Postal Growth: How the State-Sponsored Post Affected Growth in Preindustrial France, 1500–1850*

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Abstract

This paper investigates the role of postal service in city growth in pre-industrial France. Extant research shows that modern-day state-funded infrastructure projects, such as railways, predict growth. I examine the consequences of the post when the pace of expansion was slow and technological innovations were few. 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 the 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 local displacement effects are considered. My instrumental-variables estimation support the impact of the Roman posts' legacy on the initial network. Finally, the historic mid-eighteenth-century reform offers some evidence on improved travel speed in the countryside.

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Introduction

Transportation was crucial in premodern growth, but its costs always constituted a major impediment. Then, seafaring was among the most reliable means, while overland transport remained much slower (de Vries 1984). Indeed, the latter was so inefficient that Paul Bairoch (1988, 11–2) calls it the "tyranny of distance," because the greater distance a courier travelled, the more energies he needed to consume from the cargo for himself to carry on, and the less merchandise he could deliver. Thus polities with a large territory tended to incur high transportation costs. In Europe, geography helps explain why France had a smaller population density and bore greater trade costs than England, which, in turn, played a role in the former's lagged industrialization (Daudin 2010) as well as lagged political centralization for a greater capacity to tax (Johnson and Koyama 2014).[1]

Extant scholarship indicates that postal networks contributed to preindustrial growth by reducing the costs of transportation. They facilitated the faster diffusion of—and the knowledge of—new inventions as well as helped integrate the economy (Mokyr 1990, 69). They also promoted the growth of a pan-European intellectual community by bringing together scientists, engineers, and writers through the exchange of their writings (Mokyr 2016, 195). In the agrarian economy, an easier access to information and knowledge could create new opportunities and play a role of reducing inequalities between already-developed towns and less fortunate ones (Hoffman 1996, 171).

Yet, in preindustrial Europe, evidence on the linkage between postal networks as a mode of infrastructure and growth seems to have been indirect. Relevant empirical research suggests that infrastructure-building and investment in institutions generally yield positive consequences. In a recent study on Roman roads, Flückiger et al. (2022) show that regular connectivity facilitated by Roman roads led to interregional trade, bringing about the long-term convergence of preferences among traders. The expansion of the postal infrastructure is shown to be associated with growth-enhancing activity in modern times (Acemoglu, Moscona, and Robinson 2016; Rogowski et al. 2022). In addition, investment in a postal-service reform resulted in greater innovations in an

[1]Note that Daudin (2010)'s analysis finds that some French industries, particularly that of textile, had supply centers whose access to domestic markets comparable to those of Britain in the late eighteenth century.

industrializing United States toward the turn of the twentieth century (Aneja and Xu 2022). At the same time, infrastructure-building and investment in institutions were slow to come in preindustrial Europe. One reason was that the post was initially created *by* and *for* the state and, critically, not designed to be a source of revenue. Its initial function was political in that the couriers delivered messages to and from the ruler, in which the postal stations installed on the way were meant to be secure places for rest. Although the post was eventually allowed for public use and came to provide greater services, the extent to which it was conducive to growth as strongly as demonstrated in contemporary cases has not been widely studied.

In this paper, I provide systematic evidence on the relationship between the expansion of the postal network and city-level growth in preindustrial France. The postal system constituted, as an economic institution, a crucial means through which to facilitate Smithian growth by reducing transaction costs. In so doing, it created a structured economic life through the exchange of information (Caplan 2016, 177–80). The ability to have this rhythm can beget enhanced productivity and organizational skills via the coordination of one's economic activity. When individuals live in separate towns, the standardized system of delivery installed in both locales makes coordination easier. Such a system is particularly important for merchants, because the access to information—as well as an access earlier than others—would affect their business decisions (Dorhn-van Rossum 1998, ch. 10).[2] Preindustrial France constitutes an instructive case for two reasons. First, it was one of the forerunners on European soil to begin postal operations in the 1480s. Initially it was restricted solely to the crown communications but in 1672 became open to the public due to the high demand for private uses. The network grew throughout premodern times albeit at a varying pace and, as I document empirically, only in the early nineteenth century did it cover virtually all France. The post, or more specifically the one carried by men and horse-drawn carriages, continued to function as the primary means of delivery until the 1840s when steam engine-driven trains began

[2] Dorhn-van Rossum (1998, 323–4) suggests that postal expansion facilitated communications and transactions between cities bearing public mechanical clocks not just by connecting these cities but also making coordination easier among them. On the technology's impact on economic activity in late medieval and early-modern Europe, see Landes (1983), Le Goff (1980), Mokyr (1990), and Dorhn-van Rossum (1998). See also Boerner and Severgnini (2019) and Boerner, Rubin, and Severgnini (2021) for empirical analyses.

to replace it (Caplan 2016, 7). Second, despite the institutional expansion, the roads remained in "pitiful" conditions (Arbellot 1973, 766) and only in the mid- to late eighteenth century did Paris *begin* to invest in them (Lepetit 1984). As described in more detail below, this investment resulted in major improvements in the speed of delivery (Vidal de La Blache 2009, 380). Yet the fruits of the investment were concentrated in the north, especially in the areas surrounding Paris, and overall the infrastructure was poorly managed (Marchand 2006; Letaconnoux 1908, 1909*a*). Thus France is an ideal source to understand how the existing infrastructure could contribute to Smithian growth.

I examine the role of the post in preindustrial growth in France based on a new time-series and cross-sectional data set of 341 cities from 1500–1850 that I have constructed. I document evidence in two broad approaches. The first is by computing a city's distance to commercial centers in each period *via postal routes*. The data are drawn from the postal networks in five periods across three centuries—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 as 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 toward the end of the ancien régime 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 postal growth 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 was set up as a tortuous one, users may have found the service too cumbersome.

In the second approach, I focus on the variation in reductions of travel time. In a seminal article, Guy Arbellot (1973) describes how France by 1785 achieved significant improvements in the road conditions, without resorting to technological innovations, in a state-funded project. Given a large territory, travel speed was chronically slow: by the mid-eighteenth century, for example, it was estimated to take at least twelve days from Paris to Marseille on the Mediterranean. The conditions dramatically changed in what Arbellot portrays as the "grande mutation" in the period between 1765 and 1780. Through the biggest construction project in French history at the time (Arbellot 1973, 767), travel time in the same itinerary was reduced by one third—to eight days. Thus, France in this period experienced not just the expansion of the post but also an increase in delivery speed. I take advantage of this variation in my empirical analysis. By testing whether this transformation had a systematic impact on city growth, I investigate the extent to which reductions in travel time bore fruit for Paris and its neighborhood.

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 a 1-percent increase in population. This result takes into account extra costs of access put on the off-route cities. My identification strategy draws from the 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 nearby bustling 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 growth. In another exploration of heterogenous effects, I remove observations close to Paris at different cutoff distances, because they benefit from proximity to the network hub. The estimation results remain consistent, albeit with smaller magnitudes.

Given the absence of an original plan of the post, I also employ an instrumental-variables (IVs) approach to locate the sources of variation and use two IVs. These are the distance to the Roman-era posts and the distance to the urban centers at the time of 1500, prior to the first available postal map. The former draws from the historical scholarship that highlights that Paris was not a center and also that the Roman network bore no institutional connections to the early-modern one. The latter draws on the economics literature 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. 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.

Finally, I investigate how the French cities gained from the postal network by analyzing initial assignment and the changes in travel time. A difference-in-differences analysis indicates no systematic relationship between the initial postal assignment and city growth, suggesting that the initial pattern did not disproportionately benefit the on-route cities over the off-route ones. Indeed, a flexible estimation that interacts the distance to commercial hubs with the period indicator points to an incremental growth in the magnitude of the post that grew relatively rapidly in the eighteenth century. I further explore this point by using the reductions in travel time brought by the eighteenth-century reform. Although descriptive data indicates remarkable improvements in travel speed when departing from Paris, my analysis finds that these make no significant impact on growth. Where systematic linkages are found, it is among those cities that took at least five days from Paris—outside the greater capital area and in the south. This constitutes evidence of the infrastructure reform but travel-time reductions did not seem to catch up with the rate of postal expansion, resulting in the loss of efficiency in postal transportation.

The principal contribution of this study is empirical. My analysis is based on the time-varying data on the evolution of the postal networks across several periods to capture variations in postal-route travel distances between cities. Moreover, I document detailed data on the changes in travel time reflecting the state's effort to improve roads and investigate their impact as an additional dimension of postal evolution. The findings support the idea of slow and incremental growth in preindustrial times: the scale gained from the network was only discerned over a few hundred years. It was also limited, because the improvement in infrastructure accompanied little technological innovation and its geographical scope was lopsided.

Historical Background

In Europe, postal service underwent an *institutional* transformation at the turn of the fifteenth century. It was Germany in 1490 that introduced the imperial post (*Kaiserliche Reichspost*), which substantially improved the speed of operation. Previously, a single courier on horseback was responsible for an entire assigned route, including the return trip. The man and the horse therefore had to take periodic rest for food as well as lodging at postal stations 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 operation, 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.[3]

France started a state-funded post in the 1480s under Louis XI (r. 1461–1483) by investing in paving postal roads.[4] 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 the 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 2016, 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 state, in exchange, allowed the postmasters to retain all of the privileges they had acquired, in addition to an annual compensation (Vaillé 2016, 34). This was a *practical* arrangement. Prior to

[3] The German imperial post was also innovative in that the German state outsourced the operation from the start to the noble family of the Taxis who made the service *public*.

[4] 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 2016, 31–2).

the railway, the fixed costs of keeping the horses and couriers fresh as well as keeping the business afloat were high so that only wealthy individuals could afford them (Marchand 2006, 224). In this environment, horses occupied a large portion of the operational costs. Using data on England, Barker and Gerhold (1993, 4–7) shows that provender constituted more than 60 percent by the start of the eighteenth century.

