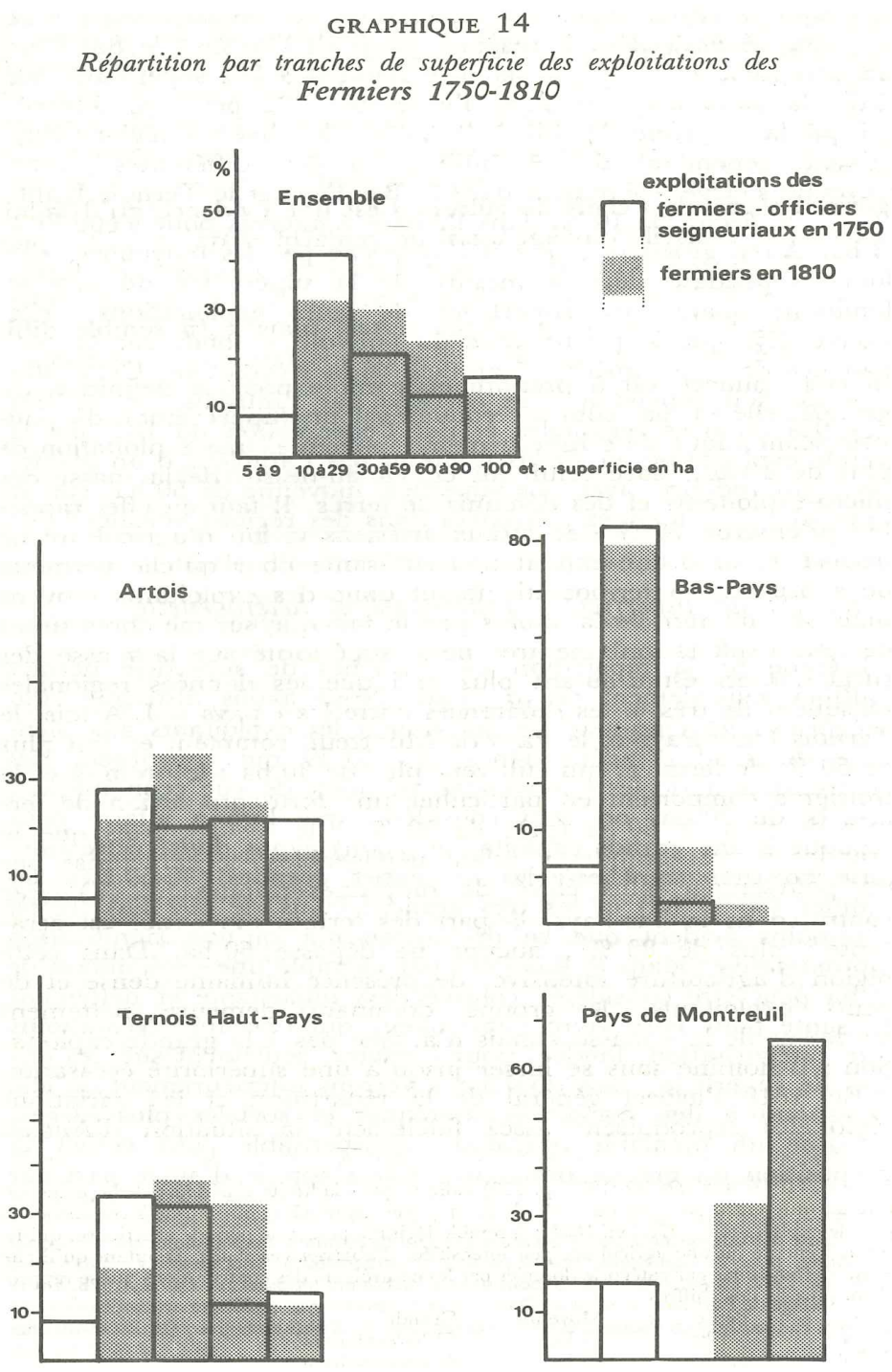
Wilkin, A. (2011). Communautés Religieuses Bénédictines et Environnement Économique, IXe-XIIe siècles: Réflexions sur les Tendances Historiographiques de l'Analyse du Temporel Monastique. *Ecclesia in Medio Nationis–actes de la rencontre de Conventus*, pages 101–150.

Young, A. (1792). *Travels in France during the Years 1787, 1788 & 1789*. George Bell and Sons.

Appendix

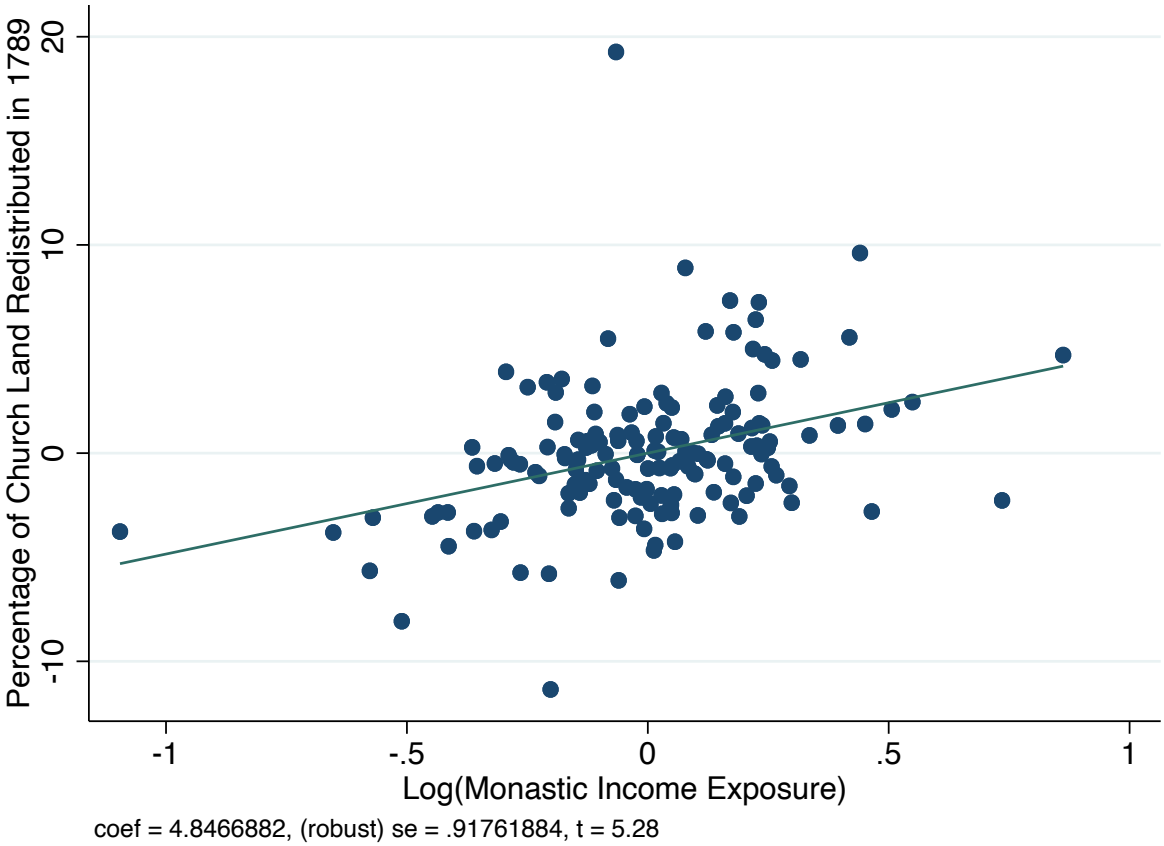
A Additional Figures

Figure A-1: Farm Size Changes in Artois (1750-1810)



Notes: This figure shows the distribution of farm size in the Artois region in 1750 and 1810 (Jessenne, 1987)

Figure A-2: Correlation between the percentage of Church Land Redistributed during the *Vente des Biens Nationaux* and Monastic Income Exposure – with controls



Notes: This figure plots the relationship between the percentage of Church land reallocated through the *Vente des Biens Nationaux* and log monastic income exposure in 1768. Residuals and coefficient estimates from Table D-4, column 6.

