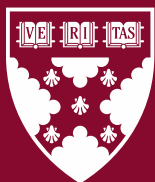


Working Paper 23-022

# You've Got Mail! The Late 19th Century US Postal Service Expansion, Entrepreneurship, and Firm Performance

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# You've Got Mail! The Late 19<sup>th</sup> Century US Postal Service Expansion, Entrepreneurship, and Firm Performance\*

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*preliminary results - please do not cite or circulate*

## Abstract

We analyze the impact of the US Postal Service's expansion in the late 1800s on entrepreneurship and firm performance. Exploiting novel data constructed from digitized archives on historic business establishments, post office locations, and road network characteristics in California, we find a positive relationship between the expansion of the postal service and entrepreneurship. To address endogeneity concerns, we exploit an unexpected change in the Californian postal service route network. In addition, we examine feasible channels through which the US Mail promoted firm entry highlighting the importance of diffusing specialized knowledge. While increasing competition given new entry exerted downward pressure on many incumbents, actors relying on specialized knowledge inputs, such as seeds, were able to benefit from access to the US Mail.

**Keywords:** *Entrepreneurship, Institutional Innovation, Knowledge Exchange, US Postal Service, Firm Performance*

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# 1 Introduction

*Messenger of Sympathy and Love*

*Servant of Parted Friends*

*Consoler of the Lonely*

*Bond of the Scattered Family*

*Enlarger of the Common Life*

*Carrier of News and Knowledge*

*Instrument of Trade and Industry*

*Promoter of Mutual Acquaintance*

*Of Peace and of Goodwill Among Men and Nations*

*(“The Letter” by Dr. Charles W. Eliot, as revised by President Woodrow Wilson. Inscription on the Smithsonian National Post Museum in Washington, DC).*

Scholars of innovation have long stressed the critical role of institutions and suggest that the institutional environment fundamentally influences technological progress through a variety of factors (Sokoloff, 1988; Almeida & Kogut, 1999; Khan, 2005; Andrews, 2023). These include, for example, the security of property rights, patent laws, the educational system, and competition policy. Although some scholars have documented the fundamental role of institutional structures in the economic development of the late 19<sup>th</sup> century United States (Acemoglu et al., 2016), we still lack an understanding of how these important institutional foundations are connected to the pace and nature of entrepreneurship.

One such structure is the US Postal Service, which was the dominant means of communication during the late 19<sup>th</sup> century. To establish a national system of communications, the US government wove together a so called “gossamer network” across the West – a new and unfamiliar model for a government institution (Blevins, 2021). The federal government did not own or operate most of the postal infrastructure, but crafted temporary and part-time arrangements to transport and distribute the mail. Several thousand of the offices formed in the second half of the nineteenth century only ran for a few years or even a few months before closing. Openings and closings often occurred contemporaneously, creating much churn in the stock of regional post offices over this period. Sprawling and fast-moving, this web of post offices connected the region’s settlements by operating in far more places than any other government institution. Between 1880 and 1900 alone,



82,500 new post offices were established across the country.

The question we strive to address in this paper is, empirically, what the impact of the US Postal Service was on entrepreneurship and to unveil potential implications for firm performance. We expect that being connected to the rest of the country and world via the US Post may have been one of the most pressing necessary conditions for firms to set up shop, for example through access to money, the regulatory system, communication or knowledge. Moreover, the post office may have also connected communities from within serving as an anchor location bringing increased foot traffic to its vicinity. Access to a local gathering place may have made firm establishment more feasible provided better access to local knowledge and customers. But, it is not clear if such connection –on net– would lead to better performance outcomes given potential increases in competitive pressures (Alcácer & Chung, 2007).

To shine light on this line of inquiry, we make use of new data capturing the precise location and time of operation of post offices in the state of California between 1880 and 1890 (Blevins, 2021) – a young state that was rapidly developing at the time. We complement these data with historic R.G. Dun & Co. credit reports that we retrieve from their original fragile paper format in library archives and transcribe. These records, unique and not accessible to the public, provide a roster of businesses and fine-grained information on the financial performance of firms as well as rich detail on the nature of the local business and financing environment.

To assess entry using these unique data, we estimate a first-differenced model with the settlement as our unit of analysis. Our main dependent variable a dummy capturing whether a city has gained at least a new Post Offices within 20km from its center, measured using a novel digitized map encompassing the entire Californian street network of 1880. Our model includes controls for population, town-level economic activity, and county and industry fixed effects. To control for potential omitted-variable bias, we exploit an unexpected change in the Californian postal route network that occurred in 1884. Namely, on January 18, 1884 it was communicated in the Congressional Record of the Senate that “... the house had passed ... a bill (H.R. 1482) making all public roads and highways post-routes” (<https://www.congress.gov/bound-congressional-record/1884/01/18>, accessed August 18, 2023).<sup>1</sup> The passage of this bill was unanticipated, and substantially reduced the cost of open-

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<sup>1</sup>The US Constitution, Article I, Section 5, requires Congress to keep a journal of its proceedings. Congressional Record was first published in 1873 and is the official record of the proceedings and debates of the United States Congress, published by the United States Government Publishing Office and issued when Congress is in session. It historically consisted of three sections: the House section, the Senate section, and the Extensions of Remarks. Since

ing a post office in locations that had previously not been in proximity to a postal route. Our results using this shock, suggest that the presence of a post office increased entry growth rates by 20-percent on average across industries over the course of a decade.

Additional analyses provide further insight into potential mechanisms driving these results. Ex ante, there are several candidate channels through which the post office may have operated. We concentrate our efforts on the following four: 1) as a financial service, 2) as an arm connecting to other government services, 3) as mass communication infrastructure, or 4) as carrier of specialized knowledge.<sup>2</sup> To empirically investigate this, we complement our data with historic post office reports and directories to retrieve information on the extent to which a post office also served as a money order touch point, where individuals could send and receive money. For the role as an arm of the legal system, we gather information on the presence of courts and assess whether post offices serve as substitutes or not. To explore the role of communication, we exploit the fact that operations in some industries may be more affected than operations in others by quicker and more reliable information flow. To understand the role of knowledge in this framework, we retrieve detailed summaries of specialized trade journals by industry and check whether industries in which trade journals were circulating abundantly out-of-state<sup>3</sup> experience higher growth in entry. As a result of this exercise, we provide support for the explanation that access to specialized knowledge in the form of periodicals and magazines may have been a critical mechanism through which post offices contributed to increasing entrepreneurship during our study period (Haveman, 2015). Our results therefore suggest that the post office expansion in the late nineteenth century may have very likely contributed substantially to entrepreneurship via the offices' role as "Carrier of (...) Knowledge." Extrapolating our results, the enhanced flow of knowledge between distant individuals and communities that the rapid development of the post office network enabled may well have contributed to making America a developed economy as suggested by other work (Rogowski et al., 2021; Aneja & Xu, 2022).

Regarding firm performance, our results are more nuanced. Estimating a similar model, but on the firm-level and controlling for firm-specific characteristics such as if the founder had established

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the 1940s, it has a fourth section: the Daily Digest.

<sup>2</sup>In the period we consider, the postal system carried only letters and envelopes, so we need not take into consideration its role as a carrier of larger goods.

<sup>3</sup>Since the number of local trade journals might be endogenous to performance and, in general, to the industry composition of a given location (i.e., we might expect to find more journals dedicated to a specific industry published in locations where this industry is developing and growing), we consider only trade journals published *outside* California, while controlling for all the journals published in California.

multiple establishments, if the company was family-based, and the nationality of the founder, we find that increases in competition given new entry exert downward pressure on many incumbents. As in the case for entry, we detect that firms in industries with out-of-state trade journals experience better performance with increases in post offices and further find that actors in those industries relying on a specific type of government distributed knowledge and technology (Cohen et al., 2002; Nagaraj, 2022) –seeds and food safety– experienced large boosts in performance. Taken together, this suggests that the presence of a post office may have been particularly crucial for those firms that could leverage specialized knowledge and technology inputs most in their day-to-day operations.

Many Americans at the time of our study “considered the role of the postal system in facilitating the transmission of information [ . . . ] to be its most important ‘national service’ ” (John, 1995: 13). Building on this notion, we provide empirical evidence on the Postal Services’ influence on entrepreneurship and firms via its impact on knowledge diffusion. Taken together, our findings speak to the literature on the importance of a region’s capacity to connect people and ideas for firm growth and innovation (Jacobs, 1969; Gaspar & Glaeser, 1998; Feldman & Link, 2001; Rosenthal & Strange, 2001; Storper & Venables, 2004). Furthermore, we provide insights on the diffusion of knowledge and technologies (Jaffe et al., 1993; Singh, 2005; Thompson & Fox-Kean, 2005; Agrawal et al., 2006; Singh & Marx, 2013; Agrawal et al., 2017), the gains from inward knowledge spillovers but also the possible cost of local competitive pressures (Alcácer & Chung, 2007), and highlight the role of an institutional innovation<sup>4</sup> in infrastructure expansion in promoting firm entry and boosting regional performance. Our results stress the importance of the Postal Service, and such institutional innovations more broadly, in providing an environment that fosters knowledge exchange. Such improvements may have played a critical role in decreasing the concentration of innovative activity in the second half of the 19<sup>th</sup> century (Andrews & Whalley, 2022). In light of recent discussion on infrastructure improvement in the US (and across the globe), our findings may provide a useful bases for debate. Moreover, our results on the importance of wide access to specialized knowledge from other geographies for entrepreneurship and the role of broad distribution of public technology, provide critical managerial understanding with regards to the relationship between knowledge sourcing and firm outcomes.

This paper proceeds as follows. Section 2 briefly describes the US Postal Service expansion and

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<sup>4</sup>Following (Li et al., 2020), we think of institutional innovation as “...the creation of a new and more effective system to encourage people’s behaviour, and the realisation of social sustainable development and innovation under the existing production and living environment” (p.115801).

outlines some potential mechanisms by which it might have affected businesses. Section 3 describes our data in detail. Section 4 uses city-level analyses to estimate the impact of post offices on firm entry and delves into possible mechanisms that can explain our results. Section 5 investigates the impact of post offices on firm performance highlighting important competition-, quality, and knowledge-based nuances. Section 6 concludes.

## 2 Literal Paper Trails: The US Postal Service Expansion and Theoretical Considerations

Between the 1870s and the early 1900s, the United States – especially the Western part – underwent a dramatic reorganization of people, land, capital, and resources. Major drivers suggested to have supported this migration and catalyzed economic growth are rooted in infrastructure (Démurger, 2001). For instance, empirical evidence directly links growth in manufacturing productivity throughout the nineteenth century to the expansion of the railroad (Redding & Venables, 2004; Hanson, 2005; Redding et al., 2007; Head & Mayer, 2011; Donaldson & Hornbeck, 2016; Balboni, 2019; Hornbeck & Rotemberg, 2019; Jaworski & Kitchens, 2019) and of canals and portages (Bleakley & Lin, 2012). Creating necessary infrastructure substantially improved the ability to move people and materials.

One particular type of infrastructure, which expanded in a very novel way for its time was the US Postal Service. This institutional innovation has been far less examined in the entrepreneurship and strategy literatures but may have had far-reaching consequences for economic growth (Rogowski et al., 2021), innovation (Aneja & Xu, 2022), and in laying the groundwork for present-day entrepreneurial conditions. As millions of settlers moved in the post–Civil War period, they relied heavily on letters, newspapers, magazines, and money orders to stay connected to the wider world. During this period, the US postal system was the nation’s largest communications network, with no other public institution as omnipresent and as central to everyday life. Over the course of the second half of the 19<sup>th</sup> century, the US Post extended its reach into nearly every American city, town, and village following a novel approach to how it grew. To establish a national system of communications, the US government wove together a so called “gossamer network” across the West. This western postal network was very different from the typical civil service bureaucracies associated with government institutions. Early on, the US Mail contracted with stagecoach companies (e.g., the infamous Pony Express, which was only in service for a year and a half) to carry the mail

and paid local merchants to distribute letters from their stores (Blevins, 2021). In this way, the US Post rapidly spun out a vast web of postal infrastructure to thousands of remote places, connecting widely dispersed settlements into a national system of communications. The rapid and branching expansion of the postal system was facilitated by the relative ease of requesting a post office, typically granted after a written request from a few citizens was filed and sent to the Postmaster General (Figures A1 to A4). The US Post operated in far more places than any other government institution, having established roughly 73,300 post offices between 1880 and 1890 alone. Though expanding rapidly, the postal infrastructure was highly unstable. Several thousand of the offices established in the second half of the nineteenth century only operated for a few years or even a few months before closing. Openings and closings often occurred contemporaneously, creating much churn in the stock of regional post offices over this period.<sup>5</sup>

We propose that the flexible and transient manner of the expansion of the US Postal Service – above and beyond the traditional infrastructure factors suggested to have driven economic progress in this period such as railroads and canals – set up important necessary conditions enabling firm entry and potentially impacting firm performance. Being connected to others via the services the post office afforded – sending and receiving letters, newspapers, periodicals, and money orders – may have had a substantial influence on the decision to start a firm and where, and on firm performance. Yet, while a positive relationship between the expansion of the postal system and business entry seems intuitive, it is unclear exactly how the postal service expansion might have contributed to entrepreneurship. Moreover, *ex ante*, it is not obvious what the relationship with firm performance may be.

