Postal Growth: How the State-Sponsored Post Affected Growth in France, 1550–1800*

Yu Sasaki†

This version: April 4, 2023

Abstract

This paper investigates the role of postal service in city growth in pre-industrial France. Extant research shows that modern-day infrastructure projects, such as railways underwritten by a strong state capacity, strongly influence growth. I examine the consequences of postal institutions when their expansion was slow and when state capacity was weak. I highlight how the French post evolved from the crown-only information tool to a public service and how investments on the physical infrastructure lagged behind. Digitizing untapped published sources, I quantify distance to commercial hubs via postal routes on the city level from 1500–1850. My analysis finds that reductions in distance are positively associated with growth. I report consistent findings when local shocks are removed and when local displacement effects are considered. My instrumental-variable estimation suggests that Paris plausibly adopted a cost-minimizing strategy to build the initial network.

*I thank participants at the Economic History seminar at the University of Tokyo for their constructive feedback to the previous draft. Financial support from the Japan Society for the Promotion of Science (20K13413) is gratefully acknowledged. All errors are mine.

†Assistant Professor, Graduate School of Economics and Faculty of Economics, University of Tokyo. E-mail: yusasaki253@gmail.com. See yusasaki.squarespace.com for the most updated version.

Introduction

A growing body of research underscores the state's ability to execute policy as an important source of economic development (Andrews, Pritchett, and Woolcock 2017; Besley and Persson 2009; Fukuyama 2011). That the state makes significant contributions to growth reflects the realization that today's wealthy states tend to have a greater capacity tax and enjoy its revenues as greater proportions of their income than developing countries (Johnson and Koyama 2017). This scholarship highlights how states cultivate such a capacity through institutional changes and explains why some acquire rules conducive to growth, such as those that are open, stable, and universally applicable, than others, given that institutions such as secure property rights are strongly associated with growth (Acemoglu, Johnson, and Robinson 2005).

A key enabling factor is an access to the technologies of control. These are tools to gain knowledge about the subject population, make them "legible," and subject them to manipulation (Scott 1998). Modern-day states have a repertoire of institutions to achieve legibility, such as census (Kertzer and Arel 2002), direct income tax (Levi 1988, ch. 6), the passport (Torpey 2000), citizenship (Brubaker 1992), and compulsory primary education (Hobsbawm 1990, ch. 3).[1] They are powerful, because once introduced, they tend to be universal in scope, penetrating, and hard to roll back. They also often bring transformative changes to subjects' behavior and identity.

State investment in infrastructure is also associated with growth. Transportation projects may reduce transaction costs and increase welfare gains. In an empirical analysis on British India, Donaldson (2018) shows how large an impact railways brought about. Prior to their introduction in the 1850s, bullocks were a primary means of overland transportation, covering 30 kilometers a day. Railways allowed users to travel 600 km a day and opened interregional trade across the subcontinent (Donaldson 2018, 900). Similarly, electricity can effect a sizable change. In post-apartheid South Africa, Dinkelman (2011) reports the impact of universal electrification. In 1993, only less than a third of the households had electricity and more than 80 percent relied on woods for home

[1] See also Brambor et al. (2020) and Lee and Zhang (2017) for empirical analysis.

production. By 2001, approximately one fourth of the households (or about 2 million households) was newly connected to the grid (Dinkelman 2011, 3079). This project can not only increase productivity and create employment opportunities but bring health benefits by not having to burn woods inside home. As these examples suggest, states' reliance on technologies of control as well as investment in infrastructure are strongly linked to economic activity in the modern context.

In this paper, I investigate the impact of state-funded postal service on city-level economic growth in pre-industrial France. This case is instructive because, unlike modern-day examples described above, the state's capacity, its technologies of control, and its infrastructure investment were more limited. Throughout the pre-modern era, European states struggled to impose their authority across their domain and raise revenue consistently (Dincecco 2009, 2015).[2] Overland transportation was generally much less reliable than overseas transportation. To circulate information and to enforce rules, the state had to resort to the known tools—man, horse, and carriage. Since these did not easily overcome geographical distances and obstacles, geography continued to present challenges to overland transportation as well as communications. The state-funded post was introduced partly to address them and make the flow of information faster—so that it would aid centralization (Schobesgerger et al. 2016). In France, one of the forerunners on European soil to begin a state-sponsored service in the 1480s, the importance of having control over the flow of political information was keenly recognized early on, through events such as the Wars of Religion in the late sixteenth century and the royal feud over the succession involving Louis XIII in the 1610s.[3] Paris increasingly centralized the postal business not just by expanding its network but also by abolishing preexisting private communal services such as university messengers. At the same time, despite the centralization, Paris's investment in the infrastructure was slow to come, and the road conditions remained poor throughout the pre-industrial period. To what extent did a postal system under these conditions contribute to pre-industrial growth?

[2]See Elliott (1992), Koenigsberger (1987), and Nexon (2009) for a general account of European states being "composite."

[3]See, for instance, Pettegree (2010, 155–6) on the former example and Sawyer (1990) as well as Vittu (2001) on the latter.

I examine the role of the post in pre-industrial growth based on a new time-series and cross-sectional data set of 341 cities in France from 1500–1850 that I have constructed. I document evidence by computing a city's distance to commercial centers in each period *via postal routes*. The data are drawn from the postal networks across several periods—1553, 1690, 1731, 1792, and 1835—by tapping hitherto undigitized published sources. These reveal two features: First, despite the absence of documentary evidence on the origins, the network clearly follows the hub-and-spokes model with Paris the hub. Second, access to postal services grew over time, but the pace was incremental in much of the time. The initial network of 1553 covered approximately 48 percent of the observations whose figure made little progress for the next two hundred years (approximately 56 percent in the 1731 network). Only in the post-Revolutionary period did the pace of coverage take off by passing the two-thirds mark (over 71 percent in the 1792 network). This approach allows me to explore the impact of variation in postal networks over time on the variation in a city's distance to commercial hubs. I can also differentiate the cost of travel between the on-route cities and the off-route ones. At the same time, postal routes can function as constraints. When a route to an urban center is set up as a tortuous one, users may find the service too cumbersome.

A main finding of this study is that the expansion of the postal network has positive consequences to city growth. In a saturated model with city and period fixed effects, a 1-percent decline in the distance to commercial hubs via postal routes leads to an approximately 1-percent increase in population size. This result takes into account extra costs of access put on the off-route cities. My identification strategy draws from the related literature on the economic impact of modern infrastructure projects, particularly railways and highways, in a number of countries. One threat to identification is that positive benefits of infrastructure come largely from activity in nearby towns, and connections with distant locales may have a negligible impact. Removing those effects, I find that a city's access to commercial centers beyond the 650-km cutoff remains positively linked to city growth. In another exploration of heterogenous effects, I remove observations close to Paris at different distance-cutoffs, because they benefit from proximity to the network hub. The estimation results remain consistent, albeit with smaller magnitudes. Finally, given the absence of a design of

the state-funded post, I use two instrumental variables to address endogeneity concerns. Both are grounded in the idea that some units become part of the network because of their proximity to major destinations which, in turn, tend to receive a treatment for expected high traffic volumes. In my case, I use as instruments the distance to the Roman-era posts and the distance to the urban centers at the time of 1500, prior to the first postal map. The results are in the expected sign and magnitude in the first instrument but not in the second, suggesting that Paris plausibly built a cost-minimizing network by using the remnants of the physical infrastructure from the Roman period.

I make two contributions in this paper. First, I conceptualize the post as the early-modern state's instrument to strengthen its capacity to rule and consolidate authority—with constraints. Empirical research has shown that the introduction and expansion of the post significantly reduces transaction costs as well as information costs and is linked to innovation and other growth-enhancing activities in the modern settings (Acemoglu, Moscona, and Robinson 2016; Rogowski et al. 2022). In early-modern France, I highlight how these positive consequences applied to this case but were slow to come in much of the period. I also discuss the dearth of state investment on the road conditions, which remained generally poor. My conceptual framework incorporates attributes that could undermine France's ability to centralize authority and could dampen economic activity through this infrastructure. Second, my findings are based on a new time-series and cross-sectional data set that I have built. In so doing, I build on the existing contributions that have compiled published sources and offered descriptive evidence on the progress of postal growth in the early eighteenth century through the early nineteenth century (Arbellot 1992; Bretagnolle and Verdier 2014). To the best of my knowledge, this study is the first to digitize the French postal routes before the eighteenth century and to document evidence on the link between the state-funded post and city growth.

Historical Background

In Europe, postal service underwent an *institutional* transformation at the turn of the fifteenth century. It was in Germany in 1490 that introduced the imperial post (*Kaiserliche Reichspost*), which

substantially improved the speed of operation. Previously, a courier on horseback was responsible for an entire route, including the return trip. The man and the horse therefore had to take a periodic rest for food and well as lodging at a post office along the way. The German innovation was to allow both postmen and horses to switch at relay stations placed at much shorter (i.e., two- to three-mile) intervals. These roadhouses were placed specifically for the postal service, where commissioned officials served as "masters of the post" to take care of horses and lodging (Allen 1972, ch. 1). This system increased the pace of delivery by several folds. For instance, couriers in 1505 carried mails in a 765-km route from Mechelen, the town near Brussels, to Innsbruck for 131 hours (or five days and eleven hours) (Behringer 1990, 10–1); if they traveled at the pace of 25 km as before, it would have taken thirty days.[4]

France started a state-funded post in the 1480s under Louis XI (r. 1461–1483) by investing in paving postal roads.[5] At the time, relay stations were placed at approximately seven-league intervals (30 km or 18.6 miles), the distance a mailman was expected to travel in a single day. It was expanded to 90 km in the following century (Caplan 2016, 35). Under this system (called *poste aux chevaux*), the postmaster retained an exclusive privilege over a given route, in which a mailman could rent a horse and other supplies for travel. This policy was in place so that couriers had an incentive to receive the service by postmasters and keep using the designated route (Vaillé 2018, 33). The position of a postmaster (*maître des postes*) was a venal one and typically purchased by members of the richest families in a parish. It was also an essential condition for recruitment for the crown. The rationale is that given the high fixed costs of keeping the horses and couriers fresh as well as keeping the business afloat, a wealthy postmaster would be ideal (Marchand 2006, 224). The state, in exchange, allowed the postmasters to retain all of the privileges they had acquired, in addition to an annual compensation (Vaillé 2018, 34).