B Variable Definitions and Sources

Variable	Definition and Source
Dependent Variables	
Wheat Yields	Average yield of wheat per hectare in an *arrondissement* in 1852, as reported by Marin and Marraud (2011) from the *Enquête Agricole* of 1852.
Days per hectare of Wheat	Total number of days required to farm one hectare of wheat in an *arrondissement* in 1852, calculated using data reported by Marin and Marraud (2011) from the *Enquête Agricole* of 1852. In particular, it includes the time needed to perform all operations, including ploughing, sowing and harvesting and all types of labor force, including days from men, women, children and animals.
Agricultural Wage	Average daily wage of agricultural laborers in francs in an *arrondissement* in 1852, as reported by Marin and Marraud (2011) from the *Enquête Agricole* of 1852.
Share of Large Landowners	Number of landowners "owning property in the *arrondissement* without residing there" and landowners "residing in the *arrondissement* but not cultivating themselves" over the total number of landowners in an *arrondissement* in 1852, calculated using data as reported by Marin and Marraud (2011) from the *Enquête Agricole* of 1852.
Farm Size	Average size of a farm in hectares in an *département* in 1862, calculated using data reported by the *Enquête Agricole* of 1862.
Parcels per Owner	Average number of parcels per owner in a *département* in 1843, calculated using data reported by Legoyt (1843).
Scarifiers and Extirpators	Total number of scarifiers and extirpators in an *arrondissement* in 1852, as reported by Marin and Marraud (2011) from the *Enquête Agricole* of 1852.
Vineyards Yields	Average product per hectare in hectolitres in an *arrondissement* in 1852, as reported by Marin and Marraud (2011) from the *Enquête Agricole* of 1852.
Share of Female and Child Labor	Number of women's and children's days of labor required to farm one hectare of wheat over the total number of days required to farm one hectare of wheat in an *arrondissement* in 1852, calculated using data reported by Marin and Marraud (2011) from the *Enquête Agricole* of 1852.

(continued on next page)

Variable	Definition and Source
Explanatory Variables	
Monastic Income Exposure	Distance weighted sum of monastic incomes in *livres tournois* in an *arrondissement* in 1768, calculated using (1) and a distance cutoff of 100km. Data on monastic incomes and location comes from the *France Ecclésiastique*, the *Almanach Royal* and Lecestre (1902). For more details on the sources, see Section C of the Appendix.
Caloric Suitability	Average caloric yields given the set of crops that are suitable for cultivation before 1500 in an *arrondissement*, calculated using data reported by Galor and Özak (2016) at a 5-degree resolution level.
Ruggedness	Average ruggedness index in an *arrondissement*, calculated using elevation data reported by Jarvis et al. (2008) at a 5-degree resolution level.
Urban Population levels	Total urban population in an *arrondissement* in a given year, calculated using data reported by Buringh (2021) at the city level.
Market Potential in 1794	Distance-weighted sum of 1794 population levels in an *arrondissement*, calculated using data reported by Cassini and EHESS (2021) at the city level. In particiular, I consider as a city all municipalities with 1,000 or more inhabitants in 1794 and use the following formula: $MP_a = [\sum_j 1/d_{ac} \cdot Pop_c]$, where Pop_c is the population of city c in 1794 and d_{ac} is the kilometric distance between the centroid of *arrondissement* a and city c.
Market Integration in 1790s	Total external suppliers of an *arrondissement* in the 1790s, calculated using data reported by Daudin (2010).
Share of *Emigrés*	Number of *Ancien Régime* supporters who fled France during the French Revolution (*émigrés*) over total population in a *département* in the 1790s, as reported by Greer (1951).
Literacy in 1786	Share of grooms who signed their wedding licenses with their names in a *département* over the 1786-1790 period (as opposed to those who marked it with a cross), as reported by Furet and Ozouf (1977).
Subscriber Density	Average density of *Encyclopédie* subscibers in an *arrondissement* in the 1750s, calculated using data reported by Squicciarini and Voigtländer (2015) at the city level.
Share of Refractory Priests	Average share of priests who refused to swear the oath of allegiance in 1791 in an *arrondissement*, calculated using data reported by Squicciarini (2020) at the district level from Tackett (1986).

(continued on next page)

Variable	Definition and Source
Banks in 1850	Total number of banks in activity in an *arrondissement* between 1800 and 1850, calculated using data reported by Hoffman et al. (2019).
Distance to Paris	The distance in kilometers from Paris to the centroid of an *arrondissement*. Author's calculations.
Distance to Bishoprics in 1789	The distance in kilometers from bishoprics and archbishoprics in 1789 to the centroid of an *arrondissement*, calculated using data reported on *Wikipédia*.
Dependent Variables used in Appendix	
Share of Church Land in 1789	Hectares of land owned by a Church-related entity in 1789 (monasteries, bishoprics, etc.) over the total hectares, calculated using data reported by Finley et al. (2021) at the district level from Bodinier and Teyssier (2000).
Explanatory Variables used in Appendix	
Distance to London	The distance in kilometers from London to the centroid of an *arrondissement*. Author's calculations.
Distance to Fresnes-sur-Escaut	The distance in kilometers from Fresnes-sur-Escaut to the centroid of an *arrondissement*. Author's calculations.
Distance to Major Harbours	The distance in kilometers from the nearest major French harbours of the 18th and 19th centuries (Rouen, Nantes, Bordeaux and Marseilles) to the centroid of an *arrondissement*. Author's calculations.

Notes: This table provides a description and the sources of all the variables used in our paper. Variables are displayed by order of apparition in tables.

C Reconstructing Ancien Régime Monastic Incomes

In this section, I provide details on the sources and the construction used to reconstruct French monastic incomes before the Revolution. First, I give details about the historical sources. Then, I detail the construction of the database along with some stylized facts. Finally, I discuss the historical reliability of the sources.

C.1 Sources

This section presents and introduces the sources used to reconstruct French monastic income before the Revolution.

I first rely on two primary sources: (i) the *France Ecclésiastique* and (ii) the *Almanach Royal* for the year 1768. The *France Ecclésiastique* is a directory of the Clergy, providing a list of all office holders in the French Clergy with typically their name, status, income and date of appointment. The *Almanach Royal* is an administrative directory, listing all office holders related to or appointed by the King, with typically their name, occupation, status, location and date of appointment. Both directories were published annually to keep the information up to date.