Given the absence of documentary evidence on an original plan (Vaillé 2016, 16), one could only imagine how Louis XI and his officials wanted the postal network to look.[5] However, how it was used is obvious: The French post was originally to carry only the personal communications for the crown (Vaillé 2016, 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 2016, 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. For the state, it was beneficial because of the 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. Now that the letter post was in place, 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

[5] 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).

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). These affected both speed and scale. Efficient delivery services would require both horse-drawn carriages for mass-transporting goods and well-designed paved roads that could accommodate the carriages. Obstacles on the road made delivery 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 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 edicts on pavement 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). I will discuss this eighteenth-century reform in more detail in the Estimation Results Section.

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 French cities over six periods (1500, 1600, 1700, 1750, 1800, and 1850) compiled therein, 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 want to get to these centers more frequently than other smaller towns. I expect this incentive to be particularly great in premodern times when transportation technologies were limited as well as when overland transportation remained much less reliable than overseas transportation. For example, the twenty-nine 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

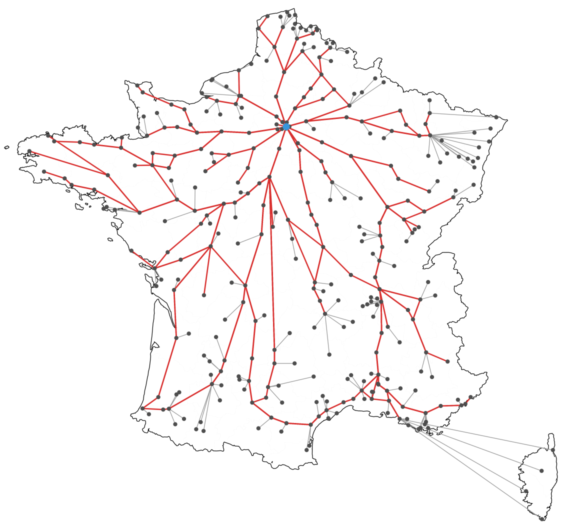
Notes: Sorted by population size. Bold fonts refer to eleven cities that held medieval commercial fairs. *Source:* Bairoch, Batou, and Chévre (1988) and Bosker, Buringh, and van Zanden (2013).

I draw on a variety of published sources for preindustrial 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.[6] Since only partial maps are printed 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).[7] 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.

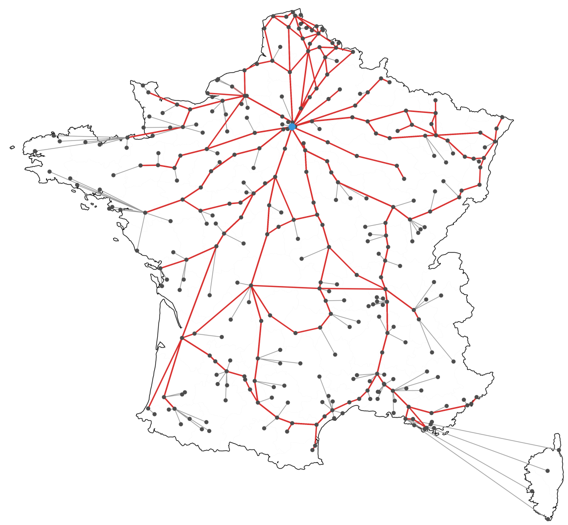
[6]See Appendix I of Arbellot (1992).

[7]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.

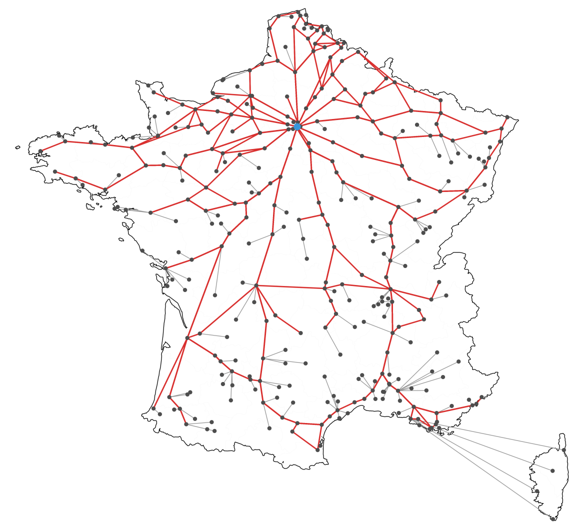
Figure 1: Postal networks in France, 1553–1835.



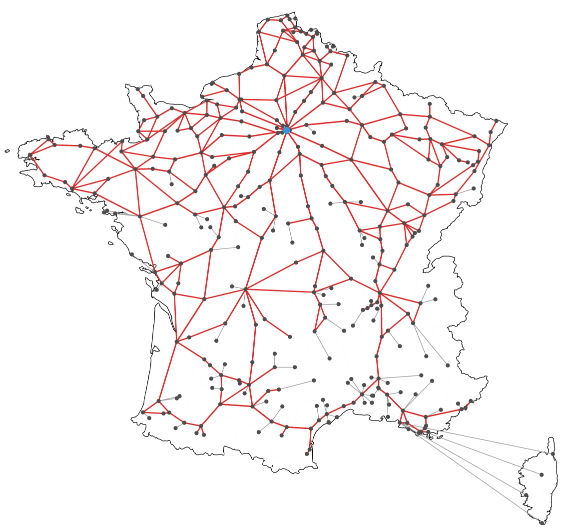
(a) 1553 network



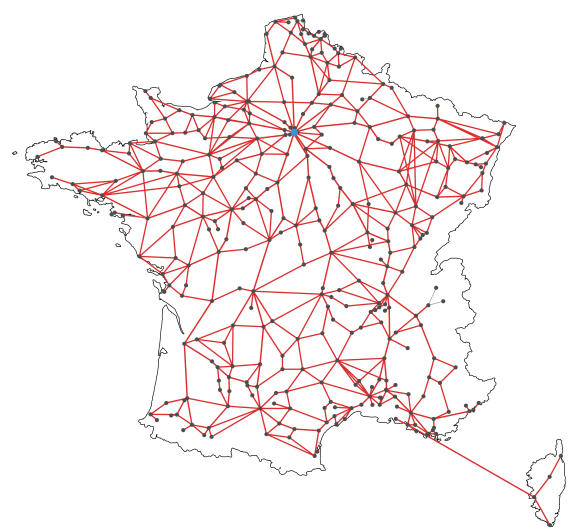
(b) 1690 network



(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, Marseille 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 displays these maps. In 1553, relay stations were established in less than a half of the 341 cities (47.8 percent). These made little progress over the next 150 years, as 50.7 percent was covered by the end of the seventeenth century. This is in line with an 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.

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. An insight comes from Brayshay, Harrison, and Chalkley (1998), which explores 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).[8] 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 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

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

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

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

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, 1500–1850			
	(1) No covariates	(2) Saturated	(3) Saturated	(4) Unweighted
Log average distance to hub cities via postal routes	-0.968^{***} (0.324)	-0.897^{***} (0.318)	-1.023^{***} (0.391)	-1.025^{***} (0.391)
All controls		✓	✓	✓
City FE	✓	✓	✓	✓
Period FE	✓	✓	✓	✓
Period × Latitude			✓	✓
N cities	341	341	341	341
Observations	2,046	2,046	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

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. In Columns 3 and 4, 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.

Heterogeneous Effects

This section 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 these effects. 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 explore 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 the 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, 1500–1850	
	(1)	(2)
Distance beyond	500 km	650 km
Log average distance to hub cities	-0.539	-1.030^{**}
via postal routes	(0.428)	(0.491)
All covariates	✓	✓
City FE	✓	✓
Period FE	✓	✓
Period $\times$ 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, such as those in the south, would be willing to go an extra mile to trade with far-flung cities in the north. 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. Here I set two scenarios: The first is that all cities within the 100-

km radius from Paris are removed. 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, 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. The coefficient of Column 1, −0.906, is lower than that of the saturated model 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

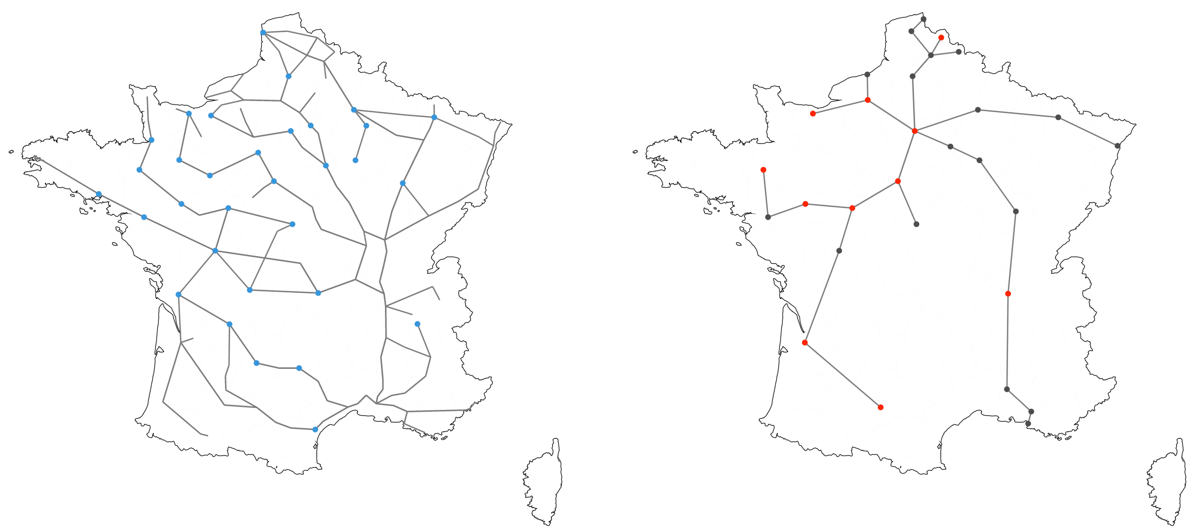
The empirical analyses thus far provide supporting evidence that the postal networks facilitated economic growth in preindustrial France. One identification challenge is that some unobserved factors determine postal routes, economic growth, or both. Another challenge comes from the fact that despite the absence of an original 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 in the Roman era. This is an ideal instrument, because the historical literature as well as the available evidence drawn from the reconstructed network indicate that Paris, the hub in the "French" system in later times, was *not* a center. In a classic work, Vidal de La Blache (2009, 378) points out that the strategic advantage on the location of Paris is only suggestive and nothing seemed predetermined at the time. Moreover, Vaillé (2016, 23) holds that there is no *institutional* linkage between the Roman-era post and the French one, suggesting that the rationales as to where to place posts in Roman times would be distinct from those of the French ones. If one is to discern Rome's legacy, it would be the remnants of infrastructure that French officials found convenient to reduce the cost of building their routes. Indeed, these roads remained active after Rome and the higher density in the north suggests where the center of communication lay (Vidal de La Blache 2009, 380). Thus, 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 thirty-two 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 2 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.[9] Similar to the first IV, I calculate each city's shortest distance to 29 most populous cities in 1500. Panel (b) of Figure 2 displays this map.