[4]The German imperial post is also innovative in that the German state outsourced the operation to the noble family of the Taxis who made the service *public*. It not only carried letters for royal and administrative purposes but also gave an access to other customers, including merchants and priests, to deliver not only letters and packages but also money, jewelry, and samples of textiles and spices (Behringer 2006, 342).

[5]Some attribute the origin of the French post to the royal decree issued on June 19, 1464, only to be proven inauthentic in subsequent research (Vaillé 2018, 31–2).

Given the absence of documentary evidence (Vaillé 2018, 16), one could only imagine how Louis XI and his officials wanted the postal network to look.[6] However, how it was used is obvious: The French post was originally to carry only the personal communications for the crown (Vaillé 2018, 36). This is partly because there were privately-run communal postal services in operation prior to the state-run post. These include clerical mail services as well as university messengers, in which faculty and students circulated copies of books across the participating institutions. In addition, beginning in the seventeenth century the state intended to consolidate authority over the postal matters by issuing a series of royal decrees. For instance, one edict granted the head of the postal institutions the sole right to install new relay stations. It was designed to undermine the private messenger services (Vaillé 2018, 43).

In 1672 came the next major institutional change, which created a letter-post system (*poste aux lettres*). Through this system, the state granted a monopoly farm (*Ferme générale des postes*) the exclusive right to run the postal business for a fixed term. The state would see a predictable flow of revenue through the lease. The farm, in exchange, retained all the profits from the sale of letters (Caplan 2016, 39). Importantly, the new service was now open to the public and carried private letters and packages for a fee throughout the territory. This change was based on a demand for private use, which was on the rise since the start of the state-directed post. Under the previous system, any profits went to the postmaster as the proprietor of a relay station.

These institutional changes should facilitate economic activity. Given that the letter post became available to public, the cost of circulating information and exchanging small goods overland is expected to go down. However, the physical infrastructure did not keep pace with the improvements in the institutions during the early-modern era. This could undermine the growth in economic activity afforded by the expansion of the postal network.

The road conditions were generally poor until at least the beginning of Louis XI's reign (r. 1710–1774). Efficient delivery services would require both horse-drawn carriages for mass-transporting goods and paved roads with certain size compatible with carriages. Obstacles on the road made de-

[6]For England, one motive to determine where to assign posts was that of defense, particularly with regard to information on continental Europe (Campbell-Smith 2011).

livery highly inefficient, because coaches were not able to bypass them as quickly as human travelers (Behringer 2006, 360). Until the eighteenth century, state officials kept relying on the roads previously constructed, including those from the Roman times, and kept using narrow and unfit roads (Arbellot 1973, 766). The poor state of the road was particularly pronounced in the West (Brittany) and the South. These road conditions were well-recognized and regarded as crucial bottlenecks for rule enforcement as well as the economy (Arbellot 1973, 766). In the 1720s, the crown started to issue edits to pave roads to accommodate more horse-drawn carriages. But much of the construction had to wait until the 1760s and the 1770s and was largely confined to the routes surrounding Paris. Progress in other parts of France came with a proposal adopted in 1818 (Marchand 2006, 77).

In sum, this section describes the postal system's characteristics that are both conducive and detrimental to economic activity. The network expanded and grew accommodating of private uses over time. The institution became streamlined so that revenue flew into the state coffers on the regular basis. However, the physical infrastructure lagged behind. Plans for improvement were conceived early in the eighteenth century, but only in the latter half of the century did they start to be implemented. In the rest of the paper I examine the postal infrastructure's impact on economic growth.

Empirical Strategy

The principal unit of analysis in the study of pre-modern economic activity is the city. On Europe, Bairoch, Batou, and Chévre (1988) is a standard source which compiles city-level population from 800–1850 at mostly hundred-year intervals. In my analysis, I use all 341 cities in France over six periods (1500, 1600, 1700, 1750, 1800, and 1850), yielding 2,046 city-periods. More recently, Bosker, Buringh, and van Zanden (2013) revisits the Bairoch et al. data, and I follow their corrections and updates on the population data. This is my outcome variable.

My main explanatory variable is the geographical distance to commercial hubs *via postal routes*. There are two rationales for the concept. First, it captures the benefits as well as the constraints of this

particular infrastructure. A given pair of cities may enjoy the service as the postal network makes the trip easier, while the travel may become more cumbersome for another if the route is designed excessively circuitous. In general, the benefits are expected to be great for less populous towns that are close to these hubs or those that lie between them, which are known in regional and urban economics as "inconsequential" towns. Second, this approach allows for understanding a town's access to urban centers, both near and far. A public infrastructure can strengthen the incentive to do business with commercial centers that were previously too time-consuming to reach. Time-series data can offer insight over how the changes in access affect growth as the networks expanded.

I base the "commercial hubs" on the 10-percent most populous cities in each period. This is for a *practical* reason: An infrastructure project typically starts by connecting between extant urban centers. Once the initial networks were built, smaller towns would most want to get to these centers more frequently than other smaller towns. I expect this incentive to be particularly great in pre-modern times when transportation technologies were limited as well as when overland transportation remained much less reliable than overseas transportation. For example, the 29 commercial centers in 1500 include all eleven cities that held medieval fairs. If these postal networks were growth-enhancing, their impact would be most discernible in changes in the ease of access to these commercial hubs. To incorporate changes in population size over time, I create a period-specific set of commercial centers as shown in Table 1.

Table 1: 10 percent most populous cities of France in each time period.

1500	1600	1700	1750	1800	1850
Paris	**Paris**	**Paris**	**Paris**	**Paris**	**Paris**
Tours	**Rouen**	**Lyon**	**Lyon**	**Lyon**	Marseille
Orléans	**Tours**	Marseille	Marseille	Marseille	**Lyon**
Lyon	Marseille	**Lille**	**Rouen**	**Bordeaux**	**Bordeaux**
Bordeaux	**Toulouse**	**Rouen**	**Lille**	**Rouen**	**Rouen**
Marseille	**Orléans**	**Bordeaux**	**Bordeaux**	Nantes	Nantes
Rouen	**Bordeaux**	**Toulouse**	Nantes	**Lille**	**Toulouse**
Bourges	**Lyon**	Nantes	Versailles	**Toulouse**	**Lille**
Toulouse	**Rennes**	Amiens	**Toulouse**	Strasbourg	Toulon
Lille	**Lille**	**Orléans**	Strasbourg	**Orléans**	Strasbourg
Caen	Valenciennes	**Rennes**	**Orléans**	Metz	Brest
Troyes	Dieppe	**Angers**	Montpellier	Nîmes	Metz
Strasbourg	**Caen**	**Caen**	**Caen**	Amiens	Saint-Étienne
Poitiers	Avignon	Aix	Amiens	**Caen**	Nîmes
Dieppe	**Angers**	Versailles	Dijon	Montpellier	Amiens
Amiens	Strasbourg	Toulon	**Rennes**	**Angers**	**Orléans**
Avignon	Nantes	Strasbourg	Metz	Reims	**Angers**
Valenciennes	Amiens	Saint-Malo	Brest	Besançon	Reims
Provins	La Rochelle	Reims	Nîmes	Avignon	Nancy
Metz	Dijon	Avignon	Avignon	Nancy	Montpellier
Nantes	Poitiers	Montpellier	Reims	Brest	**Caen**
Rennes	Metz	Arles	Besançon	**Rennes**	Le Havre
Dijon	Arras	Rochefort	**Angers**	Montauban	Limoges
Angers	Troyes	**Tours**	Aix	Clermont-Ferrand	Besançon
Aix	Bourges	Dijon	Clermont-Ferrand	Versailles	**Rennes**
Reims	Aix	Grenoble	Grenoble	Troyes	Versailles
Hondschoote	Reims	Valenciennes	Nancy	Nice	Avignon
Saint-Omer	Nice	Metz	Arles	Toulon	Nice
Arras	Arles	Poitiers	Saint-Étienne	Saint-Omer	**Tours**
	Steenvoorde	Le Havre	Douai	Limoges	Clermont-Ferrand
	Montpellier	Nîmes	Toulon	Dunkirk	Roubaix
	Montauban	Montauban	Troyes	Aix	Mulhouse
	Nîmes	Le Mans	Poitiers		Dijon
		Troyes	Limoges		Grenoble

Notes: Sorted by population size. Bold fonts refer to eleven cities that held medieval commercial fairs. *Source:* Bairoch, Batou, and Chévre (1988) and Bosker, Buringh, and van Zanden (2013).