*Entrepreneurship:* Regarding firm entry we explore four candidate channels through which the post office may have operated that we will detail in the following: 1) as a financial service, 2) as an arm of the legal system, 3) as mass communication infrastructure, or 4) as carrier of specialized knowledge.<sup>6</sup>

The first possibility is that the US Post served as a monetary distribution center, enabling actors

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<sup>5</sup>Note that at the same time, new laws promoting settlement and investment in the western United States were passed disowning many first natives. Much of this legislation centered on the distribution of plundered Native land: to individual settlers (the Homestead Act), state colleges (the Morrill Act), and railroad companies (the Pacific Railway Acts).

<sup>6</sup>One might argue that the post office served as carrier of goods, facilitating exchange of good between suppliers, businesses, and customers. Mailing packages bigger than an envelope via the postal service was only possible starting in 1913, and thus falls outside the time scope of this paper.

to send money orders from one certified post office to another. Individuals could thus pay bills, receive payments, and help friends and family who needed money quickly. One could exchange cash for a replaceable piece of paper that could only be used by a specific person or company, very much like a check. Although money orders were introduced in 1864, not all post offices provided this kind of service.

It is also feasible that the US Post served as a branch of the legal system. Legal institutions have been found to serve an important role by reducing uncertainties and establishing a stable economy and social relations. Through formal rules, legal institutions can determine what is acceptable and unacceptable and thus determine the rules of the game (Cernea, 1987). This may be what enabled firms to be established in the first place.

Another major contribution of the post office is related to communication. In particular, post offices enabled connection to a widespread communication grid that rapidly revealed itself as substantially faster, cheaper, and more reliable than the existing means of communication, such as private arrangements to deliver mail. The post office offered businesses a fast and cheap method to communicate with customers, suppliers, and other stakeholders. Note that in the period of our analysis, the telegraph was also a communication option, but message length was extremely limited and it required physical wires to connect telegram stations. The wires generally ran along railroad tracks; as a result, by the end of the nineteenth century, telegram stations were only present in major cities.

Related to this last mechanism, the post office might have had a direct impact on knowledge flows through the dissemination of knowledge. With the postal service expansion, trade journals and newsletters – which have been attributed a fundamental role as carriers of specialized knowledge in the late nineteenth century (Haveman, 2015) – began to circulate more widely via the Post Office granting businesses greater access to more knowledge. Two changes around the mid-century contributed to the steady rise of newsletters and trade journals as conduits of specialized knowledge. The first was the availability of codified specialized knowledge; for example, in the form of patents and other schematics. Second, the postage price for magazines was substantially reduced, becoming similar to the prices for letters and newspapers. These factors, in conjunction with the expansion of the post office, were crucial in reducing spatial barriers to interactions between magazines and their audiences and contributors. A statement by a reader in a leading agriculture journal of the

time highlights the critical role of the ability to disseminate scientific knowledge: “It is to our agricultural paper, most emphatically, that we owe the awakening which has taken place in this State, on the subject of agriculture” (Haveman, 2015, p.265). This awakening was not restricted to agriculture, but also took place in other industries and professions. Trade journals were not only disseminating specialized knowledge by providing information about best practices and new innovations, but were also providing domain-specific information about suppliers and customers, and how to set up shop (i.e., by providing manuals).

*Performance:* The net relationship between the US postal service expansion and the performance of firms is not obvious, since there are possible countervailing forces at work. For one, via its impact on firm entry, incumbents may have experienced higher competitive pressures leading to a reduction in financial outcomes for many. For another, certain firms, such as the more sophisticated ones (with higher quality and growth mentality), or those who can leverage access to the mail the most, may have experienced a boost in performance (Alcácer & Chung, 2007). If this is the case, then we are likely to find either a null or even negative relationship on average, but important heterogeneity along dimensions such as quality, experience, and industry.

### 3 Data

For the purpose of this paper, we focus our attention on one of the fastest-growing states in the West during the post-Civil War era – California – which achieved statehood in 1850. Settlers were attracted by the abundant natural resources and California quickly became one of the most economically important states in the West. Besides its economic importance, we also focus on this state given the extensive digitization efforts that this study required.

#### 3.1 Post Offices

Information about post offices was provided by Blevins (2021) and is based on historical documents of the Post Office Department originally collected by R. Helbock and now in the National Archives. Data on post office locations was carefully geocoded, using historical names and landmarks of the time, through the Geographic Names Information System. Moreover, the data include information about the establishment and closing year of each post office, so that the life of each post office can be precisely determined. We capture post offices by counting the change in the number of active post offices in the vicinity of a city center from 1880 to 1890.

To accurately measure distance between city centers and post offices, we leverage the existing network of trails and roads existing in California in 1882. Given the relative scarcity of infrastructure in 19<sup>th</sup>-century California and the geographical conformation of the land, rich in mountainous and impervious terrains, the use of Euclidean distance might produce incorrect measurements as relatively close post offices might have actually been very distant (Figure A5 in the Appendix shows an example). We manually georeferenced and digitized what is believed to be one of the most accurate maps of California (Bancroft, 1882) of the time, which includes the full network of trails and roads existent in 1882 (Figure A6 in the Appendix). Further details on the georeferencing and digitization process of this map can be found in Section A of the Appendix. We supplement the full network of roads and trails with information on railways, navigable rivers, and water canals active in that period Attack (2015, 2016, 2017). We then calculate the distance from each city and post office by leveraging this detailed infrastructural network, counting the number of post offices within 20km from each city center. This distance corresponds to approximately four hours walking and an hour and a half trotting on horseback.<sup>7</sup>

## 3.2 Entrepreneurship and firm performance

The primary source we use to measure firm entry and performance is the R.G. Dun & Co. credit report collection we were granted access to in library archives. This unique, historic collection consists of 2,522 volumes of handwritten credit reports on individuals and firms from the United States, its western territories, Canada, and several foreign countries starting in the 1840s. Entries include information on the business’s worth, life span, industry, sources of financing, and the character and reputation of its owners, their partners and successors. The credit report volumes are arranged geographically by state (or territory). Each state (or territory) is then subdivided alphabetically by county and/or city.

### 3.2.1 R.G. Dun & Co. credit report collection

The Mercantile Agency emerged in the first half of the 1800s to manage the growing problem of credit risk. The most important of these early agencies was established in New York in 1841 by Lewis Tappan who sought to implement a national system of credit checking that would foster trust by

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<sup>7</sup>One has to keep in mind that in 1890 most cities in California were not as extensive as they are nowadays. From a rough calculation using maps of Los Angeles dating in the 1890s, the city could be encompassed by a 15km diameter circle.



commending the honorable and exposing fraudulent purchasers, swindlers, and incompetent traders for what they were. The core was a centralized library of large leather-bound ledgers. Together, the agency's volumes listed all known businesses in the U.S. and, most importantly, included detailed reports on the personal character, financial means, and local reputations of their proprietors. For example, in the Marin County Ledger, California, Isaac Shaver, owner of a Lumber and Building maintenance company in San Rafael is described as: "Has lived in the country 9 years, engaged most of the time in the lumber business. Stock on hand about \$10 [000]. Owns steam and saw mill and timber land worth about \$10 [000]." Lewis Gordon, a wheelwright from Bolinas is described as "In business 4 or 5 years. Stocks worth \$4 [00]. No other property. Is a man of steady habits, and it is that he will pay promptly if trusted for any amount. This information was updated later and the following was added: "Canadian[,] aged and single has been in business here about 10 years owns liabilities of land with shop." Yet another, Frank Miller, a Blacksmith and Wheelright from Olema, was registered as: "Age 40 single stock \$6 [00] owns shop \$4[00] and is worth about \$15[00 ] clear. Works hard pays up and stands well in the community. Is regular nominee for office of sheriff." Some years later the update states "... about a year ago sold out to John Monroe." More tragic is the description of John Healey, a baker, who is initially registered as "Irish aged 38. Married. He bakes, she tends [to the] store and some half a dozen babies at same time." Two years later the entry is updated with the following note: "We found him completely broken down. Not a kick left in him. Calmly awaiting the day when he should be sold." Subscribers to the service – wholesalers, merchants, financiers, and insurance companies – were granted tightly controlled access to this information for the purpose of making informed credit-granting decisions. Tappan's system was continued and took over by Robert G. Dun in 1859, who ran the firm as R.G. Dun and Company.

The American Mercantile Agency was, in scale and scope, one of the most impressive apparatuses of social monitoring during the nineteenth century. Dun insisted that reporters shifted their emphasis away from moral character to measures of capital worth, cash flows, debts outstanding and other quantifiable data to allow for more rational decisions on credit transactions. The first reference book was published in 1859. In April, 1869, a main office was established at San Francisco – the first branch of The Mercantile Agency west of the Rocky Mountains – to cover present States of California, Nevada, Utah, Montana, Oregon and Washington, together with the Canadian Province of British Columbia. There also existed minor offices in the more sparsely settled portions of the

region to ensure the provision of prompt and reliable information (Vose, 1916). These offices were supported by traveling reporters as often as possible to reduce “white” space. As reported, “Dun expected to see a lot of red on the maps, and woe to the manager who submitted a map with many uncolored counties“ (p.129)(Norris, 1978), suggesting that the existing information is likely as complete as any data set of the time could have been and should have attained fairly exhaustive coverage by 1870.

### 3.2.2 Entrepreneurship

Given the improvement in data collection by 1870, we measure entrepreneurship as the growth in the number of new firms between 1880 and 1890 at city level by sector.<sup>8</sup> We leverage the sectors outlined in the R.G. Dun & Co. credit report collection, which classifies businesses in 31 different industries: barber shops, books & publishing, breweries & distilleries, butchers & fisheries, builders & contractors, wagon-makers & locksmiths, tailors & clothing, mining, commission businesses, crockery & pottery, physicians & doctors, dry goods & cannery, fancy goods & varieties, florists, flour mills & bakers, foundries & heavy machinery, furniture & decorations, general hardware & ironworks, general stores, groceries, jewelry & watches, lumber mills, musical instruments, paints & oils dealers, plumbing & wire works, stables & harnesses, hospitality, financial services, shoemakers & leather goods, cigars & tobacco, warehouses & storage.

### 3.3 Cities and Settlements

The way in which we measure cities is crucial in our context, as the West during this period was undergoing a continuous evolution. Cities were often small, reflecting their recent establishment. Mergers of cities, as well as name changes, were not uncommon throughout our study period. These aspects are consequential in our setting. Failing to recognize a merger might lead to a measurement error, causing an overestimation of new businesses in the subsequent decade. Conversely, overlooking a name change could result in underestimating the number of new businesses in a specific locality.

To ensure a comprehensive and consistent representation across the decades under study, we adopted the following approach: firstly, we gathered data on all cities, towns, and villages men-

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<sup>8</sup>To have information about new businesses we then collect business data in the years 1870, 1880, and 1890.

tioned in the R.G. Dun & Co. credit report collections during our period. We benefited from the company’s meticulous records, which noted previous city names and details of mergers or splits. This helped credit analysts track changes over time and accurately identify businesses and individuals. Using this detailed data, we constructed unique city identifiers to monitor cities over time, even when their names changed. Given our focus on the influence of new post offices on entrepreneurial entry, we retained only those cities that were documented in 1880, regardless of the name used.

While the R.G. Dun & Co. credit report collections provided rich insights about localities, relying solely on this source might introduce a selection bias, as the company only recorded cities with businesses at some point during our study period. Ideally, we would want to capture settlements that might not have housed any businesses. To address this, we supplemented our city dataset with localities listed on the 1882 map of California (Bancroft, 1882). We also incorporated geolocation data for each city, drawing from various historical maps, the positions of historical towns as outlined in Blevins (2021), and by manually searching websites that offer information on historical town locations. In the end, we were able to geolocate the majority of cities, with only 5% of firms lacking this information. Our final dataset comprises 1,317 historic cities in California.

### 3.4 Other controls

California city-level population data for 1880 come from the *Historical Census Populations of California, Counties, and Incorporated Cities, 1850–2010*. Moreover, we obtain data containing population information from Gibson (2007), based on decennial census reports on townships and places, and from the R.G. Dun & Co. credit reports, which provide relatively comprehensive information on the population of the smallest cities.<sup>9</sup> We supplement this data with information about industry, which is specified for each firm in the R.G. Dun & Co. reports and employ the original classification used in the data.<sup>10</sup>

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<sup>9</sup>If the information for one city was missing in 1880 we imputed the value using the average growth of the population between the 1870-1880 for California. Despite the various sources employed to find information about population, we were still unable to find population data for some minor settlements. For these cities we imputed the population value corresponding to the 25<sup>th</sup> percentile as these were most likely less populated settlements.

<sup>10</sup>The categories are: barber shops, books and publishing, breweries and distilleries, butchers and fisheries, builders and contractors, wagon-makers and locksmiths, tailors and clothing, mining, commission businesses, crockery and pottery, physicians and doctors, dry goods and cannery, fancy goods and varieties, florists, flour mills and bakers, foundries and heavy machinery, furniture and decorations, general hardware, tinware, and iron-works, general stores, groceries, jewelry and watches, lumber mills, musical instruments, paints and oils dealers, plumbing and wire works, stables and harnesses, hospitality, financial services, shoemakers and leather goods, cigars and tobacco, warehouses and storage.