Figure 2: 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-

[9] This approach is used in a number of previous works. In economics, pioneering studies include Michaels (2008) on U.S. highways and Atack et al. (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 (Forthcoming). 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 (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.

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 historical literature. 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 gauge how Paris could build its initial network in the sixteenth century, the results of Table 5 suggest that minimizing infrastructure cost based on the remnants of the Roman roads could plausibly play 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	Post in 1500	Log population
	(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 * $p < 0.1$.

Difference-in-Differences on the Initial Postal Assignment

The empirical analysis has thus far focused on the extent to which postal expansion facilitated cities' access to commercial centers and identified the post's varying effects in terms of geographical location, and explored historical sources of variation. This section considers how the post affected growth by taking two approaches. The first concerns whether the initial assignment of relay stations had long-term consequences for those that were included disproportionately throughout the preindustrial period. Given that networks can create path dependency between the "haves" (i.e., on-route cities) and the "have-nots" (off-route ones), it is important to investigate this possibility. To do so, I use a difference-in-differences framework, with the 1553 network as the initial variation:

$$\ln \text{Population}_{it} = \alpha + \beta \ln \text{Ave. distance to hub cities via postal routes}_i \times \text{Post office in } 1553_t + \gamma X_{it} + \delta_i + \eta_t + \epsilon_{it}. \tag{2}$$

Table 6 reports the results. Column 1 includes geographical controls but no fixed effects. Column 2 introduces period fixed effects, while Column 3 adds city fixed effects. In the first two specifications, the coefficient of the interaction term is negative but not significant, suggesting that on-route cities may have enjoyed an easier access to commercial centers for the assignment of postal offices , but the benefits were not different from those outside the network. This result makes sense as less than 50 percent of the cities were covered in the initial network (shown in Figure 1). The coefficient turns positive in Column 3. This suggests that growth came from cities and not from the sparsely-linked postal network; a greater number would have needed to observe beneficial effects. Overall, this exercise indicates that Paris did not choose the "winners" through the initial assignment and that the off-route cities were not put at a disadvantage in the long-run.

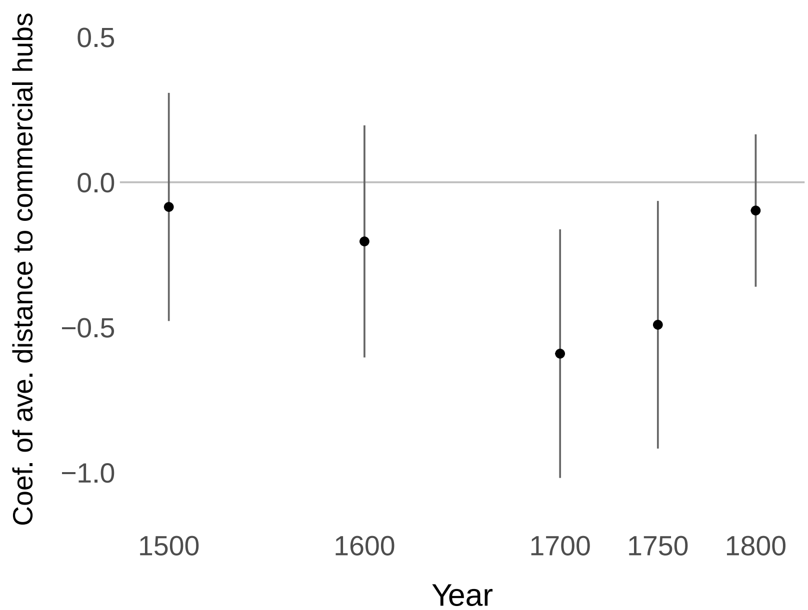
Table 6: The impact of the initial postal assignment to city growth.

Dependent variable	Log population, 1500–1850		
	(1)	(2)	(3)
Log average distance to hub cities via postal routes × Post office in 1553	−0.281 (0.214)	−0.161 (0.175)	0.108 (0.560)
Geographical controls	✓	✓	✓
City FE			✓
Period FE		✓	✓
Observations	2,046	2,046	2,046

Notes: Standard errors clustered by cities in Model 3. In all models, the year 1850 (the final period) is set as the reference category, as this exercise is designed to gauge the impact of the postal assignment in the initial period. Geographical controls include log distance to the nearest border, or log distance to the nearest coast, elevation, terrain ruggedness, and latitude. The full results are reported in the Appendix. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

The incremental impact of postal expansion is demonstrated in Figure 3. In this model, I adopt a flexible estimation method, where the postal routes-based distance measure is interacted with the period indicator. Figure 3 displays the per-period coefficient from 1500 to 1800. First, the magnitude grows in the negative direction through the eighteenth century. It is consistent with the postal expansion over the same period, by which time more than three-quarters of the cities were included. Second, the pace picks up at the same time, as shown in the significant results. I further investigate this point in a later section that focuses on the change in travel speed.

Figure 3: Incremental effects of postal routes on city growth in France, 1500–1800.



Note: The circles are the per-period point estimates from a flexible estimation model in a difference-in-differences framework. The lines are 95-percent confidence intervals.

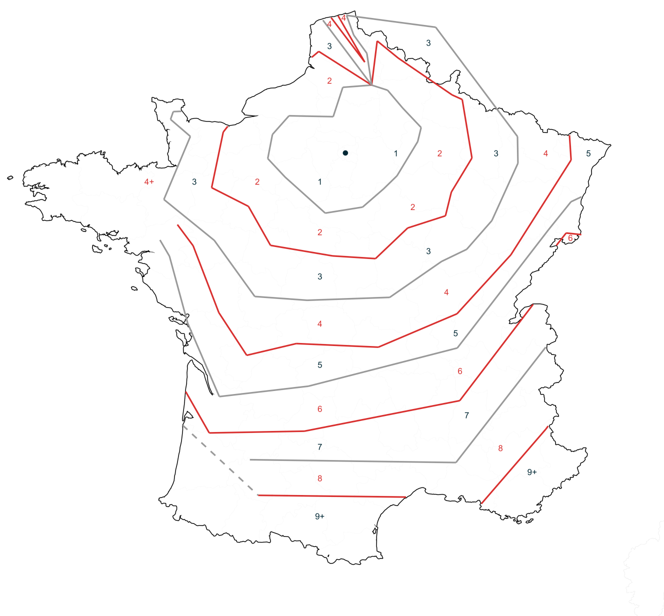
Impact of Infrastructure Investment in the Eighteenth Century

The second approach to examining the linkage between the post and growth is through the infrastructure reform. As previously mentioned, scarcely was maintaining the roads a priority for the French state in much of the preindustrial period. Travel then could not take a brisk pace: In 1680, Louis XIV had to sleep five times in a march from Paris to Châlons-sur-Marne (modern-day Châlons-en-Champagne) (Letaconnoux 1909*b*, 96), whose geodesic distance is about 147.5 km. These conditions persisted in to the eighteenth century. In the first half, overland transportation was such that it constituted an impediment to circulating agricultural products (Letaconnoux 1909*b*, 94). In the second half, it seemed that these problems became even more conspicuous in parts of the country that began to witness the nascent industry. Letaconnoux (1909*b*, 96) points to two reasons that plagued the roads: the lack of funding as well as the lack of a specialized administration.

In the early eighteenth century the state began to address these problems, which culminated in the "grande mutation" toward the end of the ancien régime. To begin, a new dedicated bureaucracy in 1716 overseeing the bridges and roads, *Le Corps des ingénieurs des Ponts and Chaussées*, was founded. Two directors were later appointed, one responsible for the finances and the other for the engineers. Then in 1738 the new corvée instruction was issued not only to bring in a number of specialists but also to secure the necessary manpower for the projects (Arbellot 1973, 766). These engineers were tasked with drawing up network plans in the provinces where roads were lacking as well as deciding on connecting the roads in as short routes as possible (Arbellot 1992, 16). However, despite these efforts, the improvements on pavement were concentrated largely in the greater region surrounding Paris (Marchand 2006, 77). The main constraint was the mounting cost of construction with which the state was simply unable to keep up. It is estimated that at best three-quarters of the planned lengths of roads were built or repaired (Arbellot 1973, 770, 772). Figure 4 displays the changes in travel speed through the state-sponsored project.

Figure 4: Changes in travel duration days from Paris between 1765 and 1780.