The *Almanach Royal* gives us the incomes of the commendatory abbots, while the *France Ecclésiastique* gives us information on the commendatory abbots and the regular abbots. In contrast with the rest of Europe, many French monasteries were still held *in commendam* at the end of the 18th century. This means that the abbot was directly appointed by the King. The commendatory abbot was a cleric or layman who received a share of monastery's income, without the obligation to live in the monastic house. This power was one of the many tools used by the king to reward and built loyalty of the nobles. Famous and prestigious people were even appointed commendatory abbot of several monasteries, thus cumulating income. This was the case for the famous Cardinal de Richelieu, who was simultaneously commendatory abbot of the most prestigious French abbeys such as Cîteaux, Cluny, Marmoutier and La Chaise-Dieu. In some cases, commendatory abbots were appointed very early in life, such as Louis de Bourbon-Condé who received Notre-Dame du Bec abbey in Normandy at the age of seven.

I supplement these data coming from primary sources with one secondary source. Lecestre (1902) compiles information on the annual income of all male monasteries in the Kingdom of France for the year 1766. This information comes from a general survey of the state of the monasteries, known as the *Commission des Réguliers*. On behalf of the King Louis XV, the commission decided on the closure of indigent monasteries, based on their annual income and the number of monks. The work of the *Commission des Réguliers* was targeted towards male

monasteries only. Therefore, all the information I have for female monasteries comes from the *France Ecclésiastique* and the *Almanach Royal*.

C.2 Construction of the Database

In this section, I provide extensive details on the process of data collection, data selection and I provide some summary statistics.

As my two primary sources are available on an annual basis, I target the year 1768 to be able to compare and extend the coverage of the data provided by Lecestre (1902) and the *Commission des Réguliers* (1768). To illustrate my data collection, Figure C-3 displays the first page of the three sources that I use, with a visualization of the available information. I first geolocated each monastery using its name (A) and bishoprics (B). The precise geographic coordinates were found using *Wikipédia* or other secondary sources. For male monasteries, I have benefited greatly from the work of Lecestre (1902), which already provides the *département*, *canton* or even the *commune* in which each monastery is located in the year 1902. I collect the annual income of each monastery in *livres tournois* as such (C). Some additional information has been systematically collected, such as the monastic order (D). This information is also important to identify each monastery, as many homonyms are present in the raw data.

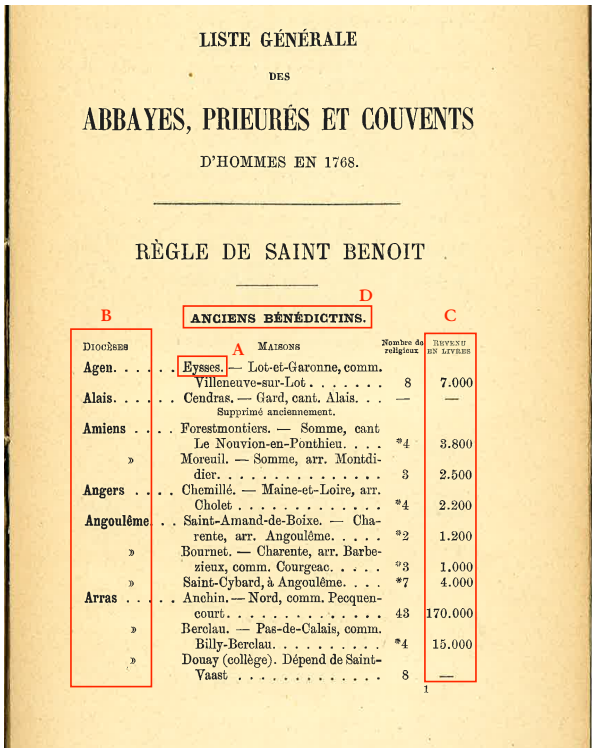
My dataset includes all the monasteries and priories for which I have the income from at least one of the three aforementioned sources, and sufficient informations to geolocate them.[31] Figure C-4 shows the geographic distribution of the 1,545 monasteries included in my database. Monasteries were widespread in France. In fact, only 21 (5.8%) *arrondissements* have no monasteries. The highest concentration is found in the *arrondissement* of Paris, with 31 monasteries. The average *arrondissement* had 4.3 monasteries (standard deviation of 3.46).

In my analysis, I do not consider monasteries belonging to the mendicant orders (Franciscans and Dominicans, among others). This is because mendicant orders depended on pure charity to live and were not supposed to hold properties. Consequently, they are not relevant to study the effect of land reallocation on agricultural productivity. Mendicant orders appear insignificant in terms of income, since they represent only 18% of the total monastic income for the year 1768; whereas they represent nearly 60% of the total number of monasteries (Lecestre, 1902, p. 120).

On the contrary, I have chosen to keep in my database the monasteries closed by the *Commission des Réguliers* for two main reasons: (i) the decision took a long time to be enforced, and we have anecdotal evidence of monasteries that remained in activity despite the decision to

[31] I failed to locate only 16 monasteries.

Figure C-3: Example of Information from my Sources



LISTE GÉNÉRALE

DES

ABBAYES, PRIEURÉS ET COUVENTS

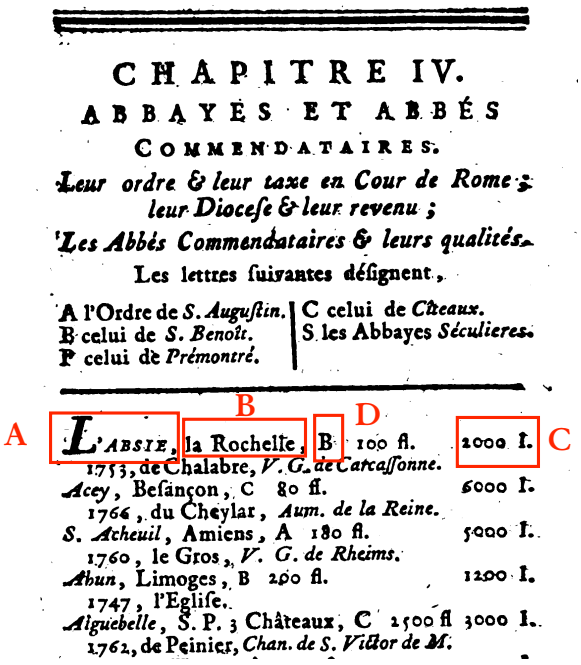
D'HOMMES EN 1768.

RÈGLE DE SAINT BENOIT

ANCIENS BÉNÉDICTINS.

Diocèses	Maisons	Nombre de religieux	Revenu en livres
Agen.	Eysses. — Lot-et-Garonne, comm. Villeneuve-sur-Lot	8	7.000
Alais.	Cendras. — Gard, cant. Alais. . . Supprimé anciennement.	—	—
Amiens	Forestmontiers. — Somme, cant Le Nouvion-en-Ponthieu. . . .	*4	3.800
»	Moreuil. — Somme, arr. Montdidier.	3	2.500
Angers	Chemillé. — Maine-et-Loire, arr. Cholet	*4	2.200
Angoulême . .	Saint-Amand-de-Boixe. — Charente, arr. Angoulême.	*2	1.200
»	Bournet. — Charente, arr. Barbezieux, comm. Courgeac.	*3	1.000
»	Saint-Cybard, à Angoulême. . . .	*7	4.000
Arras	Anchin. — Nord, comm. Pecquencourt.	43	170.000
»	Berclau. — Pas-de-Calais, comm. Billy-Berclau.	*4	15.000
»	Douay (collège). Dépend de Saint-Vaast	8	—

(a) Lecestre (1902)



CHAPITRE IV.