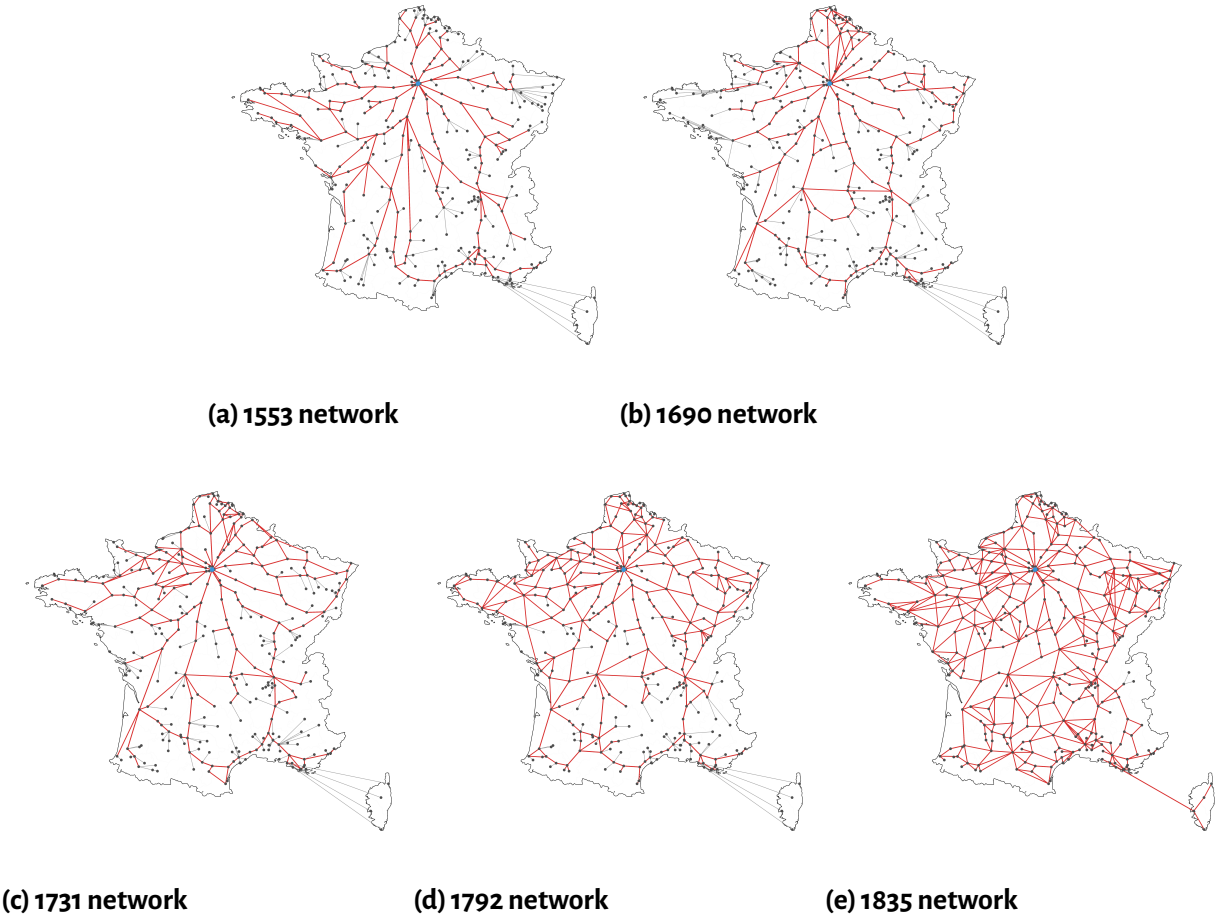
I draw on a variety of published sources for pre-industrial French postal networks. On this subject, Arbellot (1992) offers a stock of knowledge on the archival sources of maps, including those of postal routes. It highlights the evolution of the postal routes beginning with the historic 1632 map, in which cartographer Nicolas Sanson drew the known routes and relay stations throughout the country for the first time (Arbellot 1992, 20). Thereafter, the Jaillot family became the primary

editor by publishing postal maps annually under the title, *Liste générale des postes de France*, in much of the eighteenth century.[7] Since only partial maps were published in Arbellot (1992), I turn to other sources. For the sixteenth century, I use Boissière (2016) that identifies the known postal routes in 1553. For the seventeenth century, I draw on the first map that the Jaillot family published in 1690, which is available at the Bibliothèque nationale de France (BnF) (Jaillot 1690).[8] For the eighteenth century, I use the 1731 map (Jaillot 1731) as well as the 1792 one (Arbellot and Lepetit 1987). For the first half of the nineteenth century, I draw from the 1835 map made by Tardieu (1835), one of the engravers discussed in Arbellot (1992), also stored at BnF.

[7] See Appendix I of Arbellot (1992).

[8] The BnF gives 1695 as the date of publication, while the U.S. Library of Congress gives 1690 and Arbellot (1992) gives 1689. All three refer to the same map.

Figure 1: Postal networks in France, 1553–1835.



(a) 1553 network **(b) 1690 network**

(c) 1731 network **(d) 1792 network** **(e) 1835 network**

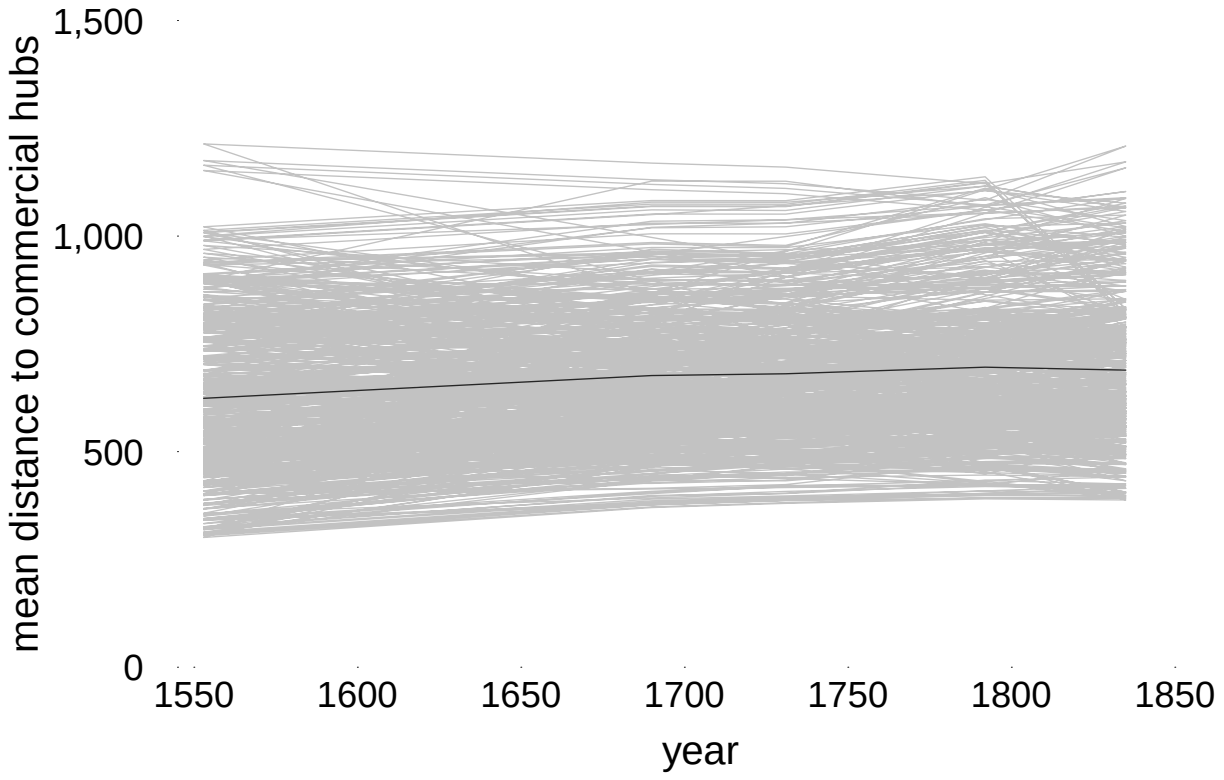
Note: The number of postal relays is 163 in 1553 (47.8 percent of the 341 observations), 173 in 1690 (50.7 percent), 190 in 1731 (55.7 percent), 243 in 1792 (71.3 percent), and 330 in 1835 (96.8 percent). The blue dot indicates Paris. The red lines indicate the postal routes. The gray lines indicate the off-route paths to the nearest post-bearing cities. For Corsica, Marseilles is set as the nearest major Mediterranean port for access.
Source: See the Empirical Strategy section. The source maps are available in the Appendix.

Figure 1 display these maps. In 1553, relay stations were established in less than a half of the 341 cities. These made little progress over the next 150 years, as a little more than a half of the cities was covered by the end of the seventeenth century. This is in line with the assessment in the literature that post offices were still rare at the time (Arbellot 1992, 20). The pace quickened in the eighteenth century, by the end of which more than two-thirds of the cities received a post. Finally, by 1835 virtually all cities were covered. These findings are consistent with those of an earlier work by Bretagnolle and Verdier (2014) which digitizes France's postal networks between 1708 and 1833.

Their contributions include the development of postal roads in length, which more than doubled during the eighteenth century (Bretagnolle and Verdier 2014, 199).

Although the existing literature provides no design or plan about how the network should be expanded, Figure 1 clearly indicates that it followed a hub-and-spokes model in which Paris served as the hub. The model suggests that those cities close to Paris would be more likely to receive a relay or be part of the network, a finding that postal roads and relay stations tended to be concentrated in the northern half (Bretagnolle and Verdier 2014). I take this pattern of development into consideration in my identification strategy in the next section. Figure 2 plots the average distance, via the postal routes in each period, to the commercial hubs, where the gray lines represent individual cities and the black line denotes the mean value.

Figure 2: Average distance to commercial hubs via postal routes, 1553–1835.



Note: The gray lines represent individual cities and the black line denotes the mean value.
Source: See the Empirical Strategy section.

For those cities that are outside the network, I identify the nearest post-bearing city and assign

the distance to that city as an additional cost of access to the service. The literature provides no theoretical or empirical guide as to how costlier it would get for an off-route city to reach commercial hubs than an on-route one. My calculation comes from Brayshay, Harrison, and Chalkley (1998), which explore the postal networks in southwestern England of the Elizabethan period. The study finds from a sample that travel would have taken twice as much time for off-route cities than for on-route ones over the same distance. I use this estimate to add the distance between an off-route city and the nearest on-route city as a "burden" to use the post.