(a) 1765 travel duration

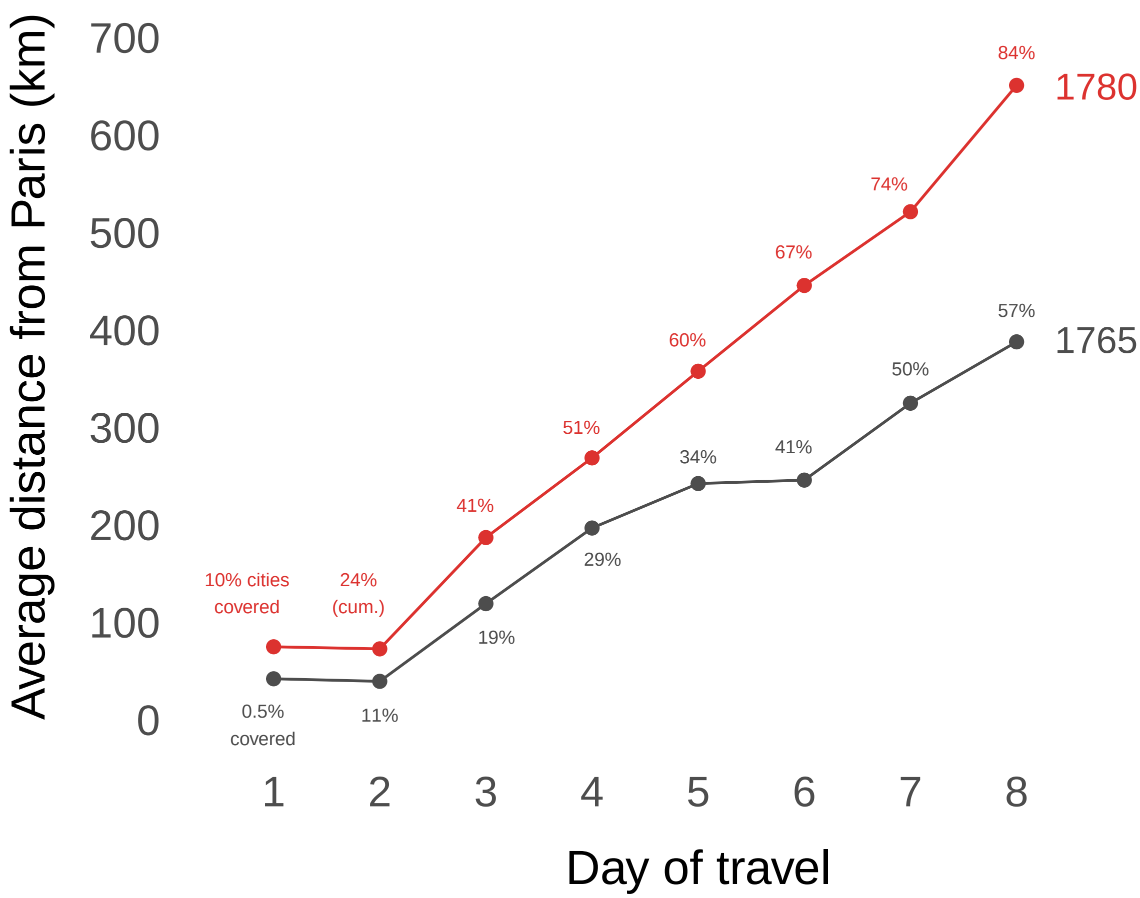


(b) 1780 travel duration

Note: The black dot in the north denotes Paris. The number within each shape, or inside the border, represents the travel duration, in days, from Paris as reported in Arbellot (1973). The alternating colors of black and red are used for each day for visibility. The source maps are available in the Appendix.

While a visual inspection would indicate that the road conditions unmistakably transformed, how much did they improve? To do so, I exploit data underlying these maps for quantitative evidence. First, I georeference the 341 cities in my data set and identify them with the reported travel duration from Paris (in days). For comparison I use the first eight days, because duration estimates for cities that lie beyond nine days in the 1765 map have greater uncertainty. Second, I calculate the distance from the capital and the average for each day. Figure 5 summarizes the exercise.

Figure 5: Comparison of changes in travel distance from Paris between 1765 and 1780.

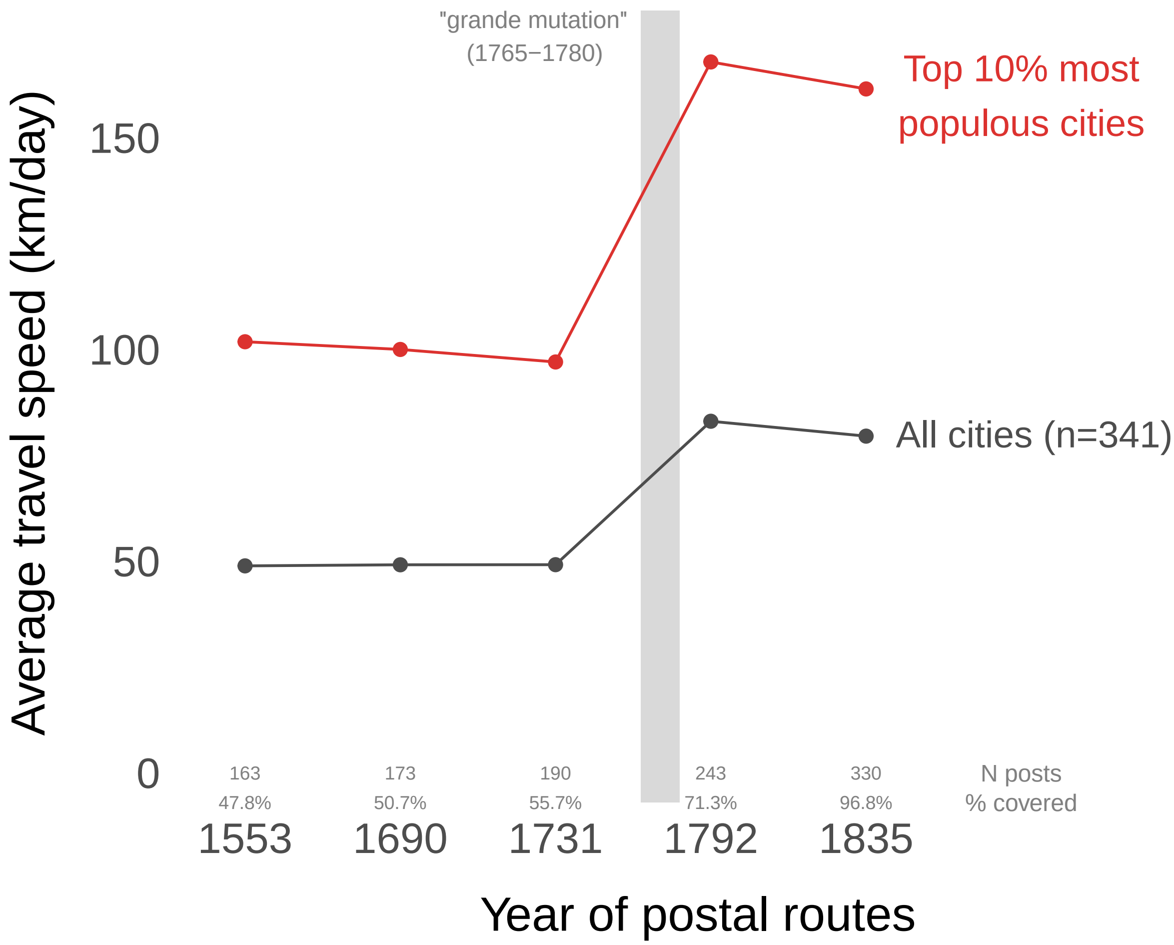


Note: The plot shows the distance from Paris for cities that can be reached within a certain number of days, averaged for the day. The black line denotes data for 1765 and the red line for 1780. The figure around the solid circle show the percentage of the 341 cities in my data set covered for each day cumulatively. *Sources:* Bairoch, Batou, and Chévre (1988) for the observations and Arbellot (1973) for travel durations.

Concrete evidence of improvement emerges from the comparison. The black line in the bottom denotes data for 1765 and the red line represents data for 1780. It is clear that more cities are covered from the first day in 1780, meaning that one could tread a greater distance. The figure around the dot shows the percentage of the cities covered, cumulatively, for each day of travel. Although 0.5 percent was reached in 1765, the number dramatically rises to 10 percent fifteen years later. Figure 5 also indicates that the infrastructure reform was geographically extensive. One reason is that the pace of distance steadily increases for 1780: The average distance for Day 8 (388 km) in 1765 is roughly achieved by Day 5 in 1780 (357 km). Another reason is the fact that a greater number of the cities could be reached by the eighth day—84 percent compared to 57 percent. Such evidence is consistent with the significant expansion of the postal network toward the end of the eighteenth century.

Further exploring the data reported in Figure 4, I compute the average per-day travel speed to commercial hubs for both periods using the following steps. First, I calculate the average distance of travel from Paris for each day based on the geolocation of the cities. It is important to note here that the information on the estimated travel time in Arbellot (1973) is not complete, and uncertainty varies across the two periods. In Panel (a), it is certain up to the eighth day of travel, while it is the fourth day in Panel (b). Indeed, it gets substantially slower using these days as the "cutoffs." In 1765, the average travel distance from one day to the next is 32 km for Day 1 through Day 8, compared to 73 km for Day 9 through Day 16—that is, it takes more than double the time in the latter category, where information is less precise. Similarly, it is 56 km for the first four days, compared to 151 km for the next four. Second, I compute the shortest distance to the nearest commercial hub that bears a relay station for those cities outside the travel-day borders (e.g., Montpellier, on the Mediterranean, has Marseille as the nearest major post, and the distance between the two is roughly 170 km). Then I divide the distance by the slower travel speed to obtain estimated travel time in days (e.g., for Montpellier in 1765, 170 km divided by 73 km per day gets 2.3 days $\approx$ at least 3 days). Third, I add these days to the known travel duration to compute travel time (e.g., Marseille has twelve days in 1765, so: twelve plus three days for Montpellier). There are 61 cities that fit this category across the two periods. Fourth and finally, I use each city's distance to major commercial centers to calculate the speed and repeat the procedure for the five postal networks. Given the "grande mutation" as the watershed period, I use the travel duration for 1765 as the denominator from the 1553 map up to 1731 and the 1780 data for the rest of the maps. Figure 6 summarizes the results.