ABBAYES ET ABBÉS

COMMENDATAIRES.

Leur ordre & leur taxe en Cour de Rome ; leur Dioceſe & leur revenu ;

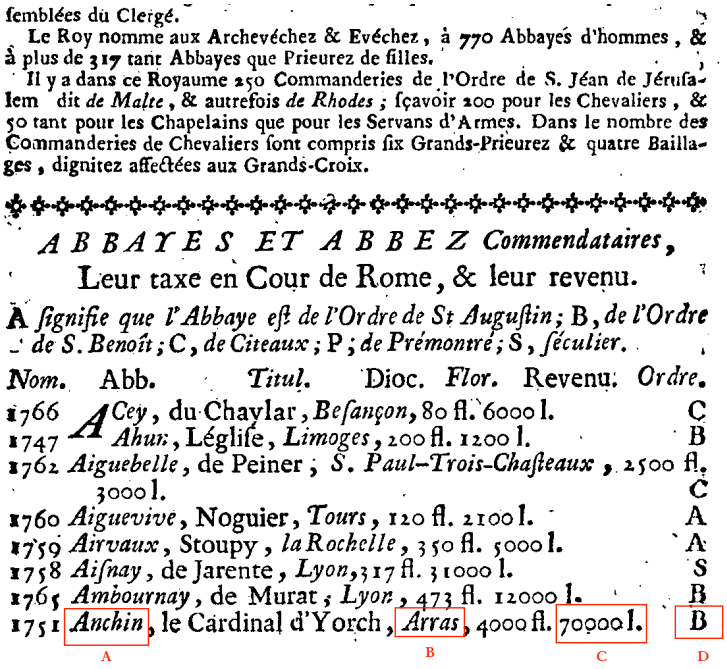
Les Abbés Commendataires & leurs qualités.

Les lettres ſuivantes déſignent,

A l'Ordre de *S. Auguſtin.* | C celui de *Cîteaux.*
B celui de *S. Benoît.* | S les Abbayes *Séculieres.*
P celui de *Prémontré.*

L'Absie, la Rochelle,	B	100 fl.	2000 l.	C
1753, de Chalabre, *V. G. de Carcaſſonne.*				
Acey, Beſançon,	C	80 fl.	6000 l.	
1766, du Cheylar, *Aum. de la Reine.*				
S. Acheuil, Amiens,	A	180 fl.	5000 l.	
1760, le Gros, *V. G. de Rheims.*				
Ahun, Limoges,	B	200 fl.	1200 l.	
1747, l'Egliſe.				
Aiguebelle, S. P. 3 Châteaux,	C	2500 fl	3000 l.	
1762, de Peinier, *Chan. de S. Victor de M.*				

(b) *La France Ecclésiastique*



ſemblées du Clergé.

Le Roy nomme aux Archevêchez & Evêchez, à 770 Abbayes d'hommes, & à plus de 317 tant Abbayes que Prieurez de filles.

Il y a dans ce Royaume 250 Commanderies de l'Ordre de S. Jéan de Jéruſalem dit *de Malte*, & autrefois *de Rhodes* ; ſçavoir 200 pour les Chevaliers, & 50 tant pour les Chapelains que pour les Servans d'Armes. Dans le nombre des Commanderies de Chevaliers ſont compris ſix Grands-Prieurez & quatre Baillages, dignitez affectées aux Grands-Croix.

ABBAYES ET ABBEZ Commendataires,

Leur taxe en Cour de Rome, & leur revenu.

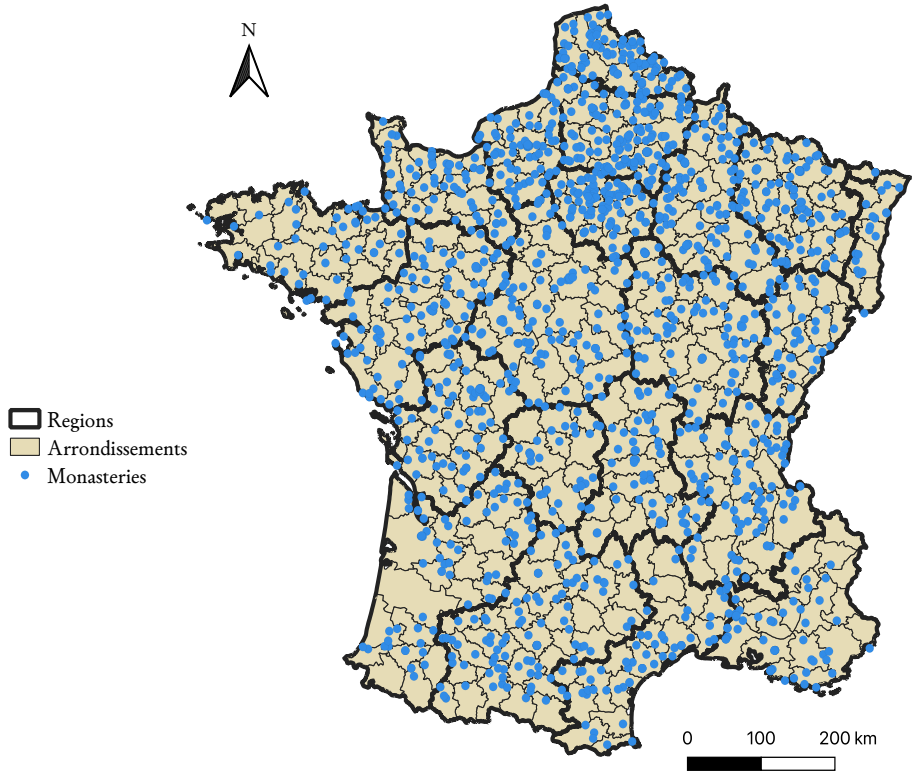
A *ſignifie que l'Abbaye eſt de l'Ordre de St Auguſtin* ; B, *de l'Ordre de S. Benoît* ; C, *de Cîteaux* ; P ; *de Prémontré* ; S, *ſéculier.*

Nom. Abb.	*Titul.*	Dioc.	*Flor.* Revenu.	*Ordre.*
1766 *Acey*, du Chaylar,	*Beſançon*,	80 fl.	6000 l.	C
1747 *Ahun*,	Egliſe, *Limoges*,	200 fl.	1200 l.	B
1762 *Aiguebelle*, de Peiner ;	*S. Paul-Trois-Chaſteaux*,	2500 fl. 3000 l.		C
1760 *Aiguevive*, Noguier,	*Tours*,	120 fl.	2100 l.	A
1759 *Airvaux*, Stoupy,	*la Rochelle*,	350 fl.	5000 l.	A
1758 *Aiſnay*, de Jarente,	*Lyon*,	317 fl.	31000 l.	S
1765 *Ambournay*, de Murat ;	*Lyon*,	473 fl.	12000 l.	B
1751 *Anchin*, le Cardinal d'Yorch,	*Arras*,	4000 fl.	70000 l.	B

A B C D

(c) *Almanach Royal*

Figure C-4: Spatial Distribution of Monasteries



Notes: This figure plots the spatial distribution of French monasteries in year 1768. Note that all existing French monasteries of that time are not displayed on this map. See text for more informations.

close them; (ii) even if a monastery was closed, its properties were given to other monasteries, and finally redistributed at the time of the Revolution.