A host of covariates are included in my data set. The first is access to canals. Canals have historically played an important role in France by facilitating the transportation of goods for the traders located inland. I draw on a public report compiled in Becquey (1820) to identify the canals that were in operation before the nineteenth century. I then georeference them and count the number of canals within the 50 km for each city. The second is a set of geographical determinants. These include the distances to the nearest border and to the nearest coast, which may vary over time as France's territory changes. I draw on the shape files in Nüssli (2011), which offers GIS (geographical information system)-based information on the location, administrative divisions, and political status for the subunits that existed at the final year of each century, to identify the nearest points for each measure. Two additional geographical measures include land elevation above the sea level and terrain ruggedness, both of which are drawn from the GLOBE (Global Land One-kilometer Base Elevation project) database (GLOBE Task Team and others 1999).[9] It is a 1 km-by-1 km gridded data on land terrain that covers the entire world.

The third set of controls refers to access to private communal postal services, specifically the university networks and the church networks. Since these came into force before the state-sponsored post but no routes are available, I take the following approach. For the university services, I first draw on Frijhoff (1996), Rüegg (2011), and Darby and Fullard (1970) to obtain the foundation date of universities and then create an indicator variable that equals one if a city hosts a university in a given period. I take into account if universities were suppressed. For the church services, I create a

[9]The terrain ruggedness index (TRI) is originally proposed by Riley, DeGloria, and Elliot (1999).

similar indicator, based on Chaney (2023) that contains information about the history of bishoprics across the world, that equals one whether a bishopric (either a diocese or an archdiocese) was established before 1500. The institutional changes, such as suppression or merger, are noted. Finally, I include an additional institutional measure that describes a city's time under French rule. Territorial change means that some cities were governed by non-French polities and came under French rule at various points of time. It happened particularly to the northeastern and eastern region of France, where territorial changes were frequent. I use Darby and Fullard (1970) to identify when cities joined and sometimes rejoined France and compute time under French rule since 1477.

Estimation Results

Baseline Estimation

My baseline specification is a model with fixed effects. For city *i* in year *t*, it is a linear estimator

$$\ln \text{Pop. growth}_{it} = \alpha + \beta \ln \text{Ave. distance to hub cities via postal routes}_{it} + \gamma X_{it} + \delta_i + \eta_t + \epsilon_{it} \quad (1)$$

where the outcome variable is the log population of city *i* in year *t*, where $t \in \{1500, 1600, 1700, 1750, 1800, 1850\}$. The main explanatory variable is β, which is the log average distance to commercial hubs via postal routes for each period. Equation 1 also includes a vector of covariates, described above and denoted in X. The inclusion of city fixed effects and the time fixed effects, δ and η respectively, means that the remaining variation comes from characteristics within city. Standard errors are clustered by the city.

Table 2: Baseline estimation on the impact of distance to commercial hubs via postal routes on city growth in France, 1500–1850.

Dependent variable	Log population growth, 1500–1850						
	Average impact				Absolute impact		
	(1) No covariates	(2) Saturated	(3) Saturated	(4) Unweighted	(5) No covariates	(6) Saturated	(7) Saturated
Log average distance to hub cities via postal routes	−0.968***	−0.897***	−1.023***	−1.025***			
	(0.324)	(0.318)	(0.391)	(0.391)			
Δ reduced distance to hub cities via postal routes					0.00003**	0.00003*	0.00003*
					(0.00002)	(0.00002)	(0.00002)
City FE	✓	✓	✓	✓	✓	✓	✓
Period FE	✓	✓	✓	✓	✓	✓	✓
Period × Latitude			✓	✓			✓
N cities	341	341	341	341	341	341	341
Observations	2,046	2,046	2,046	2,046	1,705	1,705	1,705

Notes: Standard errors clustered by cities. The number of postal relays is 163 in 1553 (47.8 percent of the observations), 173 in 1690 (50.7 percent), 190 in 1731 (55.7 percent), 243 in 1792 (71.3 percent), and 330 in 1835 (96.8 percent). Columns 1–4 use as the main explanatory variable the average distance to the hub cities via postal routes in each period, while Columns 5–7 use absolute changes in the total distance from one period to the next (e.g., changes in distance from Year 1500 to Year 1600), thus dropping Year 1500 from analysis. In Columns 1–3, a weight is assigned for each off-route city, which equals the distance to the nearest post-bearing city. Column 4 removes the weight. No weight is used for Columns 5–7. In Columns 3, 4, and 7, a period indicator interacted with latitude is introduced, where Year 1500 is the reference category. The full results are reported in the Appendix. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table 2 reports the results of the baseline estimation. In Column 1 with no covariates other than the fixed effects, the coefficient of −0.968 means that a 1-percent decline in a city's distance to commercial hubs via postal routes, on average, increases the city population by 0.968 percent. The magnitude drops to nearly 0.9 when all covariates are included in Column 2 but increases in Column 3, where latitude and the interactions between it and year indicators are introduced. These account for a city's geographical location and unobserved time-varying factors specific to the location, following the analysis on the U.S. railways in Donaldson and Hornbeck (2016). The increased value in coefficients suggests that city location seems to matter to understand population growth. Column 4 drops the weight assigned to the cities outside the postal networks in all periods. The magnitude gains given that those cities' access to commercial hubs gets shorter.

Columns 5 through 7 examines the impact of the reduced distance to commercial hubs. While the first four columns focus on *average* changes, these explore *absolute* changes in the distance from

one period to the next. In this variable, I subtract a city's distance to the hubs, for instance, from Year 1600 to Year 1500 and from Year 1700 to Year 1600, and so on. Year 1500, the reference category, is dropped from analysis as there is no change in value. Positive values mean that greater reductions in distance lead to increases in population. But the small magnitude suggests that year-to-year changes seem substantively less informative than overall changes, the results consistent with Figure 2.

Heterogeneous Effects

The rest of the analysis considers heterogeneous effects of the postal networks. The results of Table 2 suggest that geographical location plays an important role in understanding city growth. I employ two approaches to investigate this possibility. The first compares influence from nearby hubs to that from distant ones. One can imagine that proximity to nearby urban centers can disproportionately drive both local markets and economic activity in those centers. To investigate this possibility, I subset the main explanatory variable by limiting a city's access to commercial hubs at two cutoff distances: *beyond 500 km* and *beyond 650 km*. Following Donaldson and Hornbeck (2016), this approach reflects impact of exchange only from those distances while removing the "local shocks."

Table 3: The role of proximity to commercial hubs in city growth.

Dependent variable	Log population growth, 1500–1850	
	(1)	(2)
Distance beyond	500 km	650 km
Log average distance to hub cities via postal routes	−0.539	−1.030**
	(0.428)	(0.491)
All covariates	✓	✓
City FE	✓	✓
Period FE	✓	✓
Period × Latitude	✓	✓
N cities	341	341
Observations	2,046	2,046

Notes: Standard errors clustered by cities. The number of postal relays is 163 in 1553 (47.8 percent of the observations), 173 in 1690 (50.7 percent), 190 in 1731 (55.7 percent), 243 in 1792 (71.3 percent), and 330 in 1835 (96.8 percent). In

all models, a period indicator interacted with latitude is introduced, where year 1500 is the reference category. The full results are reported in the Appendix. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table 3 reports the outcome of these scenarios. When the cutoff distance is 500 km, the coefficient stays negative but the magnitude drops significantly. By contrast, the magnitude nearly doubles at the 650-km buffer. This exercise suggests two possibilities: One is that the local shocks—within the 500-km distance to commercial hubs—explain the variation. Another driver is that local markets would be willing to go an extra mile to trade with far-flung cities. This suggests that for ordinary towns, the connection to a subset of hubs plays a crucial role rather than any hubs.

The second analysis further explores this possibility by focusing on local displacement. Some localities gain disproportionate benefit from just being close to major trading centers. While they enjoy a reduced cost of access, they may experience displacement as the flow of population may be concentrated in those hubs. Distant towns, by contrast, may be shielded from such a competition. To capture these displacement effects, I draw from Bogart et al. (2022) by setting certain distances from major cities as cutoffs. The most obvious destination in my study is Paris whose surrounding towns could face displacement. I set two scenarios: In the first, all cities within the 100-km radius from Paris are removed. In the second, the cutoff is set at 150 km. 24 and 48 cities are dropped respectively.

Table 4: The local displacement effect to city growth.

Dependent variable	Log population growth, 1500–1850	
	(1)	(2)
Cities from Paris dropped within	100 km	150 km
Log average distance to hub cities via postal routes	-0.941^{**}	-0.721^{*}
	(0.383)	(0.400)
All covariates	✓	✓
City FE	✓	✓
Period FE	✓	✓
Period × Latitude	✓	✓
N cities retained (dropped)	317 (24)	293 (48)
Observations	1,902	1,758

Notes: Standard errors clustered by cities. The number of postal relays is 163 in 1553 (47.8 percent of the observations), 173 in 1690 (50.7 percent), 190 in 1731 (55.7 percent), 243 in 1792 (71.3 percent), and 330 in 1835 (96.8 percent). In all models, a period indicator interacted with latitude is introduced, where year 1500 is the reference category. The full results are reported in the Appendix. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table 4 documents evidence on local displacement. Column 1's coefficient, -0.906 is lower than that of Column 3 (-0.988) in Table 2. The reduced magnitude suggests that proximity to Paris plays a key role in the population growth of the removed localities. At the same time, the statistically significant association suggests that population gain is not large enough to compete with cities distant from Paris. A similar result obtains when the threshold increases to 150 km.

Instrumental-Variables Analysis

The empirical analyses thus far provide supporting evidence that the postal networks facilitated economic growth in pre-modern France. One identification challenge is that some unobserved factors determine postal routes, economic growth, or both. Another challenge comes from the fact that despite the absence of a grand design, the established routes clearly had Paris as the hub. To address these issues, I draw on the literature on the modern railways to employ two instrumental variables (IVs).