Figure 6: Changes in travel speed across the five postal networks, 1553–1835.



Note: The top line in red plots the average travel speed, denoted in km per day, over the five postal map-periods for the top 10 percent most populous cities and the bottom line in black shows the same for all observations. The numbers atop the postal periods indicate the number of posts and the percentage covered in each period. *Sources:* Bairoch, Batou, and Chévre (1988) for the observations and Arbellot (1973) for travel durations.

Two points merit attention. First, commercial centers enjoy the substantially higher average travel speed than all cities. This likely reflects the fact that many of them were located in the north so that the distances between them tended to be shorter. Second, the pace of change substantially increased through the "grande mutation" period. Although this affected all cities, with an average increase by 34 km a day from 49 km in 1735 to 83 km in 1792, the magnitude is much greater for major towns, with an increase by more than 71 km a day from 97 km to 168 km. Figure 5 provides evidence that the infrastructure investment not only reduced per-day travel distances across the country but also contributed to travel speed, especially among populous towns.

I take advantage of the variation in travel speed to examine the impact of infrastructure investment. More specifically, I construct three scenarios. The first is the "historical" one, in which the speed picked up at the timing of the historical record—toward the end of the ancien régime. The second is the "no investment" counterfactual, in which it is imagined that Paris never launched the infrastructure investment. Given that the absence of investment was the norm through much of the preindustrial period, it is by no means a far-fetched idea. The third story is another counterfactual that, in contrast to the second, sets the post-1785 speed as the norm throughout the analysis period. Since all cities benefited from the late-eighteenth-century investment, it is of interest to see what impact a "precocious" state project could have on city growth. In other words, while the second scenario takes the view that minimizes the impact, the third takes the maximalist approach.

Table 7: The impact of changes in travel time on city growth.

Dependent variable	Log population, 1500–1850			
	(1)	(2)	(3)	(4)
Travel time via postal routes	0.001			
	(0.002)			
Travel time held at pre-reform		-0.011^{***}		
		(0.003)		
Travel time held at post-reform			-0.005^{**}	
			(0.002)	
Travel days from Paris				-0.019
				(0.013)
All controls	✓	✓	✓	✓
City FE	✓	✓	✓	✓
Period FE	✓	✓	✓	✓
Observations	2,046	2,046	2,046	2,046

Notes: Standard errors clustered by cities. The full results are reported in the Appendix. *** denote $p < 0.01$, **

$p < 0.05$, and * $p < 0.1$.

Table 7 displays the results for broad changes in travel time on city growth. Column 1 reports the relation between greater time to reach commercial centers and growth, though it is not significant. By contrast, the two counterfactual scenarios, where time to reach those centers is held at pre-reform (1765) and at post-reform (1780), respectively in Columns 2 and 3, show that reduced time is significantly linked to city growth. Column 4 considers the impact of changes in travel days from Paris through the infrastructure investment, whose magnitude is negative but not significant (p-value at 0.13). These results suggest that the impact of reduced travel time through the "grande mutation" seemed to be confined to specific routes—that is, to and from Paris. However, despite the substantial improvements in the road conditions, these do not bring positive consequences in the analysis time.

Table 8: Heterogeneous effects of the changes in travel time.

Dependent variable	Log population, 1500–1850					
Cities reached from Paris	Within four days			Within eight days		
	(1)	(2)	(3)	(4)	(5)	(6)
Travel time via postal routes	0.001			0.001		
	(0.002)			(0.002)		
Travel time held at pre-reform		−0.008			−0.010***	
		(0.005)			(0.004)	
Travel time held at post-reform			−0.003			−0.004*
			(0.003)			(0.002)
All controls	✓	✓	✓	✓	✓	✓
City FE	✓	✓	✓	✓	✓	✓
Period FE	✓	✓	✓	✓	✓	✓
Observations	810	810	810	1,518	1,518	1,518
Cities reached from Paris	More than five days			More than eight days		
	(7)	(8)	(9)	(10)	(11)	(12)
Travel time	−0.002			−0.00004		
	(0.003)			(0.005)		
Travel time held at pre-reform		−0.016***			−0.016**	
		(0.005)			(0.008)	
Travel time held at post-reform			−0.008**			−0.009*
			(0.003)			(0.006)
All controls	✓	✓	✓	✓	✓	✓
City FE	✓	✓	✓	✓	✓	✓
Period FE	✓	✓	✓	✓	✓	✓
Observations	1,236	1,236	1,236	714	714	714

Notes: Standard errors clustered by cities. The full results are reported in the Appendix. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

Table 8 further tests the impact of the infrastructure reform in greater detail. It employs various cutoffs in travel days from Paris to identify, if at all, which part of the country might have benefitted more. The top panel examines the extent to which the impact of reductions in travel time within four days of travel from Paris and within eight days. The motivation is that following the reform, four days could cover the northern half of France and eight days could cover much of the country.

The bottom panel explores the idea in the opposite direction and seeks the extent to which cities in the countryside gained from the reform.

The results from Table 8 suggest that it is in the countryside that the state investment in infrastructure bore fruits more than the core region. For cities close to the capital, reachable within four days of travel, the reform brings no discernible impact. However, for those outside the core, travel time reductions have a significant effect. That the travel time variable turns negative in the bottom panel, though not significant, suggests that the investment had a greater impact in the countryside. In addition, the magnitude of the post-reform scenario is smaller than that of pre-reform in these regressions. This suggests that as the postal network expanded and grew more complicated, the speed did not catch up and travel became *less* efficient as a result. The gaps in the magnitude may reflect the evidence that the transport technology saw little innovation despite the state investment. Overall, the reform brought some but limited positive impact on city growth.

Conclusion

This paper explored the relationship between the postal system and city-level growth in preindustrial France. It is well-known in European history that overland transportation was much costlier than overseas transportation. An institutional innovation in the late fifteenth century that partly addressed the geographical constraints was to increase the number of men, horses, and postal stations as their resting places placed at shorter intervals than before. In France, postal expansion was overall slow to come. Not until the toward the Revolutionary period were more than two-thirds of the cities covered. My empirical analysis, based on a new time-series and cross-sectional data set, finds that in a saturated model, a 1-percent decrease in a city's distance to commercial hubs corresponds to a 1-percent increase in population. The finding is consistent when removing the "local shocks" while there is evidence of local displacement for cities close to Paris. Although there is no documented evidence of a grand design of the network, an instrumental-variable analysis suggests that the location of the initial posts in the sixteenth century seem to be dependent on the proximity to Roman-era posts. An additional investigation on the impact of the infrastructure reform that occurred in the mid-eighteenth century shows a modest improvement among those cities outside the greater Paris region. The statistical evidence, however, shows that the reform alone was not systematically linked to city growth, suggesting that the reform did not catch up with the growing postal network.

The findings of this paper have implications for economic and cultural history. These complement the narrative evidence in economic history about how an improved transportation system facilitated the circulation of products as well as the diffusion of ideas. Users found regularly-trodden paths invaluable both for reliability and for safety. Surviving travel accounts of the sixteenth century indicate that travelers would be willing to take long detours to follow an existing postal route, which provided a greater predictability in time and speed, rather than to take a shorter but perhaps riskier path (Behringer 2006, 347–8). Postal service was also critical to the development and functioning of the "Republic of Letters," the Europe-wide scholarly community. Intellectuals of the Enlightenment relied heavily on it not just to exchange ideas but also to keep in touch with each other. The couriers kept peripatetic authors, particularly those like Voltaire who did not live in major European capitals, in the circle (cf. Fumaroli (2018)).

This paper also adds to cultural history, specifically that of newspapers. Much like the access to financial information discussed earlier, merchants' demand for trade-related information underlay the rise of newspapers in the early seventeenth century. In Europe, the development of the post and that of newspapers go hand in hand. Indeed, it is postmasters who produced the earliest "news papers" (originally in separate words) (Caplan 2016, 180–2).[10] Thus my study provides empirical connections that inform how postal history is linked to other major themes in economic and cultural history.

Finally, my analysis advances the scholarship on state capacity. In early-modern times, geography constituted a major impediment to the development of state capacity among European states. Extant research indicates that those with relatively large territory, such as France, tended to be late

[10] For detailed illustrations, see, for instance, Adelman (2019), Barker and Burrows (2002), Pettegree (2014), and Schobesgerger et al. (2016).

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 more directly. This paper highlights how the state sought to consolidate authority by using the known tools and not relying on new technologies.

[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.

Adelman, Joseph M. 2019. *Revolutionary Networks: The Business and Politics of Printing the News, 1763–1789*. Baltimore: Johns Hopkins University Press.

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

Aneja, Abhay, and Guo Xu. 2022. "Strengthening State Capacity: Postal Reform and Innovation during the Gilded Age." Mimeo.

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, Fred Bateman, Michael Haines, 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. 1988. *Cities and Economic Development: From the Dawn of History to the Present*. Chicago: University of Chicago Press.

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.

Barker, Hannah, and Simon Burrows, eds. 2002. *Press, Politics and the Public Sphere in Europe and North America, 1760–1820*. Cambridge: Cambridge University Press.

Barker, Theo, and Dorian Gerhold. 1993. *The Rise and Rise of Road Transport, 1700–1990*. Cambridge: Cambridge University Press.

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.

Boerner, Lars, and Battista Severgnini. 2019. "Time for Growth." Mimeo.

Boerner, Lars, Jared Rubin, and Battista Severgnini. 2021. "A Time to Print, a Time to Reform." *European Economic Review* 138: 103826.