We also construct a set of controls that capture access to alternative communication and transportation systems, i.e., railways, rivers, and canals. We build the corresponding variables indicating whether a city was in proximity (i.e., within a 20km radius) to any railways, rivers, or canals in each decade using the data provided by Atack (2015, 2016, 2017). Finally we add county information by leveraging 1880 counties’ boundaries (Logan et al., 2011).

Table 1 shows summary statistics for our main variables and controls. In general, entry by industry was very skewed in both 1880 and 1890, with on average of 0.41 firms entering each industry in a given city in 1880 and an average of 0.49 firms in 1890. Some combinations of sector-city tend to experience high entry in both periods. For instance, San Francisco scores the highest in terms of entry of hospitality-related businesses, with 1,507 companies established between 1880 and 1890. When looking at entrepreneurial growth, entry appears to be more scattered and heterogeneous. Figure A7 in the Appendix shows the entry growth (calculated as the inverse hyperbolic sine) of the 20 most populous cities in California between 1880 and 1890. Some industries are growing in almost every major city: this is the case for instance for barber shops, cigars and tobacco, jewelry and watches, and medical instruments. At the same time, some cities experience growth in almost every industry. One example is Eureka, Los Angeles, and San Jose. Other cities, such as Bodie, experience a strong drop when it comes to new entry in 1890 compared to the previous decade.

When examining the top 10 growing and declining cities in California (see Figure A8 in the Appendix) it is striking to note that no major cities make the list. Instead, it is cities such as San Jacinto, Delano, and Greenwich that score the highest when it comes to aggregate businesses across all industries. Most of the firms that enter in 1880 and 1890 ( 27%) are active in the hospitality sector, which primarily consists of saloons and hotels. Wagon-makers & locksmiths represent the second category with 9% of new firm entry in 1880 and 1890. This sector is followed by groceries and general stores. Figure A9 in the Appendix shows a detailed breakdown by sector of the firms in our sample.

Figure 1 shows the expansion of the US Postal Service from 1880 to 1890, highlighting its growth throughout California. While there were 852 post offices in 1880, there were 1,270 by 1890. During this time, 570 new post offices were created, and 152 closed. The growth in the number of post offices can be explained by how easy it was to establish a new post office. All it took was a letter from a few citizens to the Postmaster General; requests were rarely rejected (Blevins, 2021).

For examples of letters from California and other parts of the US, please refer to the Appendix, Section B. The ease of establishing post offices allowed for their capillary expansion across the US territory. For our empirical analysis, this provides some reassurance that the establishment of most post offices was not a consequence of long-lasting economic development in a specific area. When looking at cities, roughly 75% of them do not gain any new post offices between 1880 and 1890 (67% gain no post office, and 8% lost 1 or 2 post offices), while roughly 25% get at least one. 14% of cities gained one post office, 6% gained two, 2% gained three. The remaining ( 2%) gained between 4 to 8 post offices. Figure A10 in the Appendix shows the change in the number of post offices by city from 1880 to 1890. Figure A11 displays patterns across the entire country.

## 4 Post Office Location and Entrepreneurship

### 4.1 Empirical strategy

To estimate the relationship between post offices and entrepreneurship, we use a first-differences model (1880-1890) at the city ( $c$ ) and sector ( $s$ ) level which abstract from yearly variation, as follows:

$$EntryGrowth_{i,s} = \alpha + \beta \mathbf{1}(PostOffices)_i + X_i\Gamma + \lambda_c + \theta_s + e_{i,s} \quad (1)$$

where  $i$ ,  $s$ ,  $c$  indexes cities, sectors, and counties, respectively.  $EntryGrowth_{i,s}$  is measured as the change in the inverse hyperbolic sine transformation ( $arcsin$ ) of the new number of businesses in sector  $s$  between 1880 and 1890 in city  $i$ .<sup>11</sup>  $\mathbf{1}(PostOffices)_i$  is a dummy indicating whether the city has gained at least one new post office between 1880-1890.  $X_i$  is a set of socio-economic and transportation-related controls at the city-level. The first set of controls include population and the initial stock of businesses. In general, these controls help us account for a possible alternative explanation based simply on the agglomeration of people regardless of communication infrastructure (Carlino et al., 2007). To these controls we add variables accounting for alternative transportation methods, i.e., a variable indicating if a city had access to a railway line, a waterway, a navigable river within a radius of 10km.  $\lambda_c$  and  $\theta_s$  represent county- and sector- fixed effects, respectively.  $e_{i,s}$  is the error term. We cluster our standard errors at the city level (Abadie et al., 2017).

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<sup>11</sup>The inverse hyperbolic sine transformation has recently become very popular given it exhibits the usual properties of the natural logarithm. At the same time, it allows for zero- and negative-valued observations, which tend to convey important information that a simple log- or the log+1-transformations ignore (Bellemare & Wichman, 2020).

### 4.1.1 Addressing identification

In an ideal experiment, post offices would be randomly assigned to locations. Post offices would thus not be located where there is population and economic growth, nor would firms choose to be close to a post office based on their characteristics, nor would simultaneously occurring events influence location decisions, allowing the researcher to cleanly estimate the effect of post offices on establishment growth and firm performance. Although such an experiment is not within our reach, the thought experiment highlights two major threats to identification that we must address as best we can: omitted variable bias and reverse causality.

With regard to omitted variable bias, urban growth, economic activity, and communication infrastructure may be simultaneously co-determined and regions that were developed earlier may have attracted more people and created more employment than younger regions. These locations may then also have continuously attracted firm founders, who then need employees (and customers). Some areas in a region will have been more suitable for development than others due to, for example, access to water (Duranton & Turner, 2012) or other natural resources. To partially address the issues related to omitted variable bias, we include county fixed-effects, which keep unobservable features of a county, such as its natural resources, constant; we also include industry fixed effects which help us control for industry specific trends and features.

Another threat to our identification strategy is that firm entry may have attracted the postal services, rather than the other way around. If that were the case, we would be measuring the pull relationship of economic activity on firm creation. This type of reverse causality is unlikely to be the driver of our results, given 1) how easy it was to request a new post office (please refer to Appendix Figures A1 to A4 for examples of requests from across the US), and 2) prior work suggesting that the post office preceded economic development (Rogowski et al., 2021). While some additional analyses in Section 4.2.2 highlight how reverse causality is unlikely to play a major role in our setting, we leverage an instrumented specification to make sure our results are not suffering from any endogeneity-related biases.

Specifically, for our city-level analysis, we exploit on a natural experiment that was initiated in January 1884. Announced in a message from the House to the Senate on January 18, 1884, the House had decided that all public roads and highways were to become post-routes (<https://www.congress.gov/records/house/1884/1884-01-18>).

[//www.congress.gov/bound-congressional-record/1884/01/18](https://www.congress.gov/bound-congressional-record/1884/01/18), accessed August 18, 2023, p. 475).

This change came suddenly and unexpected and was ultimately put into effect on February 14, 1884. As the verbatim discussion describes, the rationale behind the decision to do so was to reduce administrative burden of requesting a post-route.

“It has been the custom in Congress for many years at every session to pass a post-route bill. It involves a great deal of labor and a great deal of expense, and it has appeared to the committee to be an entirely unnecessary labor. We put upon those bills in every case every route that is offered, no matter from what office it come. We see that the route is put on the bill, and never of my knowledge has there been an objection made to any route being put upon one of the bills. I can see no harm that can possibly result from the passage of this bill and a great deal of good. (...) The operation practically is that if there is a new route to be established it frequently has to wait a year or a session of Congress before it can be got into the post-route bill, but it always goes in in time, nobody objecting. I take it the principle of this bill is to take away the necessity for that delay (...). It seems to me that it is a good measure and that it will save something by avoiding the passage of the annual bill which is practically useless.”<sup>12</sup>

Passed and discussed in Washington D.C. by representatives from states distant from California, the decision to approve this bill was driven by purely bureaucratic reasoning rather than motives of economic development.<sup>13</sup> As a consequence of this bill, the time and cost associated with establishing a new post office decreased significantly. In general, every city benefited from a reduction in the time required to open a post office, as the step of establishing access routes was eliminated. Crucially however, cities and settlements with access to any road that was newly designated as a “mail” road could now receive mail service, making them more likely candidates for new post offices.

We argue that this abrupt change presents an appropriate instrument for our analysis. It should correlate strongly with the opening of new post offices, but, aside from this direct effect and when

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<sup>12</sup><https://www.congress.gov/bound-congressional-record/1884/02/14>, accessed August 18, p. 113.)

<sup>13</sup>The Postmaster General at the time, Walter Q. Gresham, and the president of the time, Chester Arthur, were both Republicans. Given that the State of California had voted for the Democratic party and was distant from the home states of those in power, it is unlikely the bill was passed as a political favor to that specific state, as might have been expected under the spoils system.

conditional on controls, it should not predict firm entry except through the post-related channel. Given that the only modification in the reform pertained to road status, it is improbable that this change would be tied to dynamics that could be problematic in our context, such as those related to labor or trade. The flow of trade and goods should remain largely unaffected as the infrastructure, i.e., roads, were already in place.

One potential concern in exploiting this event, is that towns that benefited from postal routes before the reform might differ significantly from those on roads that became postal routes after the reform. Since establishing routes was time-consuming and costly before the reform, more developed and larger cities were more likely to receive a mail route. However, it is plausible to argue that some cities may have benefited from post routes pre-reform merely because they were “en route” or luckily located between major cities that needed to be connected by mail. Ideally, we aim to compare these cities with those that acquired mail routes post-reform. To achieve this, we examined historical post route maps from 1877 to 1882 to identify the principal cities first connected by mail routes.<sup>14</sup> We begin by removing these cities from our pre-reform sample. As these cities were predominantly larger settlements, we also exclude other localities within a 20km radius. Additionally, we omit all cities located at terminal points of the postal routes. The reasoning is that if a postal route concludes in a specific city, it must have been an economically significant point for various reasons (e.g., historical or geographical). By excluding these cities, we can more fairly compare those on pre-reform versus post-reform routes. Examining the economic indicators at our disposal (i.e., population and the initial stock of businesses in 1880) for these two city groups, we observe no significant differences in means.

To construct our instrument, we obtain the official route maps published by the office of the Postmaster General and digitize the pre-reform routes. We then integrate this network with the comprehensive road network from Bancroft (1882). For each city we consider, we count the number of kilometers of newly established mail routes in a close radius around the city center (i.e., 5km). New mail routes are defined as roads not designated as post roads by the Postmaster General right before the bill’s passage. We then create a ratio by dividing this number by the total kilometers of all types of roads (both pre- and post-reform mail routes) within the same radius.<sup>15</sup> Figure 2

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<sup>14</sup>These were cities that were marked as “major” in the maps.

<sup>15</sup>Some cities are not directly situated on any roads captured by our maps. These tend to be small settlements, likely linked to other cities via minor trails unsuitable for carriages. In order not to discard these cities from our analysis, we assign them the 25th percentile value from the distribution of the ratio.



depicts the digitized pre-reform postal route network (in green) and highlights roads designated as postal routes after the bill’s passage in red. Cities and settlements included in our instrumented analysis are marked with colored dots, indicating the road composition nearby. For example, cities surrounded predominantly by roads granted postal route status post-1884 are shaded more intensely in red. In contrast, cities near a pre-reform post route (green roads) are colored in white.

Using this instrument, we proceed to estimate the subsequent first-stage and instrumented first-differenced models:

$$\begin{cases} 1(PostOffices_i) = \gamma + \theta Z_i + X_i\Lambda + \lambda_c + \delta_s + \epsilon_{i,s} \\ EntryGrowth_{i,s} = \alpha + \beta 1(\widehat{PostOffices_i}) + X_i\Gamma + \lambda_c + \theta_s + e_{i,s} \end{cases} \quad (2)$$

where the first equation is our first stage, and where  $Z_i$  is the instrument for the growth of post offices in the 1880-1890 period. We construct  $Z_i$  as the ratio of newly eligible roads in close proximity to the city (within 5 km) to all available roads within the same distance. As before,  $1(PostOffices_i)$  is a dummy indicating whether the city has gained at least one new post office between 1880-1890.  $X_i$  is a set of socio-economic and transportation-related controls at the city-level including population and the initial stock of businesses.  $\lambda_c$  and  $\theta_s$  represent county- and sector- fixed effects, respectively.  $e_{i,s}$  is the error term. We cluster our standard errors at the city level (Abadie et al., 2017).

For further robustness we also construct variables that capture historic pioneer trails from the California Natural Resources Agency since it could be that initial mail routes were more likely to run along these. The routes we include are the California National Historic Trail<sup>16</sup>, accessed August 10, 2022) and the Old Spanish National Historic Trail<sup>17</sup>. We control for these to make sure they are not driving our instrumented results. As displayed in Figure A13, the trails moved from the East to the West where they ended at large water bodies.