In many cases, monastic income for a single monastery is available from more than one source. To use monastic income in my empirical analysis, I therefore assign a single income value to each monastery based on a simple criterion: for each monastery, I take the maximum income given by one of the three sources. This approach is also motivated by the fact that monasteries may have tended to reduce their income so as not to attract too much attention from the ecclesiastical or royal authorities. In all cases, the pairwise correlation between each source is very high, as shown in Table C-1.

Table C-2 summarizes the composition of my final dataset by source. It appears that I rely

Table C-1: Correlations between Sources

	Income from the *France Ecclésiastique*	Income from the *Almanach Royal*	Income from Lecestre (1902)
Income from the *France Ecclésiastique*	1		
Income from the *Almanach Royal*	0.96	1	
Income from Lecestre (1902)	0.63	0.79	1

Notes: This table presents the pairwise correlation coefficients between the three sources of data I used on monastic income.

predominantly on the secondary source (63.6%) of Lecestre (1902). Nevertheless, a substantial share of the primary sources is used as well (37%). One explanation is that Lecestre (1902) also gives the annual income of the priories, what is not taken into account at all in the primary sources which focus on abbeys. As detailed in next section, another explanation could be that the income reported by Lecestre (1902) (from the *Commission des Réguliers*), were systematically closer to the true income values, since the *Commission* had more investigative powers.

Table C-2: Number of Observations and Frequency by Source

	France Ecclésiastique	*Almanach Royal*	Lecestre (1902)	*Fr. Ecclé.* and *Almanach*	Lecestre (1902) and *Fr. Ecclé*	Lecestre (1902) and *Almanach*	The Three Sources	Total
Number obs.	133	169	966	267	3	3	4	1545
%	8.6%	11%	62.5%	17.3%	0.19%	0.19%	0.26%	100%

Notes: This table presents the contribution of each source to the final database on monastic income that I use in the article.

C.3 Reliability of the Historical Sources

In this section, I discuss the reliability and the validity of the three historical sources used to reconstruct monastic incomes before the Revolution with respect to the historical literature.

First, we do not know precisely the authors and the sources on which the *France Ecclésiastique* or the *Almanach Royal* are based. Despite that fact, several pieces of evidence, direct or indirect, suggest that this data are relatively accurate. First, the *Almanach Royal* was a commercial enterprise. The idea of its creator, Laurent d'Houry, was to publish an almanac accompanied with useful administrative information, such as the names and addresses of the intendants of finances, or the days of departure for the postal services. The *Almanach Royal* was thus always dedicated to inform a wide audience, as opposed to inform a particular administration or corporation (Brondel, 2008). Nevertheless, since its creation, the *Almanach*

was closely related to the king, the royal court and the Parisian elites.[32] The link between the editors of the *Almanach* and the monarchical power was crucial for several reasons. First, during the *Ancien Régime*, the publishing market, like any other type of business, was heavily regulated. The commercialization of a book required an explicit authorization from the King – i.e. a privilege – granting the publisher a monopoly on the printing and sale of copies. This system of privileges was also a way for the monarchy to control the diffusion and content of books. Obtaining the right to print the book was conditional on the approval of a royal censor, who was responsible for reading the book. This constituted a first control on the quality of the information contained in the *Almanach*. It is known that successive editors of the *Almanach* managed to have their privilege renewed year after year for almost a century, until the French Revolution (Brondel, 2008). Second, the connexion between the editors of the *Almanach*, the royal court and the Parisian elites was crucial in the making of the *Almanach* itself. Indeed, to keep information up to date, the editors of the *Almanach* used two strategies: (i) a network of paid informants and (ii) reader feedback. Unfortunately, little is known about the paid informants. Brondel (2008) explains that this was an expensive and little used method. On the contrary, we have more evidence of corrected erroneous information through letters sent to the editor in Paris. On that element, Brondel (2008) emphasizes that the wide diffusion of the *Almanach* in the administration and savant societies was a crucial element. This provide a powerful check on the content of the *Almanach*. Anecdotally, we know that Laurent d'Houry was in prison for three weeks in 1716. His crime was to report erroneous information about the King of England in the *Almanach*, provoking a diplomatic incident between the two kingdoms. Although not official under the *Ancien Régime*, the *Almanach* is nevertheless considered as "reliable, complete and almost official" by Brondel (2008). All these elements point to the relative quality of the information presented in the *Almanach*.

As for the *Almanach Royal*, we do not know the authors of the *France Ecclésiastique*. Unfortunately, I am not aware of any historical study analyzing this publication either. However, it is clear that the information contained in the *France Ecclésiastique* is of a similar quality to that of the *Almanach* and for the same reasons. Indeed, as with the *Almanach*, the *France Ecclésiastique* was printed with the king's privilege and read by the royal censor. Moreover, the preamble of the *France Ecclésiastique* clearly encourages the reader to send comments on erroneous information. Finally, Table C-1 shows that the pairwise correlation between the monastic income posted in the *France Ecclésiastique* and the *Almanach Royal* is 0.96, confirming that the source on which those publications were based are the same.

[32] The adjective *royal* was placed by the founder of the almanac, Laurent d'Houry, after its successful presentation to king Louis XIV in 1699.

Concerning Lecestre (1902) and the *Commission des Réguliers*, we can consider the information of this source as reliable. Indeed, the information came from a commission acting on behalf of the king (see Section C.1). This commission was headed by archbishoprics and state councillors, that is among the highest civil and religious authority of the kingdom. One can therefore legitimately think that these authorities exerted the necessary pressure on the monasteries to obtain precise information on their income. Each monastery sent its income statement to the mother house of its religious congregation. Indications furnished by bishops were also used to establish the annual income of each monastery. Lecestre (1902) judges these figures as accurate, although presumably lower than the actual figures. In all cases, we can see that the correlation between Lecestre (1902) and the primary sources used is high, indicating that the information is globally consistent. Note that the differences with respect to Lecestre (1902) could be due to the fact that it reports the net income and not the gross income of monasteries, as primary sources do.

D Cross-Checking Analysis

In this section, we empirically test the validity of our data on monastic income and our main dependent variable – i.e. monastic income exposure. We start by testing the relationship between monastic income and the type and number of monastic properties at the monastery level. Then, we test the relationship between monastic income and the dispersion of monastic properties from the monastic house. Finally, we test the ability of monastic income exposure to capture the redistribution of Church land at the *arrondissement* level.

D.1 Monastic Income and Monastic Landholdings

This section presents evidence about the link between monastic income and monastic landholdings at the monastery level – i.e. first cross-checking exercise. To do so, I use data compiled by Bodinier (1988) on the number/size and type of properties owned by French monastery in the Eure or Seine-Maritime *département* in 1789.[33] From this dataset, I can therefore compute the number of hectares of agricultural land, woods, vineyards or wastelands owned by 45 monasteries located in these two *départements* along with informations on other economic assets such as mills, houses, markets, justice courts, chapels, etc.

Table D-1 establishes that monastic income accurately captures differences in hectares of agricultural land across monasteries. Other types of properties, such as mills, houses or barns, have no predictive power on monastic income (columns 2 and 3). In particular, from column 4 on, I include factors such as the caloric suitability of the land, ruggedness, population, trade and distance to administrative centres as potential confounders of the relationship of interest at the monastery level. In the last two columns, I add *département* fixed effects (column 8) and *arrondissement* fixed effects (column 9) to further control for potential confounders at these levels. In all cases, the relationship between monastic income and hectares of agricultural land remains positive and highly significant.