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.

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.

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.

Daudin, Guillaume. 2010. "Domestic Trade and Market Size in Late-Eighteenth-Century France." *Journal of Economic History* 70(3): 716–43.

de Vries, Jan. 1984. *European Urbanization, 1500–1800*. Cambridge, MA: Harvard University Press.

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

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

Dorhn-van Rossum, Gerhard. 1998. *History of the Hour: Clocks and Modern Temporal Orders*. Chicago: University of Chicago Press.

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

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.

Flückiger, Matthias, Erik Hornung, Mario Larch, Markus Ludwig, and Allard Mees. 2022. "Roman Transport Network Connectivity and Economic Integration." *Review of Economic Studies* 89(2): 774–810.

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.

Fumaroli, Marc. 2018. *The Republic of Letters*. Translated by Lara Vergnaud. New Haven: Yale University Press.

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

Hoffman, Philip T. 1996. *Growth in a Traditional Society: The French Countryside, 1450–1815*. Princeton: Princeton 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.

Landes, David S. 1983. *Revolution in Time: Clocks and the Making of the Modern World*. Cambridge, MA: Belknap Press of Harvard University Press.

Le Goff, Jacques. 1980. *Time, Work, and Culture in the Middle Ages*. Translated by Arthur Goldhammer. Chicago: University of Chicago Press.

Lepetit, Bernard. 1984. *Chemins de terre et voies d'eau: Réseaux de transports et organisation de l'espace en France, 1740–1840*. Paris: École des Hautes Études en Sciences Sociales.

Letaconnoux, Joseph. 1908. "Les transports en France au XVIII[e] siècle." *Revue d'histoire moderne et contemporaine* 11(2): 97–114.

Letaconnoux, Joseph. 1909*a*. "Les transports en France au XVIII[e] siècle (Suite et fin)." *Revue d'histoire moderne et contemporaine* 11(4): 269–92.

Letaconnoux, Joseph. 1909*b*. "Les voies de communication en France, au XVIII[e] siècle." *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte* 7(1): 94–141.

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.

Mokyr, Joel. 1990. *The Lever of Riches: Technological Creativity and Economic Progress*. New York: Oxford University Press.

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

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

Paik, Christopher, and Jessica Vechbanyongratana. Forthcoming. "Reform, Rails, and Rice: Political Railroads and Local Development in Thailand." *Journal of Economic History* .

Pettegree, Andrew. 2014. *The Invention of News: How the World Came to Know about Itself*. 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.

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.

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

Vaillé, Eugène. 2016. *Histoire des postes françaises jusqu'en 1939*. Brussels: P.I.E. Peter Lang.

Vidal de La Blache, Paul. 2009. *Tableau de la géographie de la France*. Vol. 1 of *Histoire de France depuis les origines jusqu'à la Révolution*. Edited by Ernest Lavisse. Sainte-Marguerite-sur-Mer: Éditions des Équateurs.

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

Appendix for "Postal Growth"

March 18, 2024

Contents

1 Source 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.

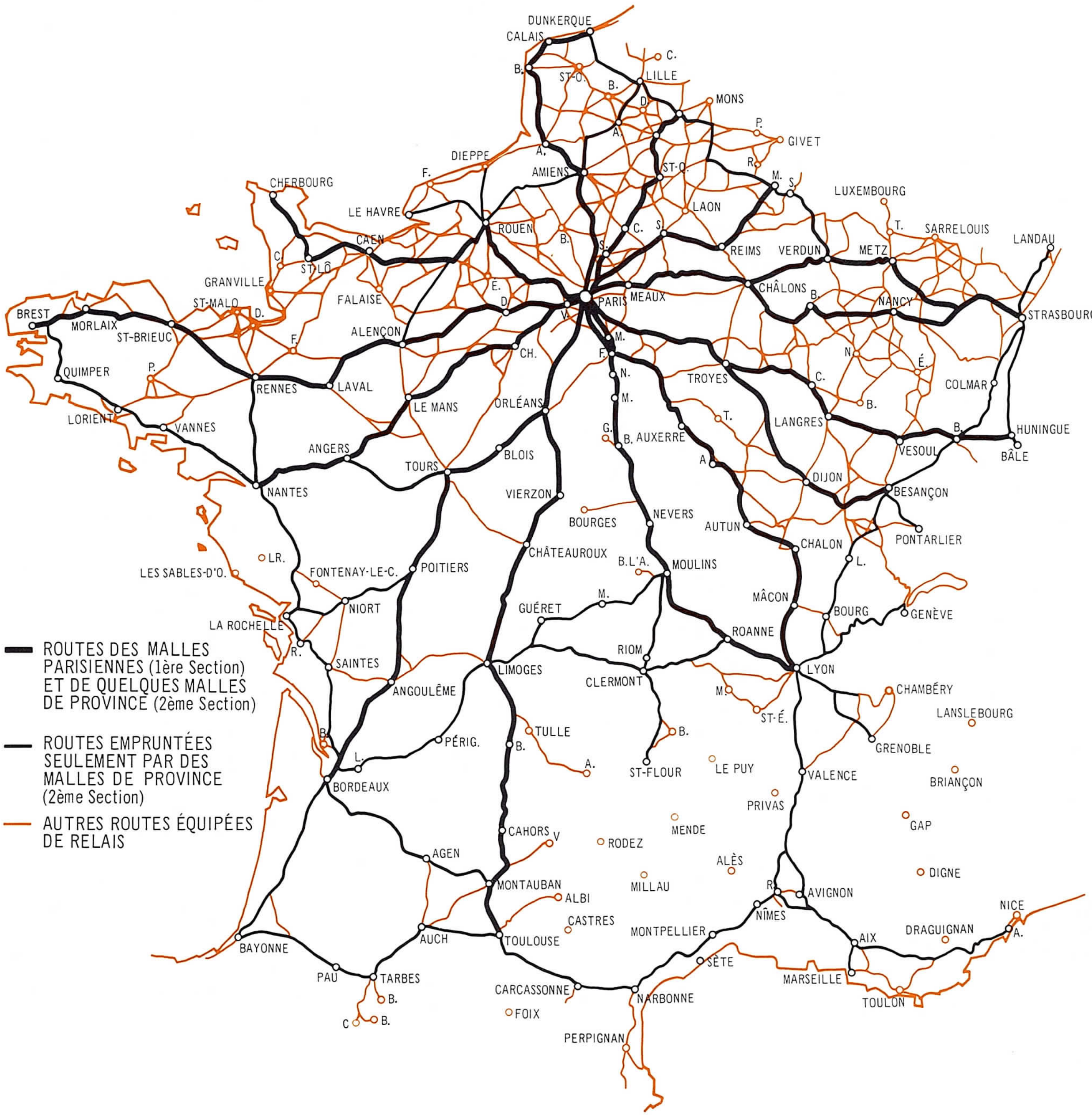
Figure A3: Geographical distribution of post offices in France in 1731.

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.

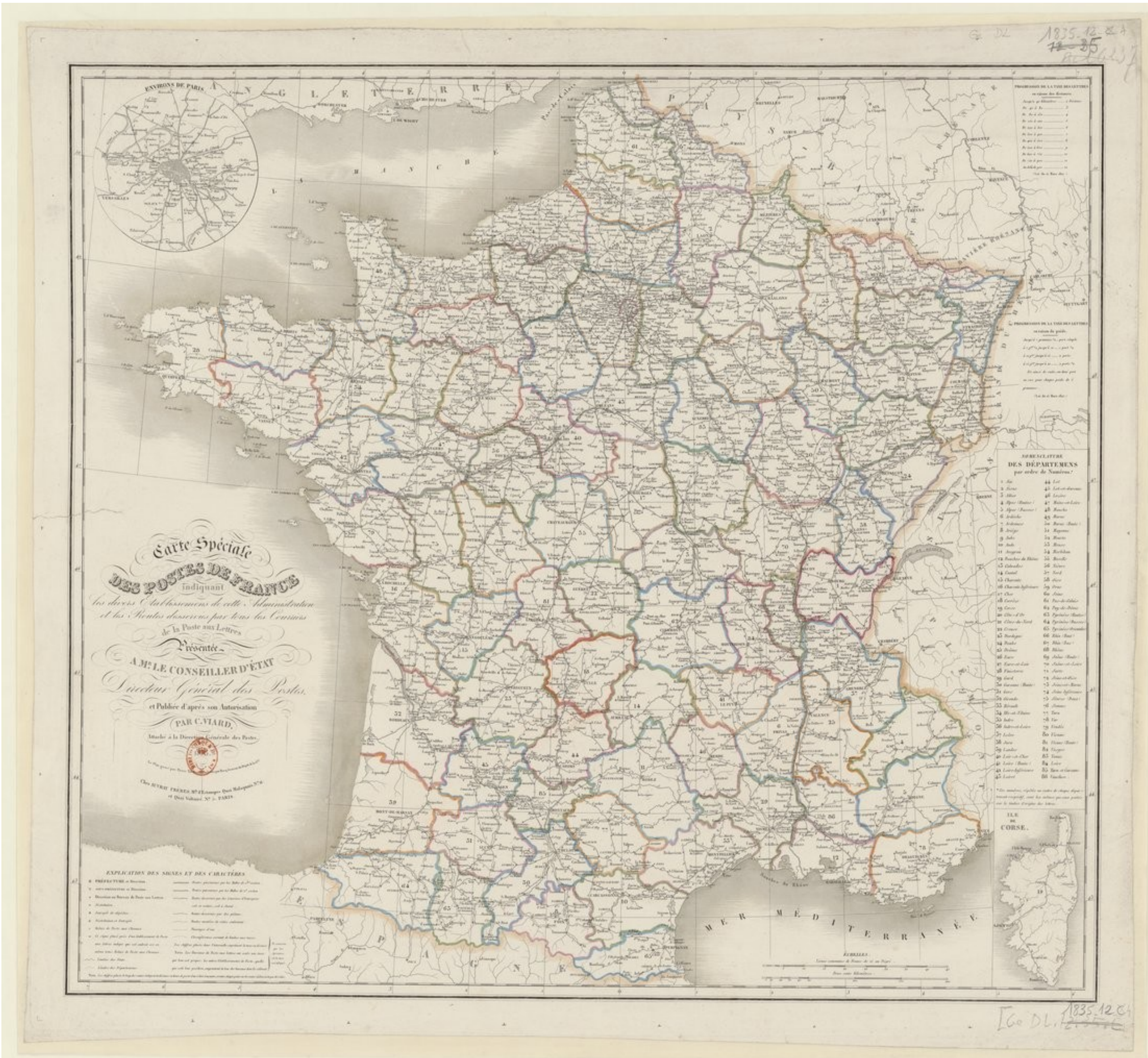
Figure A4: Geographical distribution of post offices in France in 1792.