The first instrument draws on the location of relay stations built under Rome. The idea is that those relay stations could have served as a cost-minimizing approach to building infrastructure when the French planners began to mount their own in the sixteenth century. Crucially, Vaillé (2018, 23) indicates that there is no *institutional* linkage between the Roman-era post and the French one, suggesting that the goals of choosing where to place Roman posts within the subsequent French territory would be distinct from those for the French ones. If there is Rome's legacy, it would be remnants of infrastructure that French officials found convenient to reduce the cost of building their routes. This IV captures the variation in geographical proximity to the Roman-era posts to minimize the cost of building French postal routes.

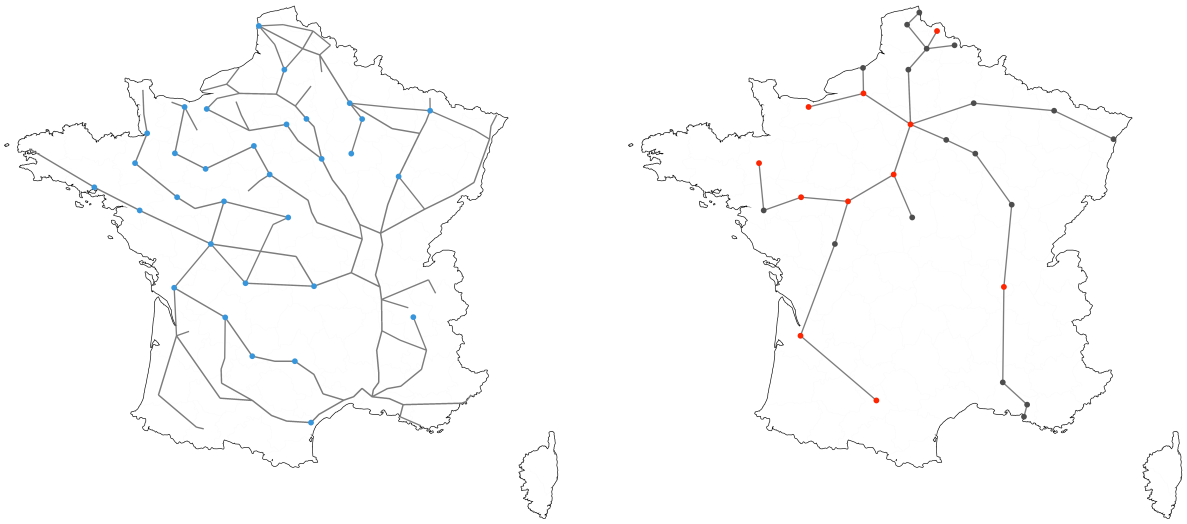
For the location of the Roman-era relay stations, I draw on a map, archived at BNF, that reconstructed in 1785 the road networks as well as postal locations in the Imperial Era (27 BCE–476 CE) (d'Anville 1785). I then identify the 32 locales that hosted a relay station, calculate the shortest distance to them for the observations, and use it as an instrument. It captures how small the infrastructure cost becomes as a city gets closer to a Roman relay station. Panel (a) of Figure 3 displays this map.

The second instrument is based on the "inconsequential places" approach. Some places get infrastructure investment simply because of their proximity to major destinations to minimize the cost of building routes along those destinations but otherwise would not (hence "inconsequential"). Those hubs are "consequential" because of an expected large volume of traffic. Proximity to such consequential places serves as a second instrument. In my case, Paris could handpick these cities as strategically important upon starting a postal network given that the use was limited to official communications only. Originally used in regional and urban economics, it is now widely used as a source of exogenous variation in the literature on modern railways and highways in many contexts.[10]

[10]This approach is used in a number of previous works. In economics, pioneering studies include Michaels (2008) on U.S. highways and Atack, Fred Bateman and Margo (2010) on U.S. railways, in which they select historically significant cities as consequential places. Others that draw from historical cities include Hornung (2015) and Paik and Vechbanyongratana (2021). Recent research that adopts this approach includes Bogart et al. (2022), Fenske, Kala, and Wei (2023), Banerjee, Duflo, and Qian (2020), which uses straight-lines connections across historical cities as a main explanatory variable. In addition, there are some studies that combine slope and other geographical impediments in computing least-cost paths, including Faber (2014), Berger (2019), and Jedwab, Kerby, and Moradi (2017). The development literature also make use of geographical attributes as a source of exogenous variation, including Dinkelman

Similar to the first IV, I calculate each city's shortest distance to 29 most populous cities in 1500. Panel (b) of Figure 3 displays this map.

Figure 3: Source networks of exogenous variation for the pre-industrial postal routes in France.



(a) Posts and roads, Roman Imperial Era **(b) "Least cost path" postal routes**

Note: The left panel displays the roman road networks of the Roman Imperial Era (27 BCE–476 CE). The gray lines indicate the road networks and the blue dots indicate the location of the relay station-bearing cities at the time. The right panel displays the "least cost path" created based on the 29 most populous cities in 1500. The red dots indicate the location of the 11 cities that once hosted the medieval fairs.
Source: See the Empirical Strategy section. The source map of the Roman roads is available in the Appendix.

Table 5 documents the results of these IV exercises. In the first stage, the distance-to-Roman-post instrument is negatively and significantly associated with a post office in the sixteenth century, meaning that proximity to the Roman Imperial Era-post predicts the city's chances of getting a relay station later. The *F*-statistic on the weak instrument is approximately 12. Having a post positively and significantly increases population size by 1.6 percent in the second stage whose outcome is consistent with the preceding analysis. By contrast, the distance-to-hub-cities instrument is negative but not significant in the first stage (Column 3). Provided that these instruments serve as tools to

(2011), which draws on land gradient to decide which locales receive an electricity project in South Africa, and Duflo and Pande (2007), which draws on river gradient to decide which locales receive dams in India.

gauge how Paris could build its initial network in the sixteenth century, the results of Table 5 suggest that minimizing infrastructure cost could have plausibly played a role.

Table 5: Two-Stage Least Squares regressions on city growth.

	IV: Log distance to Roman post		IV: Log distance to hub cities	
	First stage	Second stage	First stage	Second stage
Dependent variable	Post in 1500	Log population growth	Post in 1500	Log population growth
	(1)	(2)	(3)	(4)
Post in 1500s		1.571^{***}		17.488^{***}
		(0.529)		(1.052)
Log distance to Roman post	-0.070^{***}			
	(0.020)			
Log distance to hub cities			−0.028	
			(0.023)	
All covariates	✓	✓	✓	✓
Observations	341	341	341	341
F-statistic for weak instrument	11.65		1.6	

Notes: In Columns 1 and 2, log distance to the Roman post is the instrument. In Columns 3 and 4, log distance to the hub cities in 1500 is the instrument. The full results are reported in the Appendix. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Conclusion

In this paper, I consider the state-funded post as a tool to help consolidate authority. Using pre-industrial France as a case, I discuss how the post as an institution acquired a public good function when its expansion in the early seventeenth century became available to the public. I also mention how little investment the state made on the physical infrastructure, particularly the road conditions beyond the the vicinity of Paris. I then provide evidence that postal expansion is consistently positively linked to to city-level growth. An instrumental-variables approach suggests that Paris may have adopted a infrastructure cost-minimizing strategy in its decision to assign relay stations.

My empirical analysis yields implications for state capacity. In early-modern times, geography constituted a major impediment to the development of state capacity among European states. Ex-

tant research indicates that those with relatively large territory, such as France, tended to be late to overrule the previous taxation means that relied upon the local authorities and to institute a centralized scheme (Johnson and Koyama 2014). Geographical distance remained a key reason that European states had to turn to regional assemblies, where the taxation authority in their localities was granted in exchange for local autonomy (Stasavage 2010). For the state, this condition was less than ideal, because it perpetuated the information asymmetry between its officials and the local strongmen about the taxable economic activity. My analysis suggests that the postal institution, while growth-enhancing in the aggregate, was not a political tool strong enough to overcome geographical impediments and help consolidate authority, especially in the countryside where those assemblies were placed. In a seminal monograph, Weber (1976) vividly portrays how rare a sighting of officials was in the remote areas from the capital even in the mid-nineteenth century. When they showed up, they were to be avoided, because they tended to bring "bad news" to the villagers—taxation, conscription, and so on.[11] Only when the railway reached the countryside did geography become less of a problem and the state begin to govern the entire country directly. This paper highlights how crucial a role geography plays in understanding the state consolidation of authority.

[11] See Levi (1997, 44–51) for how many would-be conscripts tried a variety of tactics, including self-mutilation, to avoid conscription in the early nineteenth century.

References

Acemoglu, Daron, Jacob Moscona, and James A. Robinson. 2016. "State Capacity and American Technology: Evidence from the Nineteenth Century." *American Economic Review: Papers and Proceedings* 106(5): 61–7.

Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2005. "Institutions as a Fundamental Cause of Long-Run Growth". In *Handbook of Economic Growth*, ed. Philippe Aghion and Steven N. Durlauf. Vol. 1A. New York: Elsevier, pp. 385–472.

Allen, E. John B. 1972. *Post and Courier Service in the Diplomacy of Early Modern Europe*. The Hague: Marinus Nijhoff.

Andrews, Matt, Lant Pritchett, and Michael Woolcock. 2017. *Building State Capability: Evidence, Analysis, Action*. New York: Oxford University Press.

Arbellot, Guy. 1973. "La grande mutation des routes de France au XVIII^{e} siècle." *Annales: Économies, Sociétés, Civilisations* 28(3): 765–91.

Arbellot, Guy. 1992. *Autour des routes de poste. Les premières cartes routières de la France, XVII^{e}–XIX^{e} siècle*. Paris: Bibliothèque Nationale Musée de la Poste.