<sup>16</sup>[https://www.nps.gov/cali/planyourvisit/upload/National\\_Park\\_Service-California\\_Trail\\_Map-508.pdf](https://www.nps.gov/cali/planyourvisit/upload/National_Park_Service-California_Trail_Map-508.pdf)

<sup>17</sup><https://www.nps.gov/olsp/planyourvisit/upload/National-Park-Service-Old-Spanish-Brochure-Map-508.pdf>, accessed August 10, 2022

## 4.2 Results

### 4.2.1 OLS

Table 2, Column (1) presents the results only including county and industry fixed effects. In Column (2), we introduce the initial stock of businesses, in Column (3) we add population, in Column (4), we show our preferred specification, where we add transportation controls (i.e., proximity to railways, waterways, and the sea). This specification indicates a strong positive relationship between having a new post office and entrepreneurial growth. In particular, the coefficient suggests that gaining at least one new post office is associated with an average 3.3-percent increase in the growth rate of new firms on across industries. The coefficient across all models are similar and stable.

### 4.2.2 Robustness Checks and Alternative Explanations

In the Appendix, Table A1 we perform several robustness checks by employing different specifications and controls. First, we control for alternative economic factors that might have influenced the entry decision of companies. Of notable importance at the time were natural resources, and especially gold deposits, which might have had a great influence on economic growth of cities. We add information about the location of historical gold mines (McFaul et al., 2000) and we build a dummy capturing high concentrations<sup>18</sup> of gold sites within 20km of each cities. Our main results remain unchanged, and the post office coefficient is statistically equal to the one found in our preferred specification (Table 2, Column (1)). Another factor that might influence the economic pull of a location is the distance to major city centers. Since settlements might be located close to major cities which might have provided better economic opportunities, we also calculate the distances (in km) between each city and the two major cities existent in California at that time, i.e., Sacramento and San Francisco. Column (2), Table A2, shows that the results are robust to the inclusion of these controls.

We might also be worried about the presence of other amenities and geographical features that might influence entry. In order to make sure that our results are not driven by geographical differences that might exist across cities, we include as variable the latitude and longitude of the centroid of each city, following Donaldson and Hornbeck (2016). The results, reported in Column

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<sup>18</sup>Given the vast presence of gold deposits in California, we use the median value of gold sites to build our dummy.

(3), remain robust.

Another factor that might have impacted entry is the presence of financial institutions in a city. In particular, the presence of banks might be an important determinant of entrepreneurial entry (Bates, 1990). Once again we rely on the R.G. Dun & Co. credit report collection data to build a variable capturing the presence of at least a bank in each city. Results in Column (4) show how the post office coefficient remains unchanged.

In Column (5) we add the initial stock of post offices present in proximity to a city (within 20km) in 1880, while in Column (6) we add the share of businesses in each sector to account for specific cluster-like dynamics. We might also be worried that our results are driven by a few major cities, since some of them (e.g., Los Angeles) tend to experience high growth in entrepreneurship and the number of post offices. In Column (7), we run our baseline regression while excluding the three main cities in California at the time, i.e., Los Angeles, San Francisco, and Sacramento. Results are robust and the coefficient remains statistically unchanged. In Column (8) we employ the growth rate of post offices (as inverse hyperbolic sine) between 1880-1890 as the main independent variable instead of the usual dummy variable. The post office coefficient is positive and significant.

Another threat in our empirical strategy is the presence of reverse causality, i.e., business entry is attracting post offices and not vice-versa. Besides employing an IV strategy that will be described in more detail below, we perform a simple test to check whether future presence of post offices can predict present growth of entrepreneurship. We add the lead value of the number of post offices in 1890 to our preferred specification (Eq. 1). The coefficient of future post offices is not significant and close to zero, while the coefficient capturing the present value of post offices is still positive, significant, and not statistically different from the one we find in the Appendix, Table A1 (Column 9). These results suggest that it is unlikely that an increase in entrepreneurship led to an increase in post offices. Our findings are in line with recent work suggesting that postal offices preceded development (Rogowski et al., 2021) and contributed substantially to advancing the notion of nationhood (John, 1998).

In Column (10), we use an alternative outcome – the plain change in number of businesses –, and in Column (11), we apply a Poisson specification to run our baseline results. As displayed, our results remain statistically significant on conventional levels, positive, and economically meaningful.

### 4.2.3 Instrumented Results

In Table 3, Columns (3) and (4) present our main IV results, making use of the change in post-route eligibility. As displayed in Column (1), our first-stage results are positive and precisely estimated, suggesting that, as predicted, cities exposed to change were more likely to receive a post office. Column (2) displays the results using a Logit model. The F-statistics are sufficiently large, with a value of 541.326. When looking at the instrumented coefficient for post office, its magnitude is larger than the one presented in the OLS model (Table 2, Column 5), which may indicate that the IV is shifting the behavior of some industries in some cities where the returns to a post office are higher than average. If the local average treatment effect is larger than the average treatment effect, it is plausible that IV estimates are larger than OLS estimates because of heterogeneity in the sample we are analyzing. Our instrumented specification suggests that the creation of one new post office is associated with roughly a 20% increase in the growth rate of new firms in a given city-industry pair; a city with an average entry of roughly 13 businesses in 1880 would experience the entry of almost 3 new companies a decade later. Given the small size of settlements at the time, this number appears both economically meaningful and realistic.

For further robustness we consider another instrument, which exploits precipitation variability experienced by cities from 1880 to 1890. In general, such irrigation should have a substantial impact on the stock of post offices through its impact on farming and ranching productivity (Blevins, 2021), but not through its impact on non-farming activity, which are the type of businesses we are focused on. We capture average soil moisture levels in the 1880s using the Palmer Drought Severity Index (PDSI) (Palmer, 1965; Cook et al., 2010), widely used in the meteorological literature to gauge soil moisture and aridity. It is available in a spatial resolution of 0.5 x 0.5 degrees. Figure A12 shows a map depicting the average soil moisture in California in the period 1880-1890. The first-stage and instrumented results are in the Appendix, Table A2, and are similar to those of our other instrumental variable approach.

## 4.3 Towards Understanding Potential Mechanisms

To better understand which potential mechanisms underlie our main results, we examine four channels by which the US Postal Service expansion might have affected firm entry. First, as post offices also allowed individuals to send and receive money, we analyze their role as a monetary distribu-

tion centers, which may have lowered the costs and increased the convenience of money exchanges. Second, the expansion of the postal service may have help government extend its reach, particularly that of the legal system reducing uncertainties and establishing a stable economy and social relations. Third, access to the post office may have streamlined communication with customers, suppliers, and other stakeholders, enabling entry. Finally, post offices might have facilitated and encouraged knowledge flows; specifically, flows of specialized knowledge that might have affected businesses’ best practices, promoted adoption of innovation, and lowered search costs in general.<sup>19</sup>

In order to shed light on the first mechanism, we leverage the fact that not all post offices offered money order services and that post offices with and without that capability might have had heterogeneous effects on performance. We use data from the *United States Official Postal Guide* (of the Post Office Department, 1880), which lists post office locations offering money order services. For each city, we count how many post offices offering money orders are within 20 kilometers of the city center and create a dummy to indicate cities at least one post offices offering money ordering capabilities.

To understand the relationship with government institutions, and the legal system in particular, we create a variable that locates all courts existing in 1880 in the state of California. We leverage data coming from the Bureau of the Census and United States Civil Service Commission (1877) which lists all courts existing by city in California and we create a dummy indicating whether the city has at least one court.

To capture increases in firm entry due to improved communications (that is, access to a faster, cheaper, and more reliable way to communicate), we exploit the fact that different industries will be differently exposed to such improvement. For instance, a business in the banking or finance industries might benefit more than a business in the hardware sector. In general, it is very challenging to quantify how industries might benefit from improved communication. We use the data coming from the work of Forman et al. (2003), where they assess the extent to which different industries have adopted another major innovation that substantially improved communication: the internet. Though this approach has limitations<sup>20</sup>, we argue that there is, nonetheless, a strong

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<sup>19</sup>The role of the postal service as a carrier of goods might seem to be a fourth possible mechanism. But we can exclude it because mailing packages larger than an envelope was only possible starting in 1913, after our period of analysis.

<sup>20</sup>In particular, there might be a difference in how the postal system and the internet have affected various industries since the phenomena are somewhat distinct and also because businesses operations have changed substantially since the nineteenth century, possibly making the impact of the internet more pervasive than that of the postal service. In

correlation between the industries that might have benefited most from the US postal system and those that benefited most from the internet. We use the percentage of businesses within an industry that have adopted the internet to proxy for the importance of communication in an industry. We divide our businesses into two categories: above- and below-median internet adoption. It is worth recalling that we already control for an important contemporary technology that also affected the cost of communication in general—the telegraph. Telegraph lines ran along railroad tracks, which we control for by including measures for the proximity to railroads in all our specifications.

To capture knowledge flows—in particular, flows of specialized knowledge—we leverage data on trade journals and the states in which they were published. By leveraging the specialized nature of trade journals—which targeted precise industries and sectors and provided information about innovations and best practices and other industry-related news—we hope to understand if knowledge flows influenced entry. We collect information about trade journals and their industries from *N.W. Ayer & Son’s American Newspaper Annual* (Ayer & Son, 1884), which includes the name, number of issues, location of publication, and—most importantly—the target industry for every trade journal published in the early 1880s. The rationale behind the use of these data is that, if knowledge flows across the country played a role in economic growth, firms in industries that experienced a surge of available knowledge through a high number of trade journals should exhibit higher growth. Since the number of local trade journals might be endogenous to entry and in general to the industry composition of a given location (that is, we might expect to find more journals dedicated to a specific industry being published in locations where this industry is developing and growing), we consider only trade journals published *outside* California, while controlling for all the journals published in California. In this way, we aim to capture knowledge flows originating from outside the state, which had to flow through the postal system in order to be diffused in California and, most importantly, were less likely to be correlated with the endogenous productivity growth in the state. We use the number of trade journals in each industry (published outside California) as a proxy for knowledge flows.

Using these data, we estimate Equation 1 and include interaction variables that best capture each mechanism: financial service, government institutions, communication, and specialized knowledge flow. Table 4, displays the results. Those for money orders are in Column (1), those related to government institutions in Column (2), those for communication are in Column (3), and those

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addition, it is generally hard to map nineteenth-century industries to modern, NAICS-based industries.

for trade journals are in Column (4). In all specifications, we include the usual controls from earlier regressions as well as county and industry fixed effects. In Column (1), the interaction term is not statistically significant at the 10-percent level suggesting that access to money orders is not the primary driver of our results. In Column (2), we find a similar result: the interaction term is not statistically significant, suggesting that access to government institutions is not the primary driver of our results although the positive coefficient suggests that the relationship may be reinforcing. Column (3) considers the role of the US Post as a facilitator of communication: again, the interaction is insignificant, while the main effect of post offices remains positive and significant, suggesting that improvement in communication does not fully explain our result. In Column (4), we find the interaction between post offices and specialized knowledge to be positive and significant, suggesting that access to specialized knowledge may indeed explain the relationship between increases in the stock of post offices and firm financial performance. In particular the presence of one more trade journal catering to a given sector is associated with an increase in entry rate of 0.26% for that sector.

## 5 Post office location and firm performance

### 5.1 Data and Empirical Strategy: Firm Performance

In the previous sections, our goal was to establish a plausible causal connection between the expansion of post offices and firm entry. In order to delve deeper into the potential contributions of the Postal Service expansion, we consider a different outcome variable—firm performance—and a different level of analysis—the firm. With the following analyses, we aim to understand if post offices had an impact on firm performance of existing firms as well, besides entry. To measure the performance of existing businesses across decades, we continue to exploit the R.G. Dun & Co. credit report collection. A unique feature of the R.G. Dun & Co. data is a measure capturing the net worth of each firm over time, which is our main performance outcome. This measure falls into 12 categories ranging from less than \$1,000 to more than \$1 million. <sup>21</sup>

Given data limitations<sup>22</sup> and the substantial collection effort, we focus on tracking the performance

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<sup>21</sup>The categories are: AA: over \$1 million; A+: \$750,000–\$1million; A: \$500,000–\$750,000; B+: \$300,000–\$500,000; B,C+,C: \$75,000–\$300,000; D: \$40,000–\$75,000; E: \$20,000–\$40,000; F: \$10,000–\$20,000; G: \$5,000–\$10,000 H: \$2,000–\$5,000; K: \$1,000–\$2,000; L-M: less than \$1,000. Note that some of the categories had to be aggregated together to keep consistency between the two periods.

<sup>22</sup>Data about firm performance before 1880 is often not included in the R.G. Dun & Co. reports and in general very few firms survived for more than a decade.

of firms between two decades, i.e., 1880 and 1890.<sup>23</sup> Our final sample is composed of 2,435 firms.

Our original performance variable consists of ordered categories capturing firms' net worth. Given the non-linearity of the categories, we transform our categories into a dummy variable capturing whether the firm's net worth increased between the decades of 1880 and 1890 to increase the interpretability of the results.