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.



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, 1500–1850			
	(1) No covariates	(2) Saturated	(3) Saturated	(4) Unweighted
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)
Number of canals within 50km		-0.074	-0.076	-0.076
		(0.093)	(0.094)	(0.094)
Log distance to nearest border		0.014	0.027	0.027
		(0.030)	(0.032)	(0.032)
Log distance to nearest coast		0.184	0.179	0.180
		(0.251)	(0.258)	(0.258)
Elevation		-0.014^{***}	-0.028^{***}	-0.028^{***}
		(0.003)	(0.008)	(0.008)
Terrain ruggedness		0.182^{***}	-0.113^{*}	-0.113^{*}
		(0.034)	(0.068)	(0.068)
Bishopric established before 1500		-18.565^{***}	-12.469^{***}	-12.482^{***}
		(3.769)	(2.106)	(2.110)
University		-0.516^{***}	-0.504^{***}	-0.504^{***}
		(0.120)	(0.121)	(0.122)
Time under French rule since 1477		-0.0004	-0.0003	-0.0003
		(0.001)	(0.001)	(0.001)
Latitude			-5.971^{***}	-5.977^{***}
			(1.931)	(1.933)
City FE	✓	✓	✓	✓
Period FE	✓	✓	✓	✓
Period × Latitude			✓	✓
N cities	341	341	341	341
Observations	2,046	2,046	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 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. In Columns 3 and 4, 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, 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, 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	Post in 1500	Log population
	(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 * $p < 0.1$.

2.5 Difference-in-Difference Framework

Table A5 presents the full result of Table 6 in text.

Table A5: The impact of the initial postal assignment to city growth.

Dependent variable	Log population, 1500–1850		
	(1)	(2)	(3)
Log average distance to hub cities	-0.281	-0.161	0.108
via postal routes × Post office in 1553	(0.214)	(0.175)	(0.560)
Log average distance to hub cities	0.423^{**}	-0.582^{***}	-0.977^{***}
via postal routes	(0.206)	(0.174)	(0.365)
Log distance to nearest border	0.137^{***}	-0.052^{**}	0.017
	(0.024)	(0.021)	(0.030)
Post office in 1553	2.372^{*}	1.610	-3.951
	(1.385)	(1.135)	(5.128)
Log distance to nearest coast	-0.005	-0.055^{***}	0.169
	(0.021)	(0.018)	(0.242)
Elevation	-0.0004	-0.0002	-0.028^{***}
	(0.0002)	(0.0002)	(0.006)
Terrain ruggedness	-0.0004	-0.001^{***}	-0.114^{*}
	(0.0005)	(0.0004)	(0.062)
Latitude	0.026	-0.035^{**}	-6.068^{***}
	(0.017)	(0.014)	(1.600)
City FE			✓
Period FE		✓	✓
Observations	2,046	2,046	2,046

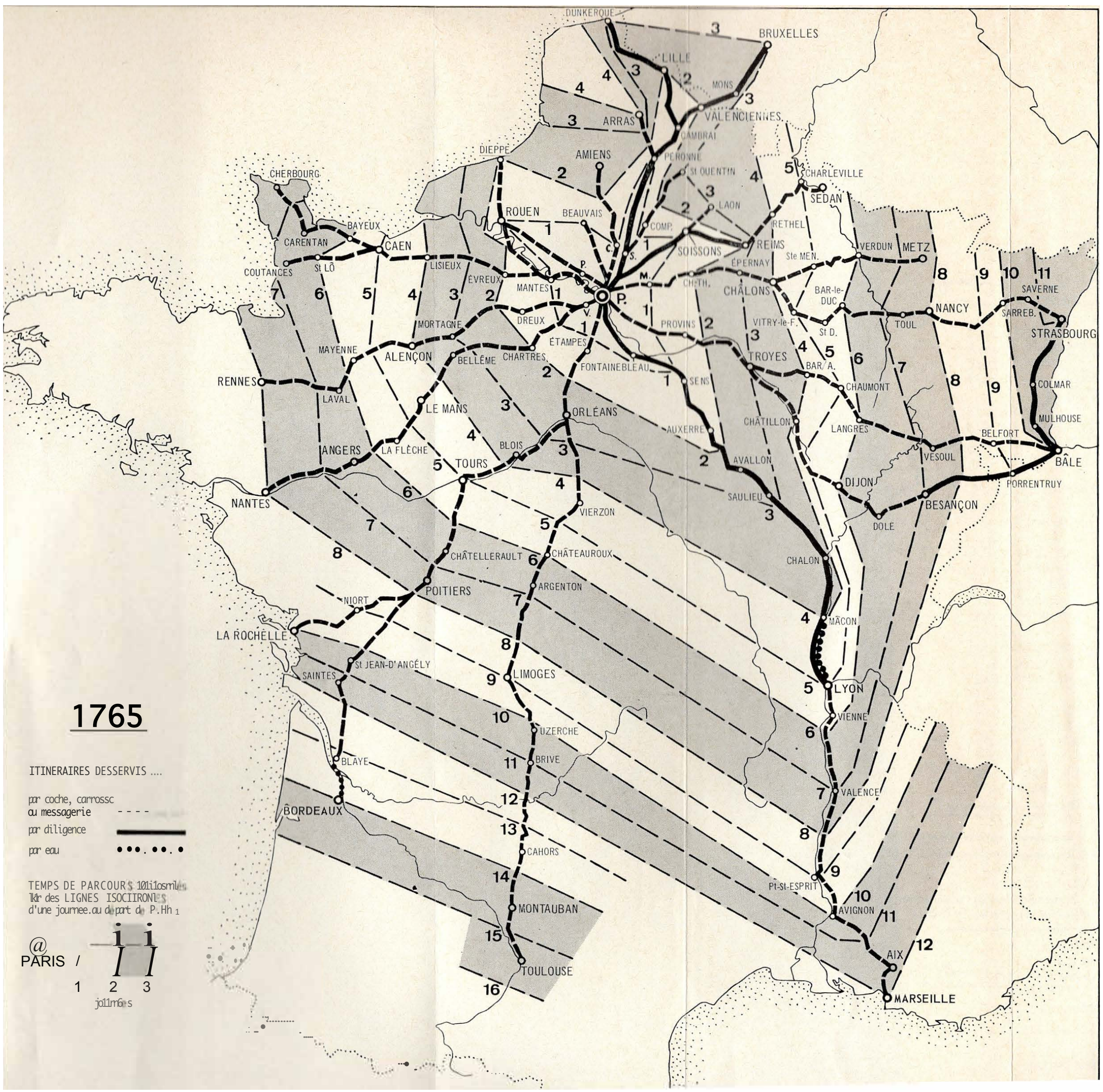
Notes: Standard errors clustered by cities in Model 3. In all models, the year 1850 (the final period) is set as the reference category, as this exercise is designed to gauge the impact of the postal assignment in the initial period. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

2.6 "Grande Mutation" and Changes in Travel Time

2.6.1 Map of Pre-Reform Travel Time, 1765

Figure A7 is the source map for travel duration days from Paris in 1765 as well as for computing travel time via postal routes. The map comes from: Arbellot, Guy. 1973. "La grande mutation des routes de France au XVIIIe siècle." *Annales: Économies, Sociétés, Civilisations* 28(3): 765–91.