Arbellot, Guy, and Bernard Lepetit. 1987. *Atlas de la Révolution française*. Vol. 1: *Routes et communications*. Paris: École des Hautes Études en Sciences Sociales.

Atack, Jeremy, Michael Haines, Fred Bateman and Robert A. Margo. 2010. "Did Railroads Induce or Follow Economic Growth? Urbanization and Population Growth in the American Midwest, 1850–1860." *Social Science History* 34(2): 171–97.

Bairoch, Paul, Jean Batou, and Pierre Chévre. 1988. *La Population des villes Européennes de 800 à 1850: Banque de données et analyse sommaire des résultats*. Genéve: Librairie Droz.

Banerjee, Abhijit, Esther Duflo, and Nancy Qian. 2020. "On the Road: Access to Transportation Infrastructure and Economic Growth in China." *Journal of Development Economics* 145: 102442.

Becquey, François-Louis. 1820. *Rapport au Roi sur la Navigation Intérieure de la France*. Paris: Imprimerie Royale.

Behringer, Wolfgang. 1990. *Thurn und Taxis: Die Geschichte ihrer Post und ihrer Unternehmen*. München: Piper Verlag.

Behringer, Wolfgang. 2006. "Communications Revolutions: A Historiographical Concept." *German History* 24(3): 333–74.

Berger, Thor. 2019. "Railroads and Rural Industrialization: Evidence from a Historical Policy Experiment." *Explorations in Economic History* 74: 101277.

Besley, Timothy, and Torsten Persson. 2009. "The Origins of State Capacity: Property Rights, Taxation, and Politics." *American Economic Review* 99(4): 1218–44.

Bogart, Dan, Xuesheng You, Eduard J. Alvarez-Palau, Max Satchell, and Leigh Shaw-Taylor. 2022. "Railways, Divergence, and Structural Change in 19th Century England and Wales." *Journal of Urban Economics* 128: 103390.

Boissière, Aurélie. 2016. *Atlas de l'histoire de France, 481–2005*. Saint-Étienne: Belin.

Bosker, Maarten, Eltjo Buringh, and Jan Luiten van Zanden. 2013. "From Baghdad to London: Unraveling Urban Development in Europe, the Middle East, and North Africa, 800–1800." *Review of Economics and Statistics* 95(4): 1418–37.

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

Brayshay, Mark, Philip Harrison, and Brian Chalkley. 1998. "Knowledge, Nationhood and Governance: The Speed of the Royal Post in Early-modern England." *Journal of Historical Sociology* 24(3): 265–88.

Bretagnolle, Anne, and Nicolas Verdier. 2014. "Expanding the Network of Postal Routes in France, 1708–1833". In *Post Offices of Europe, 18th–21st Century: A Comparative History*, ed. Muriel Le Roux. New York: P.I.E. Peter Lang, pp. 183–202.

Brubaker, Rogers. 1992. *Citizenship and Nationhood in France and Germany*. Cambridge, MA: Harvard University Press.

Campbell-Smith, Duncan. 2011. *Masters of the Post: The Authorized History of the Royal Mail*. Middlesex: Penguin.

Caplan, Jay. 2016. *Postal Culture in Europe, 1500–1800*. Oxford: Voltaire Foundation.

Chaney, David M. 2023. "The Hierarchy of the Catholic Church: Current and Historical Information about Its Bishops and Dioceses.".
URL: www.catholic-hierarchy.org

d'Anville, Jean-Baptiste Bourguignon. 1785. "Carte de la Gaule: divisée en 17 grandes Provinces Romaines au tems des Empereurs.".
URL: https://gallica.bnf.fr/ark:/12148/btv1b10678810p

Darby, H.C., and Harold Fullard, eds. 1970. *The New Cambridge Modern History*. Vol. 14: *Atlas*. Cambridge: Cambridge University Press.

Dincecco, Mark. 2009. "Fiscal Centralization, Limited Government, and Public Revenues in Europe, 1650–1913." *Journal of Economic History* 69(1): 48–103.

Dincecco, Mark. 2015. "The Rise of Effective States in Europe." *Journal of Economic History* 75(3): 901–18.

Dinkelman, Taryn. 2011. "The Effects of Rural Electrification on Employment: New Evidence from South Africa." *American Economic Review* 101(7): 3078–108.

Donaldson, Dave. 2018. "Railroads of the Raj: Estimating the Impact of Transportation Infrastructure." *American Economic Review* 108(4-5): 899–934.

Donaldson, Dave, and Richard Hornbeck. 2016. "Railroads and American Economic Growth: A 'Market Access' Approach." *Quarterly Journal of Economics* 132(2): 799–858.

Duflo, Esther, and Rohini Pande. 2007. "Dams." *Quarterly Journal of Economics* 122(2): 601–46.

Elliott, J.H. 1992. "A Europe of Composite Monarchies." *Past and Present* 137: 48–71.

Faber, Benjamin. 2014. "Trade Integration, Market Size, and Industrialization: Evidence from China's National Trunk Highway System." *Review of Economic Studies* 81(3): 1046–70.

Fenske, James, Namrata Kala, and Jinlin Wei. 2023. "Railways and Cities in India." *Journal of Development Economics* 161: 103038.

Frijhoff, Willem. 1996. "Patterns". In *A History of the University in Europe*, ed. Hilde de Ridder-Symoens. Vol. 2: *Universities in Early Modern Europe*. Cambridge: Cambridge University Press, pp. 43–110.

Fukuyama, Francis. 2011. *The Origins of Political Order: From Prehuman Times to the French Revolution*. New York: Farrar, Straus and Giroux.

GLOBE Task Team and others. 1999. "The Global Land One-kilometer Base Elevation (GLOBE) Digital Elevation Model.".
URL: http://www.ngdc.noaa.gov/mgg/topo/globe.html

Hobsbawm, Eric. 1990. *Nations and Nationalism since 1780: Programme, Myth, Reality*. Cambridge: Cambridge University Press.

Hornung, Eric. 2015. "Railroads and Growth in Prussia." *Journal of the European Economic Association* 13(4): 699–736.

Jaillot, Alexis-Hubert. 1690. "Carte particulière des postes de France.".
URL: https://gallica.bnf.fr/ark:/12148/btv1b531194921/

Jaillot, Bernard-Antoine. 1731. "Nouvelle carte des postes de France.".
URL: https://gallica.bnf.fr/ark:/12148/btv1b53083374j

Jedwab, Remi, Edward Kerby, and Alexander Moradi. 2017. "History, Path Dependence and Development: Evidence from Colonial Railways, Settlers and Cities In Kenya." *The Economic Journal* 127(603): 1467–94.

Johnson, Noel D., and Mark Koyama. 2014. "Tax Farming and the Origins of State Capacity in England and France." *Explorations in Economic History* 51(1): 1–20.

Johnson, Noel D., and Mark Koyama. 2017. "States and Economic Growth: Capacity and Constraints." *Explorations in Economic History* 64: 1–20.

Kertzer, David I., and Dominique Arel, eds. 2002. *Census and Identity: The Politics of Race, Ethnicity, and Language in National Censuses*. New York: Cambridge University Press.

Koenigsberger, H.G. 1987. *Early Modern Europe, 1500–1789*. London: Longman.

Lee, Melissa M., and Nan Zhang. 2017. "Legibility and the Informational Foundations of State Capacity." *Journal of Politics* 79(1): 118–32.

Levi, Margaret. 1988. *Of Rule and Revenue*. Berkeley and Los Angeles: University of California Press.

Levi, Margaret. 1997. *Consent, Dissent, and Patriotism*. New York: Cambridge University Press.

Marchand, Patrick. 2006. *Le Maître de postes et le messager. Les Transports publics en France au temps des chevaux*. Paris: Belin.

Michaels, Guy. 2008. "The Effect of Trade on the Demand for Skill: Evidence from the Interstate Highway System." *Review of Economics and Statistics* 90(4): 683–701.

Nexon, Daniel H. 2009. *The Struggle for Power in Early Modern Europe: Religious Conflict, Dynastic Empires, and International Change*. Princeton: Princeton University Press.

Nüssli, Christos. 2011. "Euratlas.".
URL: http://www.euratlas.com/about.html

Paik, Christopher, and Jessica Vechbanyongratana. 2021. "Reform, Rails, and Rice: Political Railroads and Local Development in Thailand." Mimeo.

Pettegree, Andrew. 2010. *The Book in the Renaissance*. New Haven: Yale University Press.

Riley, Shawn J., Stephen D. DeGloria, and Robert Elliot. 1999. "A Terrain Ruggedness Index That Quantifies Topographic Heterogeneity." *Intermountain Journal of Sciences* 6(1–4): 23–7.

Rogowski, Jon C., John Gerring, Matthew Maguire, and Lee Cojocaru. 2022. "Public Infrastructure and Economic Development: Evidence from Postal Systems." *American Journal of Political Science* 66(4): 885–901.

Rüegg, Walter, ed. 2011. *A History of the University in Europe*. Vol. 1–4. Cambridge: Cambridge University Press.

Sawyer, Jeffrey K. 1990. *Printed Poison: Pamphlet Propaganda, Faction Politics, and the Public Sphere in Early Seventeenth-Century France*. Berkeley and Los Angeles: University of California Press.

Schobesgerger, Nikolaus, Paul Arblaster, Mario Infeslise, André Belo, Noah Moxham, Carmen Espejo, and Joad Raymond. 2016. "European Postal Networks". In *News Networks in Early Modern Europe*, ed. Joad Raymond and Noah Moxham. Vol. 47 of the Library of the Written Word: *The Handpress World*, vol. 35. Leiden and Boston: Brill, pp. 19–63.

Scott, James C. 1998. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven: Yale University Press.

Stasavage, David. 2010. "When Distance Mattered: Geographic Scale and the Development of European Representative Assemblies." *American Political Science Review* 104(4): 625–43.