Table D-2 supplements the previous analysis using the number of farms instead of hectares of agricultural land as explanatory variable. I find similar results with a strong positive and significant relationship between monastic income and the number of farms across all the specifications.

The analysis conducted in Tables D-1 and D-2 is also usefull to verify whether the collected data on monastic income in the *France Ecclésiastique*, the *Almanach Royal* and Lecestre (1902) correlate with any of the monastic properties identified. This was a crucial validation step,

[33] We warmly thank Bernard Bodinier for sharing his data with us. The data come from his doctoral thesis and his personal notes for the Seine-Maritime *département*.

especially since we do not really know the authors and sources on which these figures are based (see section C.3).

D.2 Monastic Income Exposure and Church Land Reallocation

This section presents evidence about the ability of monastic income exposure to capture most of the variations in monastic landholdings at the *arrondissement* level – i.e. second cross-checking exercise. To test this, I use data collected by Bodinier and Teyssier (2000) on the percentage of Church land redistributed in French districts through the *Vente des Biens Nationaux*. These data are available for only 40% of the French *arrondissements* I use in my main analysis.

Table D-3 establishes that (i) monastic income exposure is a relevant proxy, capturing most of the cross-*arrondissement* variations in Chruch's landholdings, and that (ii) spatial spillovers of monastic incomes within a 100km radius are crucial to accurately capture this variation.

Indeed, the best fit between the percentage of Church land redistributed in 1789 and monastic income exposure is obtained when I consider a distance cutoff of 100km (column 5). In particular, column 5 shows that monastic income exposure with a distance cutoff of 100km explains more than half of the variation in the percentage of Church land redistributed at the Revolution. A 100km cutoff means that I set the spatial weights in (1) to zero for all monasteries more than 100km away from the centroid of a given *arrondissement*. I therefore consider monasteries that are more than 100km away as not being able to own a large amount of land in a given *arrondissement*. This is consistent with the historical evidence showing that most monasteries had their properties concentrated around the cloister (Bodinier and Teyssier, 2000; Goudot, 2006; Wilkin, 2011).[34]

Interestingly, the worst fit is found in column 1, where I do not consider any spatial spillovers of monastic income. In that case, only 16% of the variation in the dependent variable is explained by monastic income exposure. In particular, I define monastic income exposure in that case as the sum of monastic income only for monasteries that are included within the boundaries of a given *arrondissement*, namely $MIE_a = \sum_{m \in a} I_m$.

Table D-4 establishes that the relationship between monastic income exposure (with a 100km cutoff) and the percentage of Church land redistributed at the Revolution found in column 5, Table D-3, is not confounded by other explanatory variables. In particular, the relationship between monastic income exposure and the percentage of Church land redistributed in 1789 remains positive and highly significant across all the specifications, controlling for the agricultural potential of the land, ruggedness, urbanization, distance to bishoprics and region

[34] See Section 3.1 for a complete discussion of that implication regarding to monastic income exposure.

fixed effects.

In column 7, I run a horse race regression, adding monastic income exposure (without spatial spillovers) on top of all the aforementioned control variables. My results are unchanged, with the relationship of interest between monastic income exposure (100km cutoff) and the percentage of Church land redistributed still positive and highly significant.

Table D-1: Determinants of Monastic Income

Dep. Var.: log(Monastic Income)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(Hectares)	0.62***	0.38***	0.42***	0.44***	0.53***	0.51***	0.50***	0.50***	0.61**
	(0.111)	(0.060)	(0.104)	(0.115)	(0.132)	(0.143)	(0.152)	(0.151)	(0.197)
log(1+Woods)		-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.06	-0.05
		(0.061)	(0.061)	(0.069)	(0.060)	(0.046)	(0.048)	(0.076)	(0.115)
log(1+Vineyards)		0.17	0.16	0.18	0.16	0.13	0.14	0.14	0.31
		(0.166)	(0.157)	(0.119)	(0.158)	(0.198)	(0.213)	(0.227)	(0.272)
log(1+Fallow)		-0.02	-0.02	-0.00	-0.01	0.00	0.01	0.01	-0.12
		(0.050)	(0.044)	(0.029)	(0.039)	(0.039)	(0.037)	(0.060)	(0.070)
Houses		0.01	0.02	0.02	0.03	0.04	0.04	0.04	0.03
		(0.027)	(0.026)	(0.028)	(0.028)	(0.034)	(0.036)	(0.035)	(0.024)
Mills		0.10	0.07	0.05	0.01	-0.07	-0.06	-0.06	-0.10
		(0.067)	(0.078)	(0.082)	(0.072)	(0.089)	(0.093)	(0.084)	(0.120)
Barns		-0.07	-0.09	-0.05	-0.05	0.04	0.02	0.02	-0.00
		(0.091)	(0.077)	(0.079)	(0.063)	(0.070)	(0.060)	(0.046)	(0.063)
Priories		0.11	0.10	0.09	0.05	0.03	0.05	0.05	0.01
		(0.099)	(0.095)	(0.097)	(0.067)	(0.048)	(0.044)	(0.045)	(0.105)
Manors		0.01	-0.01	-0.08	-0.05	-0.16	-0.17	-0.17	-0.12
		(0.164)	(0.158)	(0.201)	(0.189)	(0.234)	(0.228)	(0.216)	(0.147)
Markets		0.05	0.10	-0.06	0.03	0.11	0.11	0.11	0.31
		(0.333)	(0.344)	(0.337)	(0.301)	(0.499)	(0.512)	(0.497)	(0.499)
Courts		0.24	0.27	0.44	0.49	0.45	0.51	0.51	1.11**
		(0.349)	(0.321)	(0.324)	(0.347)	(0.549)	(0.581)	(0.586)	(0.445)
Chapels		0.15*	0.18***	0.12	0.17	0.09	0.11	0.11	0.12
		(0.079)	(0.053)	(0.082)	(0.091)	(0.086)	(0.078)	(0.104)	(0.125)
Benedictines			0.22	0.33	0.43*	0.42*	0.39*	0.39	0.44
			(0.222)	(0.221)	(0.213)	(0.187)	(0.209)	(0.252)	(0.243)
Female			0.09	0.01	0.08	-0.02	-0.00	-0.00	0.08
			(0.207)	(0.182)	(0.201)	(0.184)	(0.206)	(0.204)	(0.302)
Cal. Suit. 20km				0.12	-0.14	-2.13*	-2.41*	-2.41	-1.31
				(0.474)	(0.621)	(1.035)	(1.107)	(2.445)	(3.756)
Rugg. 20km				0.58	0.90**	0.59*	0.54	0.54	-0.37
				(0.328)	(0.363)	(0.321)	(0.381)	(0.410)	(1.441)
Pop. 20km					-0.52**	-1.12***	-1.15***	-1.15***	-1.13**
					(0.221)	(0.279)	(0.276)	(0.290)	(0.494)
Dist. Seine						-0.34**	-0.34**	-0.34**	-0.42
						(0.127)	(0.128)	(0.132)	(0.283)
Dist. *Dép.*							-0.05	-0.05	-0.11
							(0.039)	(0.052)	(0.079)
Dép. FE	No	No	No	No	No	No	No	Yes	No
Arrond. FE	No	No	No	No	No	No	No	No	Yes
Obs.	45	45	45	45	45	45	45	45	45
VIF	1.00	4.78	4.47	4.45	4.45	4.74	4.85	5.33	9.19
adj. R-sq	0.52	0.57	0.57	0.57	0.60	0.70	0.70	0.68	0.66