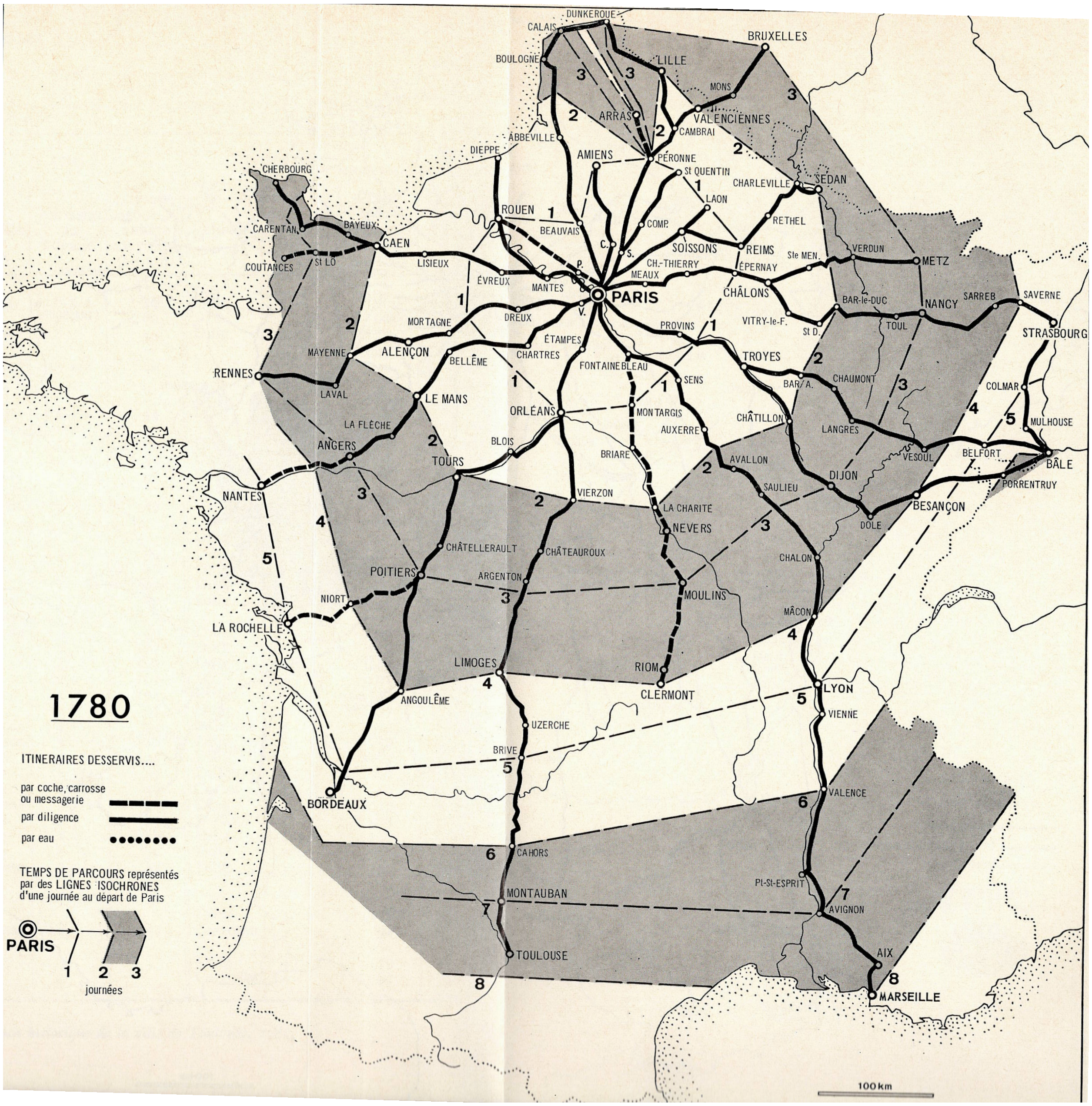
Figure A7: Travel Days from Paris Before the Reform as Estimated by Arbellot (1973).



2.6.2 Map of Post-Reform Travel Time, 1780

Figure A8 is the source map for travel duration days from Paris in 1765 as well as for computing travel time via postal routes. The map comes from: Arbellot, Guy. 1973. "La grande mutation des routes de France au XVIII[e] siècle." *Annales: Économies, Sociétés, Civilisations* 28(3): 765–91.

Figure A8: Travel Days from Paris After the Reform as Estimated by Arbellot (1973)



2.6.3 Changes in Travel Time

Table A6 presents the full result of Table 7 in text.

Table A6: The impact of the changes in travel time.

Dependent variable	Log population, 1500–1850			
	(1)	(2)	(3)	(4)
Travel time via postal routes	0.001			
	(0.002)			
Travel time held at pre-reform		-0.011^{***}		
		(0.003)		
Travel time held at post-reform			-0.005^{**}	
			(0.002)	
Travel days from Paris				-0.019
				(0.013)
Number of canals within 50km	-0.101	-0.083	-0.048	-0.083
	(0.094)	(0.091)	(0.095)	(0.094)
Log distance to nearest border	0.014	0.011	0.011	0.024
	(0.030)	(0.031)	(0.031)	(0.031)
Log distance to nearest coast	0.207	0.183	0.208	0.192
	(0.257)	(0.251)	(0.254)	(0.252)
Elevation	-0.029^{***}	-0.031^{***}	-0.028^{***}	-0.028^{***}
	(0.008)	(0.008)	(0.007)	(0.007)
Terrain ruggedness	-0.144^{**}	-0.156^{**}	-0.133^{**}	-0.133^{**}
	(0.068)	(0.067)	(0.066)	(0.067)
Bishopric established before 1500	-11.249^{***}	-11.932^{***}	-11.254^{***}	-11.637^{***}
	(1.988)	(2.020)	(1.982)	(1.974)
University	-0.506^{***}	-0.526^{***}	-0.521^{***}	-0.496^{***}
	(0.121)	(0.122)	(0.122)	(0.122)
Time under French rule since 1477	-0.0004	-0.0004	-0.0004	-0.0003
	(0.001)	(0.001)	(0.001)	(0.001)
Latitude	-6.403^{***}	-6.892^{***}	-6.118^{***}	-6.244^{***}
	(1.936)	(1.945)	(1.895)	(1.905)
City FE	✓	✓	✓	✓
Period FE	✓	✓	✓	✓
Observations	2,046	2,046	2,046	2,046

Notes: Standard errors clustered by cities. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

2.6.4 Heterogeneous Effects of Travel Time: Cities reached from Paris within certain days

Table A7 presents the full result of Table 8, top panel.

Table A7: The impact of the changes in travel speed.

Dependent variable	Log population, 1500–1850					
Cities reached from Paris	Within four days			Within eight days		
	(1)	(2)	(3)	(4)	(5)	(6)
Travel time via postal routes	0.001			0.001		
	(0.002)			(0.002)		
Travel time held at pre-reform		−0.008			-0.010^{***}	
		(0.005)			(0.004)	
Travel time held at post-reform			−0.003			-0.004^{*}
			(0.003)			(0.002)
Number of canals within 50km	−0.147	−0.139	−0.126	−0.093	−0.074	−0.046
	(0.204)	(0.198)	(0.203)	(0.100)	(0.096)	(0.101)
Log distance to nearest border	0.071	0.071	0.074	0.027	0.023	0.026
	(0.053)	(0.054)	(0.054)	(0.038)	(0.039)	(0.038)
Log distance to nearest coast	0.142	0.113	0.132	0.259	0.223	0.250
	(0.319)	(0.308)	(0.311)	(0.311)	(0.300)	(0.304)
Elevation	-0.007^{**}	-0.007^{**}	-0.007^{**}	-0.029^{***}	-0.030^{***}	-0.028^{***}
	(0.003)	(0.003)	(0.003)	(0.009)	(0.009)	(0.009)
Terrain ruggedness	−0.001	−0.001	−0.003	-0.172^{**}	-0.180^{**}	-0.160^{**}
	(0.017)	(0.016)	(0.016)	(0.081)	(0.079)	(0.079)
Bishopric established before 1500	1.006	1.008	1.042	-9.976^{***}	-10.655^{***}	-10.010^{***}
	(0.751)	(0.734)	(0.740)	(2.354)	(2.334)	(2.288)
University	-0.826^{***}	-0.872^{***}	-0.844^{***}	-0.739^{***}	-0.767^{***}	-0.756^{***}
	(0.088)	(0.074)	(0.074)	(0.109)	(0.107)	(0.107)
Time under French rule since 1477	0.001	0.002	0.001	0.001	0.001	0.001
	(0.003)	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)
Latitude	0.246	0.284	0.157	-6.743^{***}	-7.137^{***}	-6.457^{***}
	(0.522)	(0.518)	(0.513)	(2.319)	(2.294)	(2.254)
City FE	✓	✓	✓	✓	✓	✓
Period FE	✓	✓	✓	✓	✓	✓
Observations	810	810	810	1,518	1,518	1,518

Notes: Standard errors clustered by cities. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.

2.6.5 Heterogeneous Effects of Travel Time: Cities reached from Paris more than certain days

Table A8 presents the full result of Table 8, bottom panel.

Table A8: The impact of the changes in travel speed.

Dependent variable	Log population, 1500–1850					
Cities reached from Paris	More than five days			More than eight days		
	(1)	(2)	(3)	(4)	(5)	(6)
Travel time via postal routes	−0.002			−0.00004		
	(0.003)			(0.005)		
Travel time held at pre-reform		−0.016***			−0.016**	
		(0.005)			(0.008)	
Travel time held at post-reform			−0.008**			−0.009*
			(0.003)			(0.006)
Number of canals within 50km	−0.138	−0.154	−0.050	−0.010	0.024	0.091
	(0.163)	(0.160)	(0.175)	(0.251)	(0.246)	(0.260)
Log distance to nearest border	−0.049	−0.050	−0.041	−0.128*	−0.108	−0.115
	(0.051)	(0.051)	(0.051)	(0.078)	(0.076)	(0.079)
Log distance to nearest coast	0.111	0.141	0.148	−0.118	−0.087	−0.088
	(0.202)	(0.203)	(0.204)	(0.280)	(0.272)	(0.266)
Elevation	−0.001***	−0.001***	−0.001***	−0.001	0.0001	−0.0004
	(0.0003)	(0.0002)	(0.0002)	(0.002)	(0.002)	(0.002)
Terrain ruggedness	−0.004***	−0.004***	−0.005***	−0.001	0.002	−0.001
	(0.001)	(0.001)	(0.001)	(0.012)	(0.012)	(0.012)
Bishopric established before 1500	−1.166*	−1.005	−0.938	−1.030	−0.223	−0.654
	(0.683)	(0.664)	(0.672)	(2.579)	(2.527)	(2.552)
University	−0.361**	−0.357**	−0.351**	0.059	0.065	0.066
	(0.176)	(0.174)	(0.178)	(0.066)	(0.063)	(0.068)
Time under French rule since 1477	0.0002	−0.00003	−0.00003	−0.001	−0.001	−0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Latitude	−0.232**	−0.274***	−0.215**	0.071	0.117	0.118
	(0.097)	(0.096)	(0.098)	(0.566)	(0.552)	(0.548)
City FE	✓	✓	✓	✓	✓	✓
Period FE	✓	✓	✓	✓	✓	✓
Observations	1,236	1,236	1,236	714	714	714

Notes: Standard errors clustered by cities. *** denote $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.