Tardieu, Pierre-Antoine. 1835. "Carte spéciale des postes de France.".
URL: https://gallica.bnf.fr/ark:/12148/btv1b53035319f

Torpey, John. 2000. *The Invention of the Passport: Surveillance, Citizenship and the State*. New York: Cambridge University Press.

Vaillé, Eugène. 2018. *A Concise History of the French Post Office: From Its Origins to the Present Time*. New York: P.I.E. Peter Lang.

Vittu, Jean-Pierre. 2001. "Instruments of Political Information in France". In *The Politics of Information in Early Modern Europe*, ed. Brendan Dooley and Sabrina A. Baron. London and New York: Routledge, pp. 160–78.

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

Appendix for "Postal Growth"

April 4, 2023

Contents

1 Original Maps of Post Offices in France Used to Construct the Main Explanatory Variable **A2**
- 1.1 1553 . . . A2
- 1.2 1690 . . . A3
- 1.3 1731 . . . A4
- 1.4 1792 . . . A5
- 1.5 1835 . . . A6

2 Estimation Results **A7**
- 2.1 Baseline Estimate . . . A7
- 2.2 Local Shocks . . . A8
- 2.3 Local Displacement . . . A9
- 2.4 Instrumental-Variables (IV) Approach . . . A10
  - 2.4.1 Map of Roman Posts and Attendant Roads during the Imperial Period . . . A10
  - 2.4.2 Location of Roman Posts as an IV . . . A11

1 Original Maps of Post Offices in France Used to Construct the Main Explanatory Variable

1.1 1553

Figure A1 shows the distribution of the known postal relays in France in 1553. It is drawn by cartographer Aurélie Boissière and documented in *Atlas de l'histoire de France, 481–2005* (2016).

Figure A1: Geographical distribution of post offices in France in 1553.

1.2 1690

Figure A2 exhibits the distribution of the known relay stations of the French post published in 1690. Titled "Carte particulière des postes de France," it is drawn by Alexis-Hubert Jaillot. The map is available online as part of the World Digital Library project of the U.S. Library of Congress. The date of publication is 1695 according to the Bibliothèque nationale de France (BnF).

Figure A2: Geographical distribution of post offices in France in 1690.

1.3 1731

Figure A3 presents the distribution of France's post offices published in 1731. Titled "Nouvelle carte des postes de France," it is drawn by Bernard-Antoine Jaillot. The map is available online at BnF.

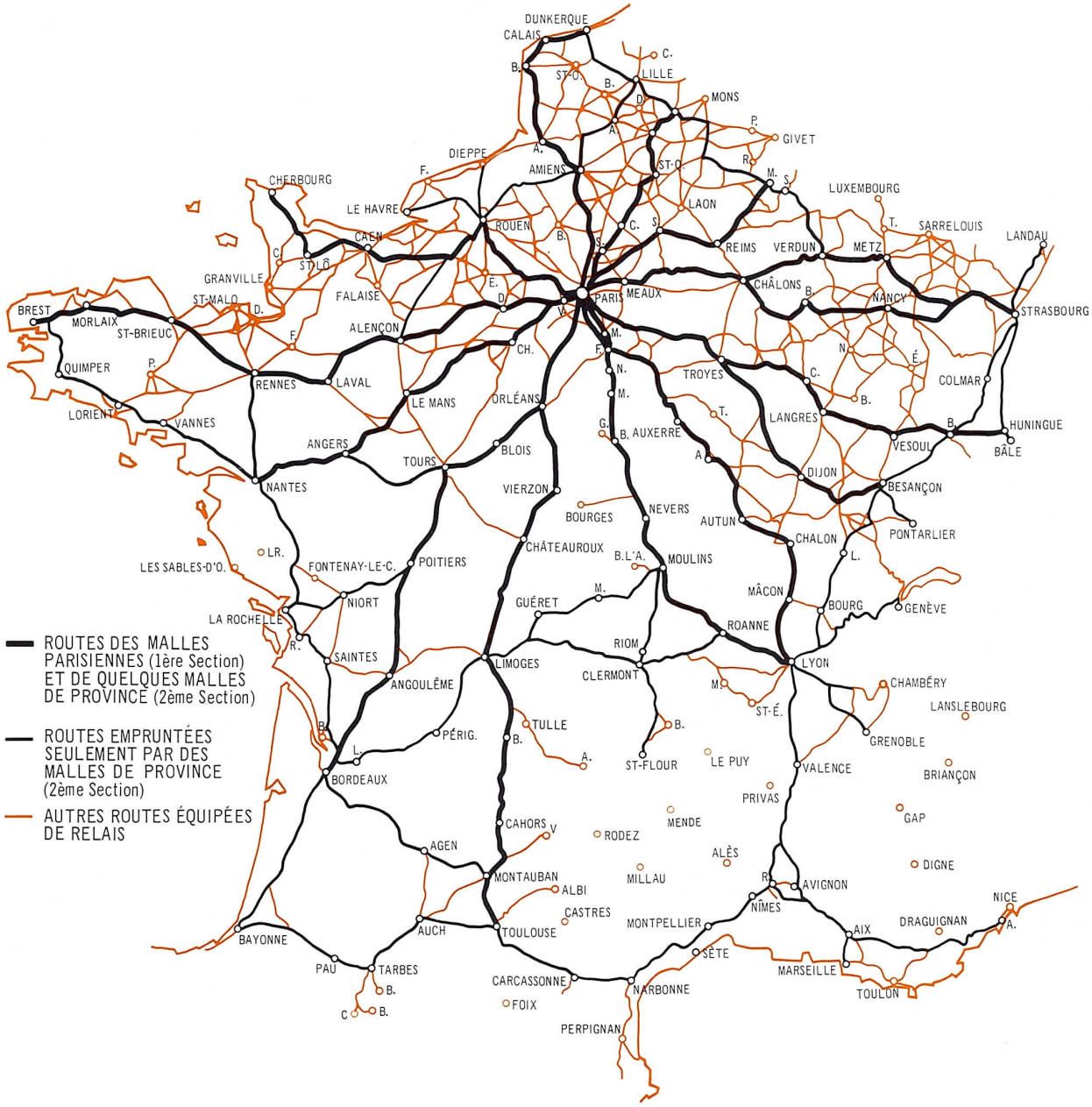
Figure A3: Geographical distribution of post offices in France in 1731.

Source gallica.bnf.fr / Bibliothèque nationale de France

1.4 1792

Figure A4 presents the distribution of France's post offices in 1792. It comes from Guy Arbellot and Bernard Lepetit in *Atlas de la Révolution française*, vol. 1: *Routes et communications* (1987). It is part of the 11-volume series on the French Revolution published by the École des Hautes Études en Sciences Sociales.

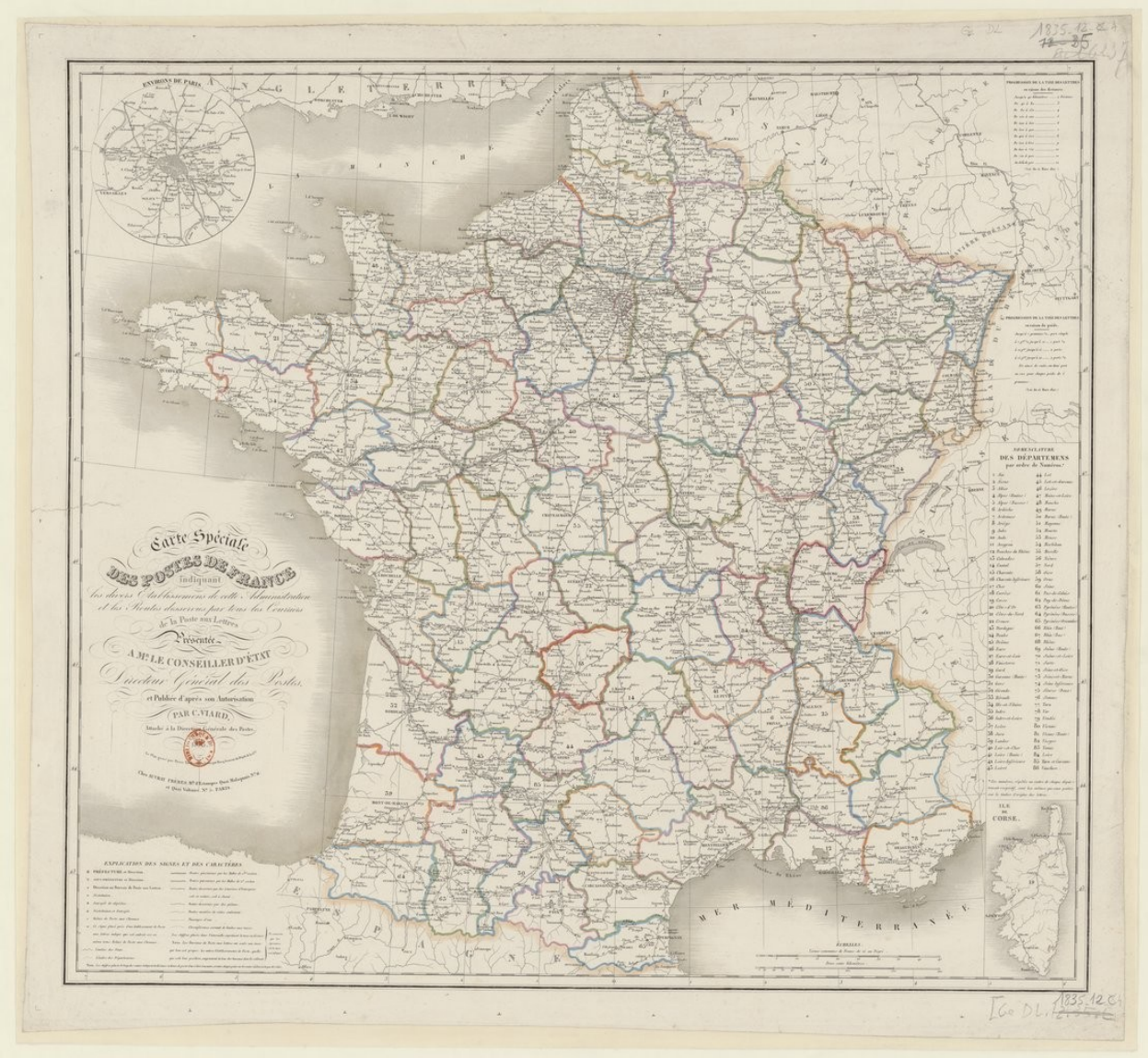
Figure A4: Geographical distribution of post offices in France in 1792.