Notes: This table presents OLS estimates of the effect of hectares of agricultural land owned by a monastery in 1789 on monastic income in 1768 at the *monastery* level. Up to column 3, all variables are computed using data from Bodinier (1988). From column 4 on, I include the controls specified in the first column of the table. Standard errors clustered at the *département* level are in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table D-2: Determinants of Monastic Income – alternative specification

Dep. Var.: log(Monastic Income)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(1+Farms)	0.59***	0.31***	0.31***	0.31***	0.32***	0.32***	0.31***	0.31**	0.39**
	(0.085)	(0.062)	(0.063)	(0.074)	(0.065)	(0.080)	(0.093)	(0.098)	(0.154)
log(1+Woods)		-0.01	-0.00	0.01	0.01	0.01	0.01	-0.00	0.01
		(0.057)	(0.057)	(0.068)	(0.064)	(0.051)	(0.055)	(0.090)	(0.116)
log(1+Vineyards)		0.11	0.11	0.14	0.14	0.11	0.12	0.13	0.25
		(0.194)	(0.189)	(0.143)	(0.156)	(0.176)	(0.194)	(0.205)	(0.386)
log(1+Fallow)		-0.00	-0.00	0.01	0.01	0.02	0.03	0.02	-0.12
		(0.065)	(0.065)	(0.050)	(0.053)	(0.039)	(0.044)	(0.069)	(0.087)
Houses		0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.02
		(0.025)	(0.027)	(0.030)	(0.030)	(0.036)	(0.038)	(0.037)	(0.040)
Mills		0.10	0.09	0.07	0.05	-0.03	-0.02	-0.01	-0.02
		(0.067)	(0.075)	(0.084)	(0.081)	(0.090)	(0.095)	(0.104)	(0.137)
Barns		-0.09	-0.10	-0.07	-0.07	0.02	-0.00	-0.01	-0.04
		(0.093)	(0.084)	(0.079)	(0.071)	(0.081)	(0.068)	(0.060)	(0.070)
Priories		0.10	0.09	0.10	0.08	0.06	0.08	0.08	0.04
		(0.106)	(0.094)	(0.102)	(0.087)	(0.053)	(0.045)	(0.045)	(0.107)
Manors		0.05	0.05	-0.01	0.02	-0.10	-0.11	-0.09	-0.05
		(0.162)	(0.168)	(0.215)	(0.221)	(0.219)	(0.219)	(0.235)	(0.285)
Markets		-0.01	0.01	-0.11	-0.07	0.02	0.02	0.01	0.13
		(0.350)	(0.381)	(0.384)	(0.367)	(0.551)	(0.565)	(0.555)	(0.646)
Courts		0.38	0.41	0.49	0.53	0.49	0.55	0.55	1.39**
		(0.350)	(0.343)	(0.362)	(0.371)	(0.563)	(0.594)	(0.610)	(0.595)
Chapels		0.09	0.10	0.07	0.09	0.02	0.05	0.04	0.02
		(0.076)	(0.067)	(0.088)	(0.100)	(0.075)	(0.070)	(0.099)	(0.088)
Benedictines			0.11	0.16	0.20	0.19	0.16	0.15	0.08
			(0.173)	(0.180)	(0.181)	(0.141)	(0.174)	(0.221)	(0.237)
Female			0.05	0.02	0.05	-0.05	-0.03	-0.03	0.04
			(0.203)	(0.173)	(0.182)	(0.169)	(0.190)	(0.200)	(0.263)
Cal. 20km				-0.42	-0.58	-2.61***	-2.95***	-3.12	-2.63
				(0.771)	(0.750)	(0.761)	(0.817)	(2.008)	(3.492)
Rug. 20km				0.39	0.54	0.24	0.17	0.17	-0.30
				(0.332)	(0.315)	(0.404)	(0.462)	(0.488)	(1.578)
Pop. 20km					-0.27	-0.90**	-0.94***	-0.94***	-0.95*
					(0.217)	(0.282)	(0.261)	(0.276)	(0.490)
Dist. Seine						-0.34**	-0.35**	-0.35**	-0.37
						(0.139)	(0.140)	(0.141)	(0.294)
Dist. *Dép.*							-0.06	-0.06	-0.07
							(0.037)	(0.044)	(0.098)
Dép. FE	No	No	No	No	No	No	No	Yes	No
Arrond. FE	No	No	No	No	No	No	No	No	Yes
Obs.	45	45	45	45	45	45	45	45	45
VIF	1.00	4.65	4.32	4.33	4.27	4.57	4.67	5.14	9.06
adj. R-sq	0.51	0.58	0.56	0.54	0.54	0.65	0.64	0.63	0.55

Notes: This table presents OLS estimates of the effect of hectares of agricultural land owned by a monastery in 1789 on monastic income in 1768 at the *monastery* level. Up to column 3, all variables are computed using data from Bodinier (1988). From column 4 on, I include the controls specified in the first column of the table. Standard errors clustered at the *département* level are in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table D-3: Distance Calibration of Monastic Income Exposure

Dep. Var.: % Church Land Redistributed in 1789	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(MIE, $\sum_{m \in a} I_m$)	1.26***								
	(2.816)								
log(MIE, 25km cutoff)		1.18***							
		(3.309)							
log(MIE, 50km cutoff)			5.07***						
			(6.822)						
log(MIE, 75km cutoff)				5.91***					
				(7.602)					
log(MIE, 100km cutoff)					6.17***				
					(7.996)				
log(MIE, 125km cutoff)						6.34***			
						(7.779)			
log(MIE, 150km cutoff)							6.48***		
							(7.653)		
log(MIE, 200km cutoff)								6.54***	
								(7.166)	
log(MIE, no cutoff)									11.14***
									(6.794)
Controls	No	No	No	No	No	No	No	No	No
Region fixed effects	No	No	No	No	No	No	No	No	No
Observations	153	153	153	153	153	153	153	153	153
Adjusted R^2	0.16	0.17	0.47	0.50	0.52	0.52	0.51	0.50	0.48

Notes: This table presents OLS estimates of the effect of monastic income exposure in 1768 on the percentage of Church land redistributed in 1789 at the *arrondissement* level. In each line, I use a different way of calculating monastic income exposure in (1) starting from no spatial spillovers (column 1) to no distance cutoff (column 9). Standard errors are clustered at the *département* level. *t*-stats are in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table D-4: The Effect of Monastic Income Exposure on the Percentage of Church Land Redistributed in 1789