We then estimate the following first-differenced Probit model:

$$\Delta^{1880-1890} FinancialGrowth_{j,i,s,c} = \alpha + \beta \Delta^{1880-1890} PostOffices_i + X_j\Gamma + W_i\Lambda + \phi_s + \lambda_c + e_{i,j,s,c} \quad (3)$$

where  $j$  indexes firms,  $s$  sectors,  $i$  cities, and  $c$  counties.  $\Delta^{1880-1890}, FinancialGrowth_{i,j}$  is a dummy capturing the growth in financial performance measured as an increase in the firms' net worth of firm  $j$  in city  $i$  between the beginning and the end of the decade we consider (1880-1890).<sup>24</sup>  $\Delta^{1880-1890}, PostOffices_j$  is a dummy equal to 1 if the city has gained at least one post office within 20km from its centroid (using the full infrastructure network in 1880).  $X_j$  is a set of controls at firm-level. Most businesses in that period were named after their owners, which helps us infer several characteristics about the founders and the company. We control whether the firm is part of multi-establishment (i.e., the entrepreneur has connected businesses in other location)<sup>25</sup>, whether there are multiple founders, i.e., we observe the presence of multiple names in the company name or the company name includes words that suggest the presence of multiple co-founders, (the presence of the words "& co." and similar terms), whether the company is a family-based business, i.e., whether the word "brothers" or "sons" and their respective abbreviation terms are present in the name of the company, and the ethnic origin of the main founder.<sup>26</sup>  $W_i$  is a set of controls at city-level which include population, the close proximity of railroads, waterways, and the sea (within 10km) as well as main cities. Controlling for railways is not only important as they were a significant driver of economic growth per se (Donaldson & Hornbeck, 2016), but they held telegraph lines, which ran

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<sup>23</sup>Our sample is then composed of businesses that exist both in 1880 and 1890. We match the name of the business and its location in order to flag businesses observed in both years.

<sup>24</sup>Source: R.G. Dun & Co. credit report collection. Since the original measure of performance is a categorical variable including 12 non-linear categories of net worth, which had to be aggregated in order to provide consistency over time, it is not possible to provide a clear economic interpretation of the underlying coefficient. We avoid these issues by building a dummy capturing growth and running a Probit model that can provide a measure for the probability of growth.

<sup>25</sup>This information is provided directly in the Dun & Co. Credit Reports.

<sup>26</sup>We leverage an AI-based service (Namsor) to infer the origin of the name of the main founder based on the first and last name. As individuals in that period were primarily first or second-generation immigrant, it is fairly straightforward to infer the country of origin by analyzing one's first and last name.



along the existing railroad tracks.  $\lambda_c$  are county dummies,  $\phi_s$  are industry dummies, and  $e_{i,j,s,c}$  is the error term. We cluster the standard errors at the city level.

For summary statistics of variables at the firm-level, please refer to Table 5. Dun & Co. reports financial information for roughly 70% of the firms who survive from 1880 to 1890 (2,435 out of 3728). Of the 2,435 firms in our sample for which we have information about financials, 43% experience a performance increase. The median firm in 1880 has a net worth of 3 (corresponding to the category \$2,000–\$5,000). Moreover, 5% of the firms are part of a multi-establishment, 18% have multiple founders listed, and 2% are family business. Regarding the ethnicity of founders, 4% of the firms were created by an individual of African origin, 1.34% of Asian, 92.8% of European, and 1.85% of Hispanic.

## 5.2 Results

We estimate Equation 3 and present the results in Table 6. The first column contains the results from a Probit model where the outcome variable is equal to 1 if the firm’s net worth increased from 1880 to 1890. Columns (2) and (3) present analogous models that use a continuous measure of financial growth as main dependent variable (and specifically the delta in the value of the financial categories between 1880-1890). Column (2) presents the result of a simple OLS, while Column (3) presents the results from a Ordered Logit specification. In general, all results suggest that an increase in the number of post offices near the city of the focal firm (i.e., within 20 kilometers) is not associated with a clear change in firms’ financial performance. This null result is interesting but not surprising, since the net relationship between the US postal service expansion and the performance of firms is not obvious. There are possible countervailing forces at work.

For one, via its impact on firm entry, incumbents may have experienced higher competitive pressures leading to a reduction in financial outcomes for many. For another, certain firms, such as those of the highest quality, with most skin in the game, or those who can leverage access to the mail the most, may have experienced a boost in performance. If this is the case, then we are likely to find either a null or even negative relationship on average, but interesting heterogeneity along dimensions such as quality, experience, and industry. In particular, above and beyond the negative pressures of competition and given our previous results, those firms that benefit the most may be able to leverage local and specialized knowledge the best.

To shed more light on the potential sources of heterogeneity, we examine the interaction of having a new post office (*1(New Post Office)*) with different competition-, quality- and knowledge-based measures. The results of our preferred Probit model are displayed on Table 7. In Columns (1) and (2), our findings suggest that firms in industries that have a large representation within their city and those firms in cities with increasing numbers of new entrants, experience large drops in performance. Columns (3) and (4) suggest quality alone, i.e., family businesses and firms started by founders who have already existing establishments is not a sufficient condition to benefit from the opening of a post office. In Columns (5) and (6) we explore the relationship with specific knowledge and technology channels. First, we use our trade journal data and we interact having an out-of-state trade journal in a given sector with our post office measure. The interaction is positive and significant on conventional levels. The main effect turns negative, suggesting that in absence of such a knowledge channel post offices may dampen performance.

Finally, we investigate a further channel through which post offices may impact performance – by providing access to technology. Here, we examine a special and public, technology of the time that potentially had substantial impact on private sector outcomes (Cohen et al., 2002; Nagaraj, 2022). The specific technology we exploit was distributed by a branch of the government – the newly founded USDA – via mail: seeds. In 1839 the Agricultural Division was established by Congress within the Patent Office. Two decades and a half later, Abraham Lincoln established the independent Department of Agriculture through the Morrill Act, which received Cabinet status in 1889.<sup>27</sup> From its establishment within the Patent Office until 1923, an integral task allotted to what would become the USDA and then was, was to send seeds across the country to the public.<sup>28</sup> The goal was to improve food safety and experiment with the country’s crops by relying on an agricultural depository to collect seeds and plants. Handling seeds (and bulbs) was not a straightforward task. It required extensive knowledge to produce successfully (Lyon-Jenness, 2004).

From this, seeds appear to have been an important “technology” throughout the end of the 19<sup>th</sup> century. We exploit this fact and create a measure that equals to one for those industries that directly handled seeds and their derivatives. These industries are “florists” who dealt with seeds and ran nurseries as well as “grocers” who distributed them. Using this measure, we find suggestive evidence that those firms acting in industries that could benefit from this specific technology expe-

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<sup>27</sup>For more information, see: <https://www.usda.gov/our-agency/about-usda>.

<sup>28</sup><https://history.house.gov/Blog/2016/May/5-23-photo-seed-distribution/>

rienced boosts in performance (Table 7, Column 6) more than the potential negative competitive pressures. Taken together with our previous results, the findings from our performance heterogeneity analysis suggest that the US Postal Services may, indeed, have played an impactful role both for firm entry and performance in the late 19<sup>th</sup> century as a channel spreading specialized knowledge and technologies though not all benefited in the same way.

## 6 Discussion and Conclusion

In this paper, we analyze the impact of the US Postal Service expansion of 1880–1900 – an institutional innovation – on regional firm entry and firm performance outcomes. To do so, we exploit a novel dataset and estimate both region- and firm-level outcomes. We first examine the role of the US Postal Service expansion on the rate of new firm entry at the city level. To deal with concerns of omitted-variable bias, we saturate our models with county and industry fixed effects and a host of demographic and transportation-related controls and include an instrument based on post-route networks. Our findings suggest that an increase in the number of post offices in a city is associated with an increase in entrepreneurship. As such, post offices may have helped connect more remote areas to—and may also have helped establish—a denser communication grid as well as have aided in creating a central gathering place for knowledge exchange to take place.

Additional analyses provide further insight into potential mechanisms driving these results. By testing several candidate channels through which the post office may have operated – as a financial service, as an arm of the legal system, as mass communication infrastructure, or as carrier of specialized knowledge – we unveil that access to specialized knowledge in the form of periodicals and magazines is feasibly the most dominant explanation and may have been a critical mechanism through which post offices contributed to increasing entrepreneurship during our study period (Haveman, 2015). Our results therefore suggest that the post office expansion in the late nineteenth century may have very likely contributed substantially to entrepreneurship via the offices’ role as “Carrier of (...) Knowledge.”

Regarding firm performance, our results are more nuanced. Estimating a similar model, but on the firm-level and controlling for firm- and founder-specific characteristics, we find that increases in competition given new entry exert downward pressure on many incumbents. Although we detect a negative or null relationship for most, we still find positive association with businesses that

can rely on knowledge flows coming from out of state. We further detect that actors in those industries relying on a specific type of government distributed knowledge and technology –seeds and food safety– experienced a boosts in performance. Overall, this suggests that the presence of a post office may have been particularly crucial for those firms who could leverage such specialized knowledge and technology inputs most in their day-to-day operations.

Taken together, our results highlight the critical role of knowledge exchange for entrepreneurship and firm performance. We thereby speak to the literature that stresses the importance of a region’s capacity to connect people and ideas for firm growth and innovation (Jacobs, 1969; Gaspar & Glaeser, 1998; Feldman & Link, 2001; Rosenthal & Strange, 2001; Storper & Venables, 2004) and provide important insights on the diffusion of knowledge (Jaffe et al., 1993; Singh, 2005; Thompson & Fox-Kean, 2005; Agrawal et al., 2006; Agrawal et al., 2017; Dutta et al., 2022). Moreover, we shine light on the role of broadly used communication infrastructure in promoting firm entry and boosting firm performance and find suggestive evidence for the importance of wide access to specialized knowledge from other geographies for firm performance. Especially this finding, furthers our understanding critically with regards to the relationship between knowledge sourcing and firm outcomes.

This paper has important implications for managers and policymakers. We present evidence that one reason why firms benefit from co-locating near infrastructure is superior knowledge flows. Our results provide critical information regarding infrastructure investment decisions, which may be especially crucial in the current debate on the pervasive roll-out of broadband, which now serves, as the Post Office once did, as an essential communication and knowledge vehicle. Our findings also suggest that investments made to connect remote places are worthwhile and may have a considerable effect on entrepreneurship and firm performance. Such connection may be particularly valuable to overcome the increasing urban–rural and even intra-urban divide in the US and many other developed or developing economies. Moreover, our work highlights the crucial role of establishing a central gathering place for critical local knowledge exchange and economic development to to occur, similar in vein to anchor institutions (Andrews, 2023).

Naturally, our work has limitations. The expansion of the US Postal Service was in many ways a unique endeavor, taking place at a time when the US was undergoing many changes and with much violence and injustice. This is not the focus of our paper, but may require further attention by the

literature. In addition, our focus on California, though critical for our empirical strategy, may be too narrow. Follow-on work may provide more detailed evidence pertaining to other states. Finally, we offer only a small window into the role of the Post Office – “Carrier of News and Knowledge” – for entrepreneurship and firm performance. More work will be required—for example, in the form of a general equilibrium model—in order to precisely estimate the gains that post offices brought to the economic development of regions.