1.5 1835

Figure A5 presents the distribution of France's post offices published in 1835. The map is titled "Carte spéciale des postes de France," in which Pierre-Antoine Tardieu is the engraver. The map is available online at BnF.

Figure A5: Geographical distribution of post offices in France in 1835.



Source gallica.bnf.fr / Bibliothèque nationale de France

2 Estimation Results

2.1 Baseline Estimate

Table A1 presents the full result of Table 2 in the text.

Table A1: Baseline estimation on the impact of distance to commercial hubs via postal routes on city growth in France, 1500–1850.

Dependent variable	Log population growth, 1500–1850						
	Average impact				Absolute impact		
	(1) No covariates	(2) Saturated	(3) Saturated	(4) Unweighted	(5) No covariates	(6) Saturated	(7) Saturated
Log average distance to hub cities via postal routes	−0.968***	−0.897***	−1.023***	−1.025***			
	(0.324)	(0.318)	(0.391)	(0.391)			
Δ reduced distance to hub cities via postal routes					0.00003**	0.00003*	0.00003*
					(0.00002)	(0.00002)	(0.00002)
Number of canals within 50km		−0.074	−0.076	−0.076		−0.109	−0.115
		(0.093)	(0.094)	(0.094)		(0.106)	(0.107)
Log distance to nearest border		0.014	0.027	0.027		0.015	0.025
		(0.030)	(0.032)	(0.032)		(0.035)	(0.037)
Log distance to nearest coast		0.184	0.179	0.180		0.335**	0.323**
		(0.251)	(0.258)	(0.258)		(0.159)	(0.159)
Elevation		−0.014***	−0.028***	−0.028***		−0.016***	−0.035***
		(0.003)	(0.008)	(0.008)		(0.003)	(0.007)
Terrain ruggedness		0.182***	−0.113*	−0.113*		0.199***	−0.208***
		(0.034)	(0.068)	(0.068)		(0.046)	(0.044)
Bishopric established before 1500		−18.565***	−12.469***	−12.482***		−20.784***	−12.156***
		(3.769)	(2.106)	(2.110)		(4.600)	(3.080)
University		−0.516***	−0.504***	−0.504***		−0.541***	−0.530***
		(0.120)	(0.121)	(0.122)		(0.161)	(0.157)
Time under French rule since 1477		−0.0004	−0.0003	−0.0003		0.001	0.001
		(0.001)	(0.001)	(0.001)		(0.002)	(0.002)
Latitude			−5.971***	−5.977***			−8.152***
			(1.931)	(1.933)			(1.625)
City FE	✓	✓	✓	✓	✓	✓	✓
Period FE	✓	✓	✓	✓	✓	✓	✓
Period × Latitude			✓	✓			✓
N cities	341	341	341	341	341	341	341
Observations	2,046	2,046	2,046	2,046	1,705	1,705	1,705

Notes: Standard errors clustered by cities. The number of postal relays is 163 in 1553 (47.8 percent of the observations), 173 in 1690 (50.7 percent), 190 in 1731 (55.7 percent), 243 in 1792 (71.3 percent), and 330 in 1835 (96.8 percent). Columns 1–4 use as the main explanatory variable the average distance to the hub cities via postal routes in each period, while Columns 5–7 use absolute changes in the total distance from one period to the next (e.g., changes in distance from Year 1500 to Year 1600), thus dropping Year 1500 from analysis. In Columns 1–3, a weight is assigned for each off-route city, which equals the distance to the nearest post-bearing city. Column 4 removes the weight. No weight is used for Columns 5–7. In Columns 3, 4, and 7, a period indicator interacted with latitude is introduced, where Year 1500 is the reference category. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

2.2 Local Shocks

Table A2 presents the full result of Table 3 in the text.

Table A2: The role of proximity to commercial hubs in city growth.

Dependent variable	Log population growth, 1500–1850	
	(1)	(2)
Distance beyond	500 km	650 km
Log average distance to hub cities via postal routes	−0.539	−1.030**
	(0.428)	(0.491)
Number of canals within 50km	−0.102	−0.101
	(0.093)	(0.092)
Log distance to nearest border	0.023	0.026
	(0.032)	(0.032)
Log distance to nearest coast	0.171	0.158
	(0.258)	(0.252)
Elevation	−0.027***	−0.027***
	(0.008)	(0.007)
Terrain ruggedness	−0.128*	−0.121*
	(0.068)	(0.066)
Bishopric established before 1500	−11.295***	−11.240***
	(1.994)	(1.956)
University	−0.499***	−0.493***
	(0.120)	(0.119)
Time under French rule since 1477	−0.0003	−0.0002
	(0.001)	(0.001)
Latitude	−6.019***	−5.799***
	(1.947)	(1.897)
City FE	✓	✓
Period FE	✓	✓
Period × Latitude	✓	✓
N cities	341	341
Observations	2,046	2,046

Notes: Standard errors clustered by cities. The number of postal relays is 163 in 1553 (47.8 percent of the observations), 173 in 1690 (50.7 percent), 190 in 1731 (55.7 percent), 243 in 1792 (71.3 percent), and 330 in 1835 (96.8 percent). In all models, a period indicator interacted with latitude is introduced, where year 1500 is the reference category. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

2.3 Local Displacement

Table A3 presents the full result of Table 4 in the text.

Table A3: The local displacement effect to city growth.

Dependent variable	Log population growth, 1500–1850	
	(1)	(2)
Cities from Paris dropped within	100 km	150 km
Log average distance to hub cities via postal routes	-0.941^{**}	-0.721^{*}
	(0.383)	(0.400)
Number of canals within 50km	−0.079	−0.098
	(0.094)	(0.095)
Log distance to nearest border	0.023	0.008
	(0.032)	(0.032)
Log distance to nearest coast	0.157	0.164
	(0.257)	(0.263)
Elevation	-0.027^{***}	−0.0002
	(0.008)	(0.001)
Terrain ruggedness	−0.109	−0.0002
	(0.067)	(0.003)
Bishopric established before 1500	-12.360^{***}	0.424
	(2.119)	(1.266)
University	-0.504^{***}	-0.478^{***}
	(0.121)	(0.126)
Time under French rule since 1477	−0.0004	−0.0003
	(0.001)	(0.001)
Latitude	-5.867^{***}	−0.047
	(1.926)	(0.160)
City FE	✓	✓
Period FE	✓	✓
Period × Latitude	✓	✓
N cities retained (dropped)	317 (24)	293 (48)
Observations	1,902	1,758

Notes: Standard errors clustered by cities. The number of postal relays is 163 in 1553 (47.8 percent of the observations), 173 in 1690 (50.7 percent), 190 in 1731 (55.7 percent), 243 in 1792 (71.3 percent), and 330 in 1835 (96.8 percent). In all models, a period indicator interacted with latitude is introduced, where year 1500 is the reference category. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

2.4 Instrumental-Variables (IV) Approach

2.4.1 Map of Roman Posts and Attendant Roads during the Imperial Period

Figure A6 shows the distribution of the roads and postal relays of the Roman Imperial Era (27 BCE–476 CE) within the current French territory. It is drawn by Jean-Baptiste Bourguignon d'Anville, who reconstructed the information on Roman roads and postal relays. The map is available online at BnF.

Figure A6: Geographical distribution of post offices and attendant roads in France during the Imperial.

Source gallica.bnf.fr / Bibliothèque municipale du Havre

2.4.2 Location of Roman Posts as an IV

Table A4 presents the full result of Table 5 in the text.

Table A4: Two-Stage Least Squares regressions on city growth.

	IV: Log distance to Roman post		IV: Log distance to hub cities	
	First stage	Second stage	First stage	Second stage
Dependent variable	Post in 1500	Log population growth	Post in 1500	Log population growth
	(1)	(2)	(3)	(4)
Post in 1500s		1.571***		17.488***
		(0.529)		(1.052)
Log distance to Roman post	−0.070***			
	(0.020)			
Log distance to hub cities			−0.028	
			(0.023)	
Number of canals within 50km	0.016	0.033	−0.001	−0.105***
	(0.029)	(0.052)	(0.030)	(0.040)
Log distance to nearest border	0.015	−0.008	0.037	−0.626***
	(0.024)	(0.046)	(0.023)	(0.051)
Log distance to nearest coast	0.015	−0.016	0.024	−0.467***
	(0.019)	(0.037)	(0.019)	(0.039)
Elevation	−0.0004*	0.0002	−0.0004*	0.008***
	(0.0002)	(0.0005)	(0.0002)	(0.001)
Terrain ruggedness	0.0003	−0.001	0.0002	−0.004***
	(0.0005)	(0.001)	(0.0005)	(0.001)
Bishopric established before 1500	0.178***	0.191	0.216***	−3.374***
	(0.062)	(0.161)	(0.061)	(0.249)
University	0.152	0.873***	0.166	−2.356***
	(0.098)	(0.205)	(0.103)	(0.251)
Time under French rule since 1477	0.001	−0.003**	0.001	−0.017***
	(0.001)	(0.001)	(0.001)	(0.001)
Observations	341	341	341	341
F-statistic for weak instrument	11.65		1.6	

Notes: *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.