Dep. Var.: % Church Land Redistributed in 1789	(1)	(2)	(3)	(4)	(5)	(6)	(7)
log(MIE, 100km cutoff)	6.17***	6.20***	5.92***	5.80***	5.75***	4.85***	4.50***
	(0.772)	(0.774)	(0.792)	(0.781)	(0.752)	(0.918)	(0.894)
Caloric suitability		1.19	0.88	0.89	0.40	2.04	2.15
		(2.332)	(2.379)	(2.333)	(2.218)	(3.438)	(3.392)
Ruggedness			-0.66*	-0.65*	-0.82**	-0.09	-0.10
			(0.380)	(0.389)	(0.395)	(1.281)	(1.265)
Urban population in 1750				0.33*	0.11	-0.06	-0.09
				(0.179)	(0.230)	(0.257)	(0.260)
log(Distance to Bishoprics)					-0.29	-0.39	-0.35
					(0.204)	(0.275)	(0.274)
log(MIE, $\sum_{m \in a} I_m$)							0.25*
							(0.131)
Region fixed effects	No	No	No	Yes	Yes	Yes	Yes
Observations	153	153	153	153	153	153	153
Adjusted R^2	0.52	0.51	0.52	0.52	0.52	0.63	0.63

Notes: This table presents OLS estimates of the effect of monastic income exposure in 1768 on the percentage of Church land redistributed in 1789 at the *arrondissement* level. Column 1 displays the bivariate relationship, then I gradually include my main set of controls (caloric suitability of the land, ruggedness and urban population levels in 1750) in columns 2-4. Column 5 adds the distance to nearest bishoprics in 1789 and column 6 adds region fixed effects. Finally, I control for an alternative version of monastic income exposure that ignores spatial spillovers in column 7. Standard errors clustered at the *département* level are in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

E Additional Robustness Checks

Table E-1: Additional Robustness Checks – controlling for urban population levels in the Middle Ages

Added control:	Urban population in 700			Urban population in 800			Urban population in 900		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(Monastic Income Exposure)	0.10	-0.11	0.08	0.11	-0.10	0.09	0.11	-0.10	0.09
	(0.045)**	(0.039)***	(0.041)**	(0.045)**	(0.038)***	(0.040)**	(0.045)**	(0.038)***	(0.040)**
	[0.041]**	[0.036]***	[0.037]**	[0.041]**	[0.036]***	[0.036]**	[0.041]**	[0.036]***	[0.037]**
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	354	354	354	354	354	354	354	354	354
Adjusted R^2	0.58	0.47	0.69	0.58	0.47	0.69	0.58	0.47	0.69

Notes: This table presents OLS estimates of the effect of monastic land reallocation, proxied by monastic income exposure in 1768, on agricultural productivity in 1852 at the *arrondissement* level. In each column, I test the sensitivity of my results to an additional control variable that is specified in the column header. Each column changes its dependent variable.In particular, I use wheat yields in columns 1, 4 and 7, the average number of days required to farm one hectare of wheat in columns 2, 5 and 8 and daily agricultural wage in columns 3, 6 and 9 as dependent variables. Each column controls for the caloric suitability of the land, ruggedness, urban population levels in 1750 and region fixed effects. Standard errors clustered at the *département* level are in parentheses and Conley (1999) standard errors, with a Bartlett kernel and a cut-off distance of 100km, in brackets. * p<0.1, ** p<0.05, *** p<0.01.

Table E-2: Additional Robustness Checks – controlling for further urban population levels in the Middle Ages

Added control:	Urban population in 1000			Urban population in 1100		
	(1)	(2)	(3)	(4)	(5)	(6)
log(Monastic Income Exposure)	0.11	-0.11	0.09	0.11	-0.10	0.09
	(0.045)**	(0.038)***	(0.040)**	(0.045)**	(0.038)***	(0.040)**
	[0.041]**	[0.036]***	[0.036]**	[0.041]**	[0.036]***	[0.036]**
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	354	354	354	354	354	354
Adjusted R^2	0.58	0.47	0.69	0.58	0.47	0.69

Notes: This table presents OLS estimates of the effect of monastic land reallocation, proxied by monastic income exposure in 1768, on agricultural productivity in 1852 at the *arrondissement* level. In each column, I test the sensitivity of my results to an additional control variable that is specified in the column header. Each column changes its dependent variable.In particular, I use wheat yields in columns 1 and 4, the average number of days required to farm one hectare of wheat in columns 2 and 5 and daily agricultural wage in columns 3 and 6 as dependent variables. Each column controls for the caloric suitability of the land, ruggedness, urban population levels in 1750 and region fixed effects. Standard errors clustered at the *département* level are in parentheses and Conley (1999) standard errors, with a Bartlett kernel and a cut-off distance of 100km, in brackets. * p<0.1, ** p<0.05, *** p<0.01.

Table E-3: Additional Robustness Checks – controlling for distances

Added control:	Distance to London			Distance to Fresnes-sur-Escaut			Distance to Major Harbours		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(Monastic Income Exposure)	0.12	-0.08	0.09	0.10	-0.11	0.08	0.11	-0.10	0.07
	(0.042)***	(0.036)**	(0.040)**	(0.048)*	(0.040)***	(0.040)**	(0.045)**	(0.040)**	(0.041)*
	[0.038]***	[0.033]**	[0.036]**	[0.045]*	[0.038]***	[0.038]**	[0.040]**	[0.038]**	[0.036]*
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	354	354	354	354	354	354	354	354	354
Adjusted R^2	0.58	0.49	0.69	0.58	0.47	0.69	0.58	0.47	0.70

Notes: This table presents OLS estimates of the effect of monastic land reallocation, proxied by monastic income exposure in 1768, on agricultural productivity in 1852 at the *arrondissement* level. In each column, I test the sensitivity of my results to an additional control variable that is specified in the column header. Each column changes its dependent variable.In particular, I use wheat yields in columns 1, 4 and 7, the average number of days required to farm one hectare of wheat in columns 2, 5 and 8 and daily agricultural wage in columns 3, 6 and 9 as dependent variables. Each column controls for the caloric suitability of the land, ruggedness, urban population levels in 1750 and region fixed effects. Standard errors clustered at the *département* level are in parentheses and Conley (1999) standard errors, with a Bartlett kernel and a cut-off distance of 100km, in brackets. * p<0.1, ** p<0.05, *** p<0.01.

Table E-4: Additional Robustness Checks – trimmed sample

Dependent variable:	log(Wheat yields)			log(Days per hectare of wheat)			log(Agricultural wage)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(Monastic Income Exposure)	0.30	0.26	0.09	-0.21	-0.22	-0.14	0.23	0.25	0.10
	(0.034)***	(0.032)***	(0.044)**	(0.034)***	(0.035)***	(0.050)***	(0.052)***	(0.054)***	(0.049)**
	[0.034]***	[0.031]***	[0.039]**	[0.037]***	[0.038]***	[0.048]***	[0.054]***	[0.054]***	[0.045]**
Caloric suitability	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Ruggedness	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Urban population in 1750	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Region fixed effects	No	No	Yes	No	No	Yes	No	No	Yes
Observations	320	320	320	320	320	320	320	320	320
Adjusted R^2	0.38	0.43	0.54	0.23	0.26	0.46	0.18	0.27	0.66

Notes: This table presents OLS estimates of the effect of monastic land reallocation, proxied by monastic income exposure in 1768, on agricultural productivity in 1852 at the *arrondissement* level. I test the sensitivity of my results presented in Table 1 excluding the 5% *arrondissements* with the top and bottom monastic income exposure. For each dependent variable, I first display the bivariate relationship in the first column, then I include my main set of controls (caloric suitability of the land, ruggedness and urban population levels in 1750) and finally I add region fixed effects. Standard errors clustered at the *département* level are in parentheses and Conley (1999) standard errors, with a Bartlett kernel and a cut-off distance of 100km, in brackets. * p<0.1, ** p<0.05, *** p<0.01.