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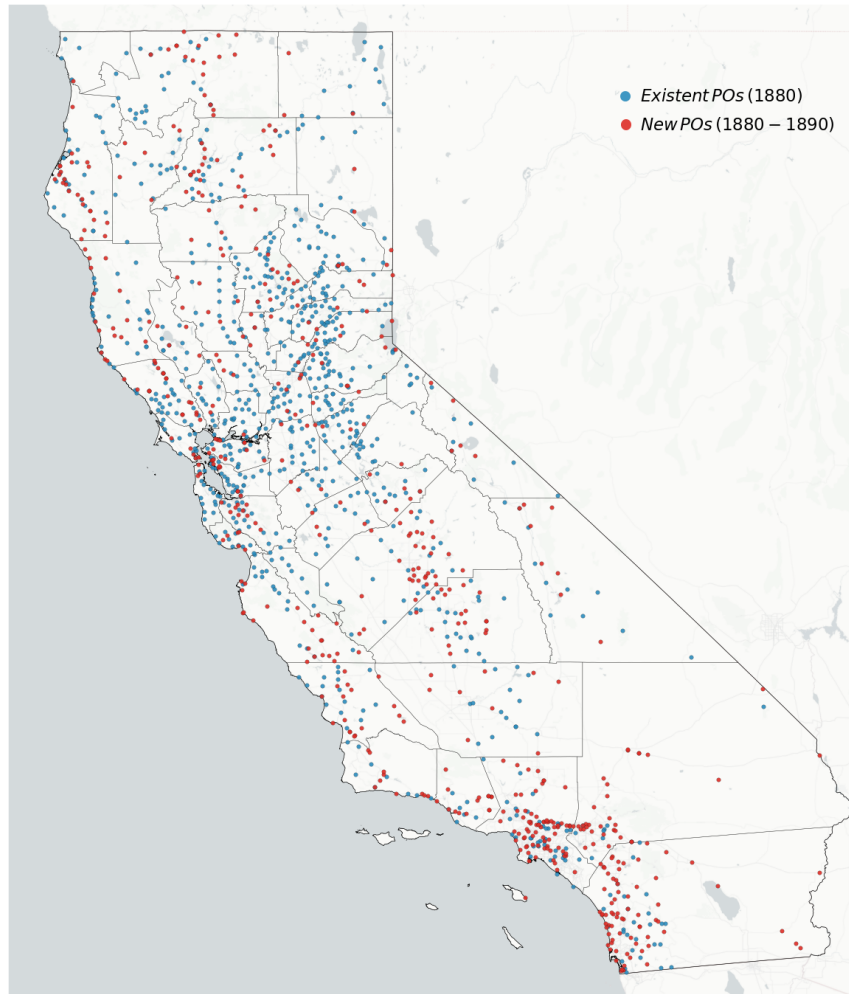
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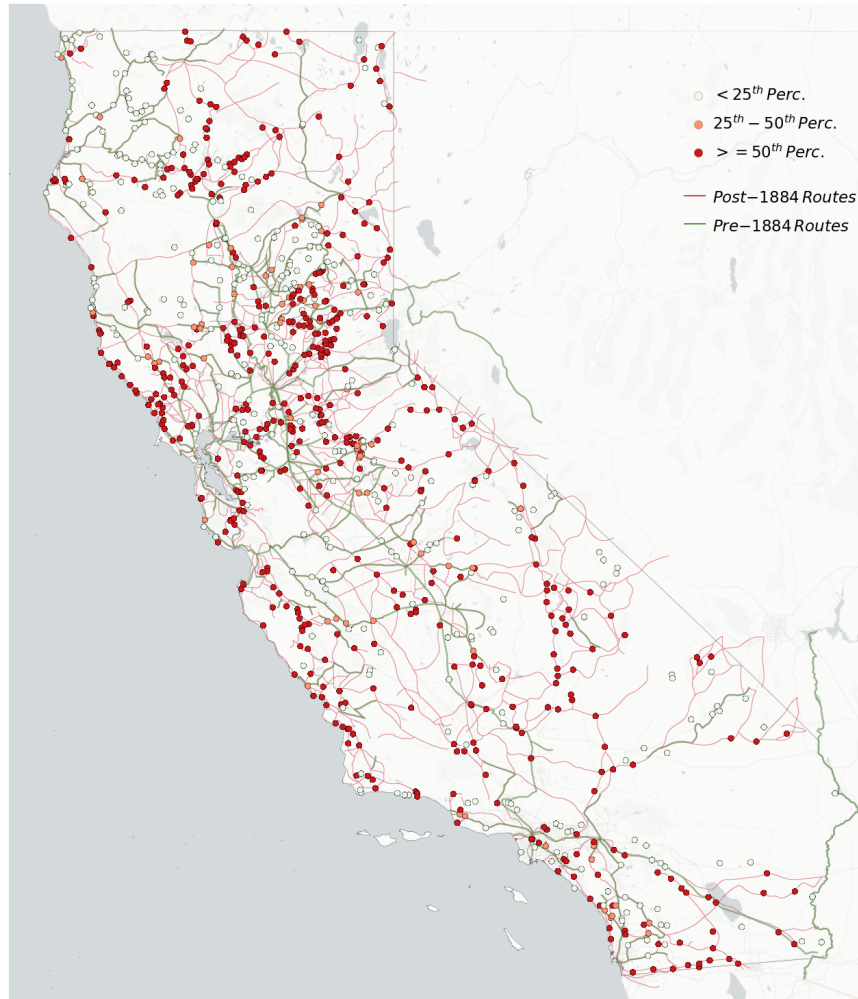
## Tables and Figures

**Figure 1:** Post Office Expansion in California (1880-1890)



*Notes:* This figure displays the location of US post offices in the period 1880-1890. The blue dots represent post office locations in 1880 and the red dots represent new post offices that were formed between 1880 and 1890.

**Figure 2:** Mail Routes in California pre- and post-1884



*Notes:* This figure illustrates the mail routes that existed prior to 1884, shown in green, alongside the streets that were designated as mail routes subsequent to the reform, depicted in red. The coloring of cities reflects the proximity of these two distinct types of streets.

**Table 1:** Summary Statistics - City-Sector level

City-Sector	min	p25	mean	p50	p95	max
New businesses 1880	0.00	0.00	0.41	0.00	2.00	739.00
New businesses 1890	0.00	0.00	0.49	0.00	2.00	1507.00
IHS(Growth of POs)	-3.33	0.00	-0.00	0.00	0.56	3.64
1(Post Office)	0.00	0.00	0.25	0.00	1.00	1.00
Population 1880	5.97	89.52	1076.52	238.72	2984	179040
Stock of Firms 1880	0.00	0.00	0.42	0.00	2.00	752.00
1(Railroads)	0.00	0.00	0.25	0.00	1.00	1.00
1(Waterways)	0.00	0.00	0.05	0.00	0.00	1.00
Money Order POs	0.00	0.00	0.58	0.00	2.00	5.00
Government Institution	0.00	0.00	0.68	1.00	1.00	1.00
Communication	68.50	85.30	90.17	92.53	97.80	97.80
Out-of-State Trade Journals	0.00	0.00	11.03	6.00	35.00	45.00
Observations	40,827					

*Notes:* This table displays summary statistics on the city-sector level for the main variables in our model.

**Table 2:** Post office location and firm entry: OLS

Dep.Var.: Entry Growth Model	(1) OLS	(2) OLS	(3) OLS	(4) OLS
1(Post Offices)	0.030** (0.013)	0.045*** (0.014)	0.035*** (0.013)	0.033** (0.013)
Initial Stock of Businesses	No	Yes	Yes	Yes
Population	No	No	Yes	Yes
Rail & Waterways	No	No	No	Yes
Observations	38,812	38,812	38,812	38,812

*Notes:* This table displays the results from estimating Equation 1. Each model includes county and industry fixed effects. *1(Post Offices)* equals to one if the stock of post office within a 20km distance from the center of each city increased. Column (1) to (4) progressively include controls. We show some results with only county and industry fixed effects (Column 1). In column (2) we further add population, the initial stock of businesses in 1880 (column 3), and the proximity to railroads and waterways (column 4). We cluster standard errors (in parentheses) at the city level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table 3:** Post office location and entrepreneurship: Instrumented Results

Dep.Var. Model	1(Post Offices) First Stage	1(Post Offices) Logit	Entry Growth IV	
	(1)	(2)	(3)	(4)
Postal Routes	0.140 *** (0.033)	0.832*** (0.318)		
1(Post Offices)			0.198** (0.097)	0.195** (0.097)
Distance from Historic Trails				Yes
Observations	36,921	36,921	27,776	27,776
F-Stat			541.326	546.276

*Notes:* This table displays the results from estimating Equations 2, using our postal route instrument.  $1(Post\ Offices)$  equals one if the stock of post office within a 20km radius around the center of each city increased. As controls at city-level we include population, the stock of businesses, and the proximity to railroads, and waterways. To each model, we also add county and industry fixed effects. Column (1) shows the standard first stage. Column (2) shows the correlation between the endogenous variable and our instrument using a Logit regression given that the instrumented variable is categorical in nature, so we run into the so called “forbidden regression” (Angrist & Pischke, 2008). Columns (3)-(4) show instrumented results. We report the F-statistics. Standard errors (in parentheses) are at the city level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table 4:** Potential Mechanisms

DV: Entry Growth	(1)	(2)	(3)	(4)
1(Post Offices)	0.030** (0.013)	0.024 (0.028)	0.092* (0.051)	0.016 (0.011)
Financial Services	0.021 (0.016)			
1(Post Offices) $\times$ Financial Services	0.008 (0.035)			
Government Institution		-0.063*** (0.012)		
1(Post Offices) $\times$ Gov. Inst.		0.014 (0.033)		
Communication			-0.000 (0.000)	
1(Post Offices) $\times$ Communication			-0.001 (0.001)	
Out-of-State Trade Journals				0.018*** (0.004)
1(Post Offices) $\times$ Out-of-State Trade Journals				0.026*** (0.010)
Observations	38,812	38,812	37,560	38,812

*Notes:* This table displays the results from estimating Equation 3. *New PO* equals to one if the stock of post office within a 20km radius around the center of each city increased. The controls at city-level we include are population, the stock of businesses, and the proximity to railroads and waterways. The results including and interaction with money orders are presented in Column (1), those related to government institutions are in Column (2), the results pertaining to industries that benefited from internet enhancement are presented in Column (3), and the results pertaining to trade journals are presented in Column (4). In Column (4) we further control for in-state trade journals. In each model, we add county and industry fixed effects and cluster standard errors (in parentheses) at the county level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table 5:** Summary Statistics - Firm Level

Firm	min	p25	mean	p50	p95	max
1(Financial Growth)	0	0	0.43	0	1	1
Net Worth 1880 (categ.)	1	1	3.25	3	8	12
Net Worth 1890 (categ.)	1	2	3.88	3	8	12
1(Post Office)	0	0	0.56	1	1	1
Population	5.97	1,100	57,651	5,000	179,040	179,040
1(Railroads)	0	0	0.73	1	1	1
1(Waterways)	0	0	0.10	0	1	1
Multiple Establishments	0	0	0.05	0	1	1
Multiple Founders	0	0	0.18	0	1	1
Family Business	0	0	0.02	0	0	1
Founder						
- African	0	0	0.04	0	0	1
- Asian	0	0	0.01	0	0	1
- European	0	1	0.93	1	1	1
- Hispanic	0	0	0.02	0	0	1
Observations	2,435					

*Notes:* This table displays summary statistics at the firm-level.



**Table 6:** Post office location and performance: OLS and Probit estimates

	(1)	(2)	(3)
Financial Growth	0/1 Probit	0/1 OLogit	$\Delta$ OLS
1(Post Office)	-0.143 (0.100)	-0.239 (0.165)	-0.000370 (0.0730)
Firm Controls	Yes	Yes	Yes
City Controls	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	2,140	2,160	2,160

*Notes:* This table displays the results from estimating Equations 3.  $1(Post\ Office)$  equals to one if the stock of post office within a 20km radius around the center of each city increased. We include a set of company- and city-specific controls. We capture if the company has multiple establishment, was founded by multiple individuals, is a family business and the ethnicity of the founders. At city level, we control for population and the proximity to railroads and waterways. In each model, we add county and industry fixed effects and cluster standard errors (in parentheses) at the county level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table 7:** Performance Heterogeneity: Probit Models

	Competition		Quality/Reput.		Knowl./Techn.	
1(Financial Growth)	(1)	(2)	(3)	(4)	(5)	(6)
1(New PO)	-0.108 (0.105)	-0.0284 (0.117)	-0.131 (0.103)	-0.133 (0.103)	-0.301** (0.153)	-0.151 (0.102)
Industry Concentration	-0.0894 (0.381)					
1(New PO) $\times$ Industry Concen.	-0.406 (0.536)					
>Median # New Entrants		0.00479** (0.00227)				
1(New PO) $\times$ >Median # New Ent.		-0.00470** (0.00225)				
Family Business			0.456 (0.536)			
1(New PO) $\times$ Family Business			0.504 (0.474)			
Multiple Establishments				-0.200 (0.340)		
1(New PO) $\times$ Multiple Establ.				0.527 (0.368)		
Out-of-State Trade Journal					-0.421*** (0.108)	
1(New PO) $\times$ Out-of-State Trade Journ.					0.261* (0.157)	
Seeds						0.681 (0.554)
1(New PO) $\times$ Seeds						0.720*** (0.199)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
City-level controls	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	No	Yes
Observations	2,140	2,140	2,140	2,140	2,140	2,140

*Notes:* This table displays the results from estimating the Probit Model displayed in Table 6, but with a battery of interactions. *1(Post Office)* equals to one if the stock of post office within a 20km radius around the center of each city increased. We include a set of company- and city-specific controls. We capture if the company has multiple establishment, was founded by multiple individuals, is a family business and the ethnicity of the founders. At city level, we control for population and the proximity to railroads and waterways. In each model, we add county and industry fixed effects (except for the journal-related regression in column 5, which relies on industry variation) and cluster standard errors (in parentheses) at the county level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Online Appendix for:**  
**You've Got Mail! The Late 19<sup>th</sup> Century US Postal Service Expansion,  
Entrepreneurship, and Firm Performance**

## A Digitization of the 1882 road networks

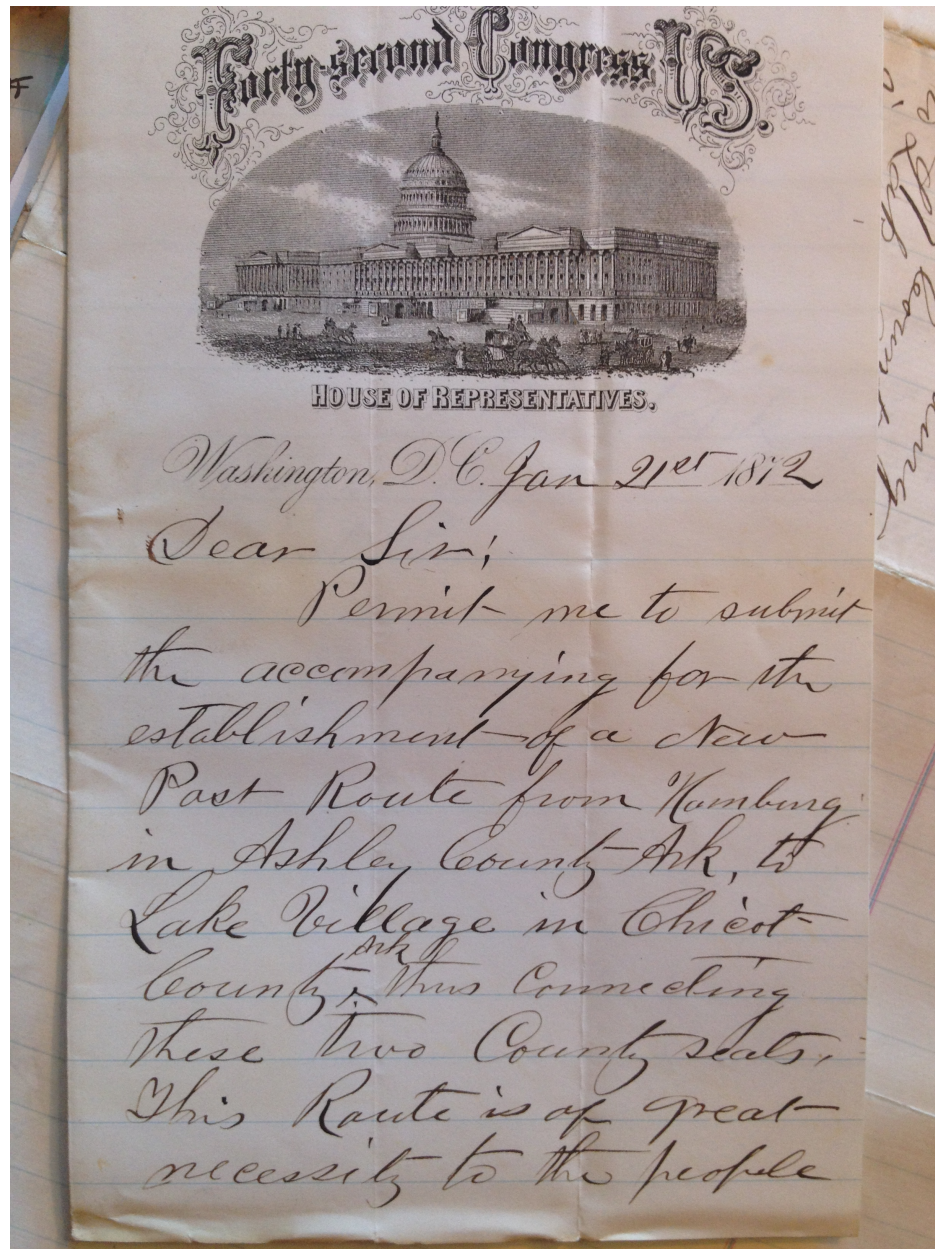
In order to measure the distance between each city center and each post office, we rely on distance calculated using the full network of trails and roads (defined as roads where stagecoaches could circulate) existent in 1882 as well as railways and waterways of the time (Atack, 2015, 2016, 2017). This type of measurement more accurately captures the actual distance that individuals had to travel to reach a post office, as it takes into account geographical features of the land, such as mountains, gorges and other water bodies, which could not be easily crossed (see Figure A5 for a graphical example).

In order to include this network-based distance in our paper, we had to digitize what is thought to be one of the most comprehensive map of California in 1880 (Bancroft, 1882) from scratch. One of the many obstacles in digitizing relatively old map is the fact that most of them do not conform to any common modern world projections, given the means to produce a perfectly to scale map were limited. We geo-reference the map by using points that identify land features and borders which did not change from 1880 to today, and reassigning their latitude and longitude values. For instance, we leverage several points located on the California coast, given that the shape and position of the shoreline has remain unchanged over time. We geo-reference more than 100 points to shift the whole map from the old to the new projection (Mercator). This step is necessary to ensure this map is aligned with the other set of spatial data employed in the paper (e.g., post offices) and that distances (in km) are correctly calculated.

Once the new map gets transformed and “distorted” in position to fit the new projection system, we proceed to carefully draw each road and trail present on the map by hand. Besides roads and trails, we also pinpoint the position of main cities, which was sometimes slightly different than their current position, mainly because their spatial extent was much more limited in 1882. After digitizing every road and trail present in California in 1882, we build a network of roads, railways, and waterways by joining all the individual spatial lines, which we can then use to calculate distances between points. Given not all points of interests are exactly located on a road, we calculate distance by taking the Euclidean distance from a given origin point to the closest point located on the road network and calculate the network distance from there to the closest point on the network to the destination point. Finally, we sum the Euclidean distance between this point and the location of the destination point.

## B Examples of Letters requesting a Post Office or Route

Figure A1: Request from Arkansas 1872



Notes: Images taken at the National Archives from the 42nd Congress House Committee on Post Offices and Post Roads



**Figure A2:** Request From California, Date unknown (likely 1872)

To The Senate and  
House of Representatives  
of the United States in  
Congress Assembled

We Respectfully petition your  
honorable body to Establish A  
mail route in Yolo County  
State of California - commencing  
at Woodland and ending at  
Head of Capay Valley  
Distance thirty (30) miles

Names	Names
J. L. Rumsey	J. B. Curtis
W. W. Holt	J. M. Stark
H. L. Linn	Thomas Cluney
John M. Kelly	Ed. Carr
Charles C. Lathrop	Robert Cluney
J. W. Aldrich	J. H. Norton
Edwin Kellogg	J. B. Goss
Sam. Chen	Thomas Alsop
E. B. Aldrich	Chadwick Hotel
B. F. Crap	W. F. Downs
W. H. Troop	J. T. Lorton
Olive Boder	J. R. Prentiss

Notes: Images taken at the National Archives from the 42nd Congress House Committee on Post Offices and Post Roads

**Figure A3:** Request From San Francisco 1872

Special Agency P. O. Department,  
4th District, 6th Division,  
(CALIFORNIA AND NEVADA.)  
San Francisco, Jan'y 13. 1872.  
Hon. J. M. Coghlan  
M. C.  
Washington D.C.  
Sir:  
I respectfully recommend the establishment of a Post Route from Calistoga to Cloverdale by way of Great Geysers. Calistoga Napa County to Cloverdale Sonoma County. State of California  
Respectfully  
Alfred Barstow  
Spt. Agt. P.O.D.

Notes: Images taken at the National Archives from the 42nd Congress House Committee on Post Offices and Post Roads



**Figure A4:** Request From Minnesota 1872

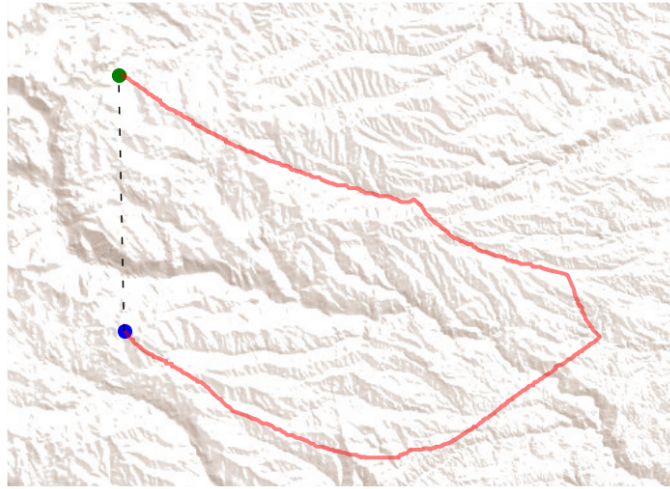


Notes: Images taken at the National Archives from the 42nd Congress House Committee on Post Offices and Post Roads



## C Other Figures and Tables

**Figure A5:** Euclidean vs. Street Network-based distance



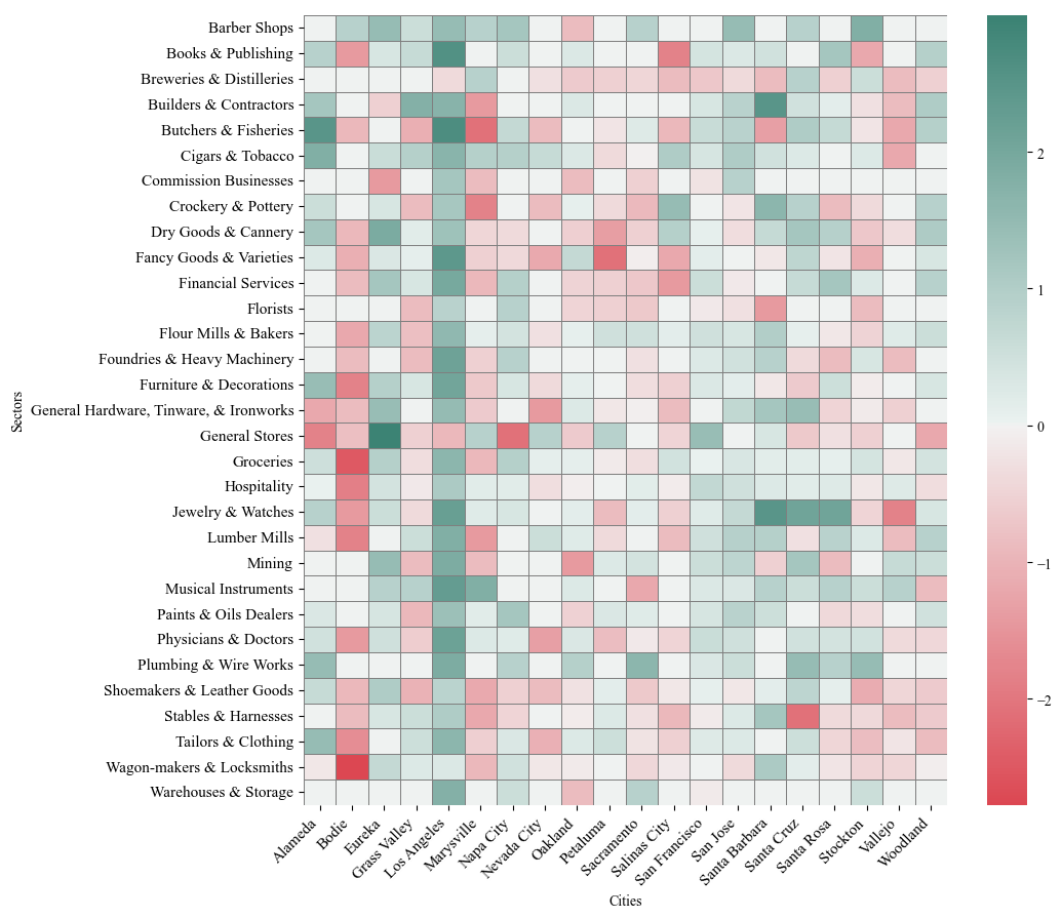
*Notes:* The figure shows the distance between two points using two different methods. The first is Euclidean distance (black dotted line) while the second is a distance calculating using the full network of streets, railroads, and waterways in 1880 (red line). The figures uses a post office and a point located in Alpine county. The figures demonstrates that in some regions, especially the ones rich in mountainous terrains and bays, the Euclidean distance can severely underestimate the distance between points, as some geographical features impede to simply reach the desired destination through a straight line.

**Figure A6:** Full Digitized 1880 network of roads, railways, and waterways



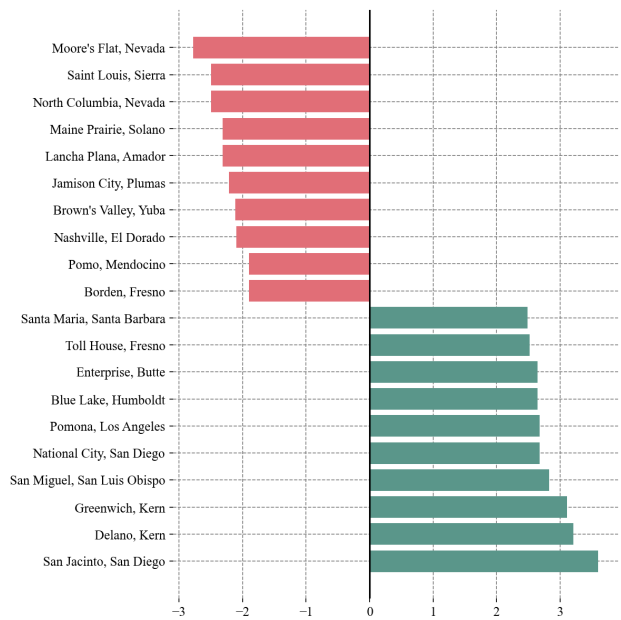
*Notes:* This figure displays the main network of roads, trails, railways, and waterways existent in California in 1882, which has been digitized manually from Bancroft (1882).

**Figure A7:** Entrepreneurial Growth by city and industry (California, 1880-1890)



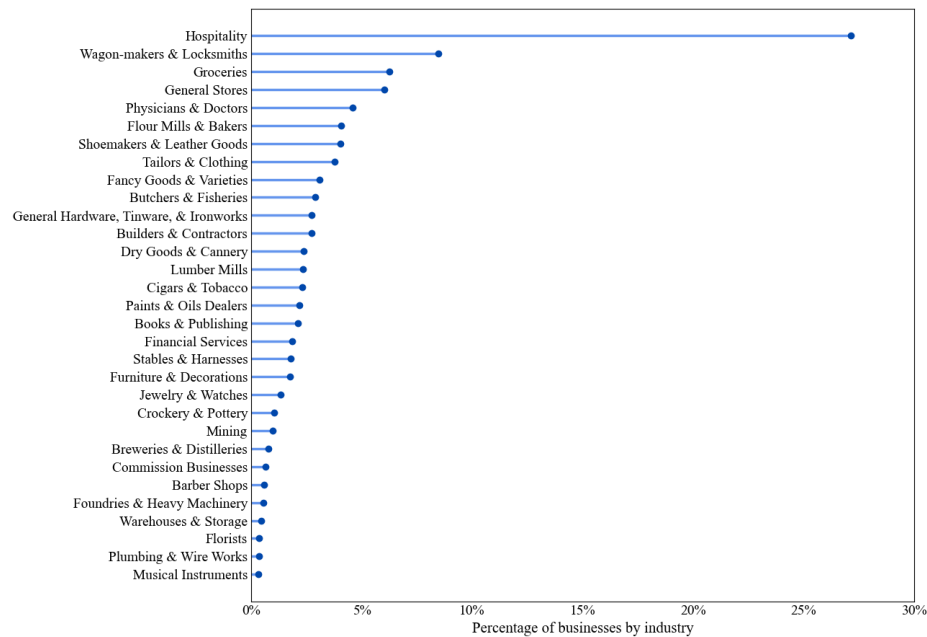
*Notes:* This figure shows entrepreneurial growth by city and industry between the years 1880-1890. Growth is calculated using an inverse hyperbolic sine transformation. White squares indicate no growth, while green and red squares indicate positive and negative growth, respectively.

**Figure A8:** Top 10 growing and declining cities in terms of entrepreneurial entry (California, 1880-1890)



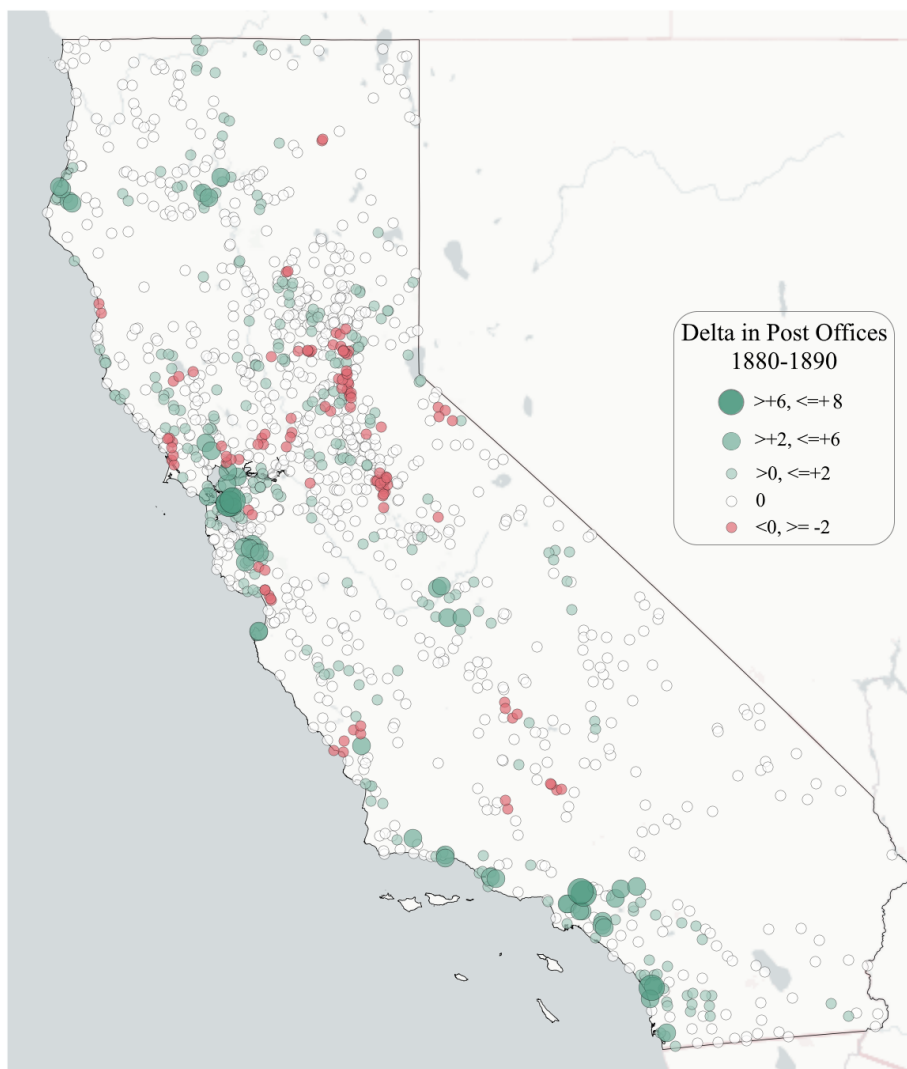
*Notes:* This figure shows the top 10 cities that experienced the highest (in green) and lowest (in red) growth in entrepreneurship

**Figure A9:** New businesses by industry (California, 1880-1890)



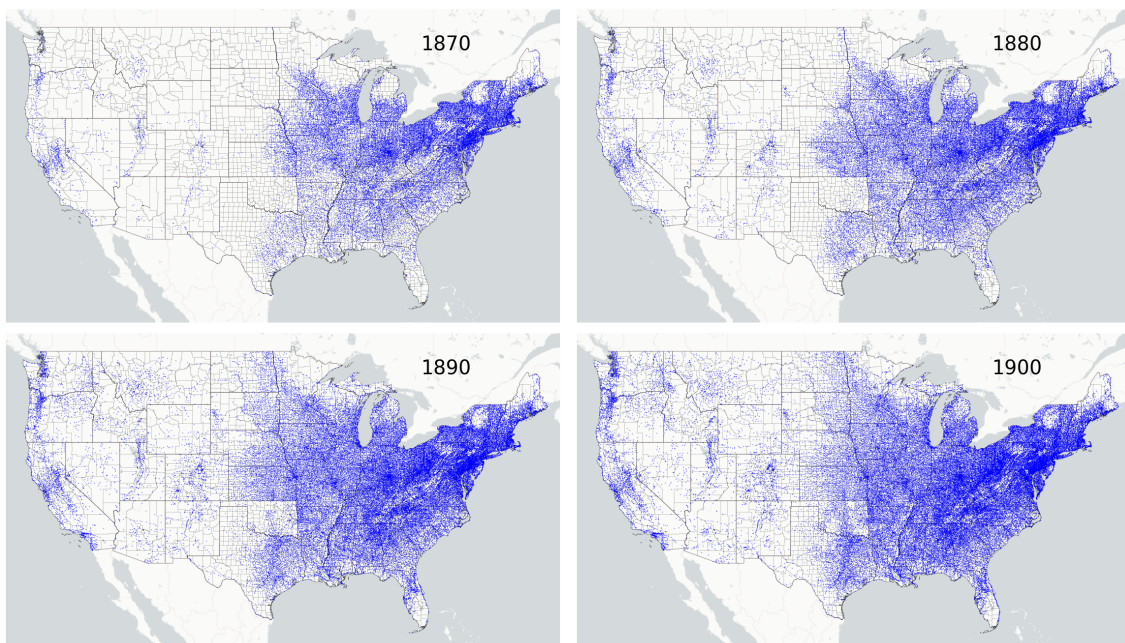
*Notes:* This figure shows the distribution of firms by industry for companies born in California in the years between 1880 and 1890.

**Figure A10:** Delta in number of Post Offices (1880-1890)



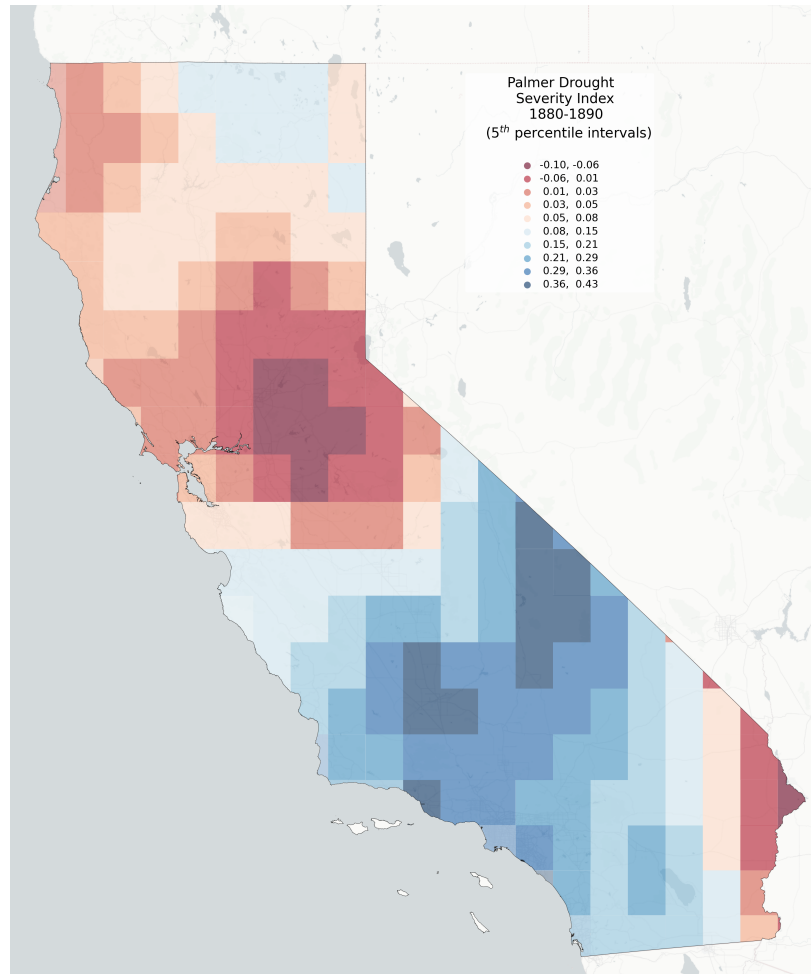
*Notes:* This figure displays the change in the number of post offices between 1880 and 1890. Green and red dots indicate cities that have lost or gained post offices, respectively. White dots indicate cities that did not experience a change in the number post offices. The size of the dots and their color are proportional to the number of post offices gained and lost.

**Figure A11:** Post Office Expansion Over Time in the US



*Notes:* This figure displays the location of US post offices for each decade spanning from 1880 to 1900 (clockwise from top left). Each dot represents a post office location.

**Figure A12:** Soil Moisture in California (1880-1890)



*Notes:* This figure displays average Palmer Drought Severity Index (PDSI) for the years 1880-1890.

**Figure A13:** California Historical Trails



*Notes:* In this figure, we map out the original California National Historic Trail and the Spanish Trail (for more information, see: <https://www.nps.gov/cali/planyourvisit/directions.htm> and <https://www.nps.gov/olsp/index.htm>)



**Table A1:** Post office location and firm entry: Robustness Checks

Spec. Dep.Var.: Entrepren.	Baseline (1)	Baseline (2)	Baseline (3)	Baseline (4)	Baseline (5)	Baseline (6)	Baseline (7)	Log-Log (8)	Rev. Causality (9)	$\Delta$ Busin. (10)	Poisson (11)
1(Post Office)	0.033** (0.013)	0.033** (0.013)	0.032** (0.013)	0.031** (0.013)	0.033*** (0.013)	0.036*** (0.013)	0.030** (0.013)		0.036** (0.015)	0.164** (0.069)	0.207** (0.092)
Growth of POs								0.018*** (0.005)			
Lead Post Office (1890)									-0.001 (0.003)		
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gold Mines	Yes	No	No	No	No	No	No	No	No	No	No
Distance to main cities	No	Yes	No	No	No	No	No	No	No	No	No
Latitude & Longitude	No	No	Yes	No	No	No	No	No	No	No	No
Bank City	No	No	No	Yes	No	No	No	No	No	No	No
Initial Stock of POs	No	No	No	No	Yes	No	No	No	No	No	No
Cluster Dynamics	No	No	No	No	No	Yes	No	No	No	No	No
Major Cities Excluded	No	No	No	No	No	No	Yes	No	No	No	No
	38,812	38,812	38,812	38,812	38,812	38,812	38,812	40,827	38,812	38,812	38,812

*Notes:* This table displays the results from estimating Equations 3 including further robustness checks. 1(*Post Office*) equals to one if the stock of post office within a 20km distance from the center of each city increased. Columns (1) to (7) include a variety of controls that might be driving our results. In Column (\*) we present a log-log model where both the dependent and independent variable are in log form. In column (9), we show the results from a reverse causality test. In column (10) we use the change in the number of businesses as the main outcome, and in column (11), we run a Poisson model. In all models, we control for population, the stock of businesses, and the proximity to railroads and waterways. We further add county and industry fixed effects and cluster standard errors (in parentheses) at the city level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A2:** Post office location and entrepreneurship: Instrumented Results - Precipitation

Dep.Var. Model	1(Post Offices) First Stage (1)	Entry Growth IV (2)
Average Soil Moisture	1.584*** (0.521)	
1(Post Offices)		0.144** (0.064)
Observations	37,045	37,045
F-Stat	716.734	716.734

*Notes:* This table displays the results from estimating Equations 2, using an alternative instruments, namely average soil moisture.  $1(Post\ Offices)$  equals one if the stock of post office within a 20km distance from the center of each city increased. As controls at city-level we include population, the stock of businesses, and the proximity to railroads, and waterways. To each model, we also add county and industry fixed effects. We report the F-statistics. Standard errors (in parentheses) are at the city level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .