Federal Infrastructure and Manifest Destiny: State-Led Development in the 19th Century

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Abstract

In the 19th century the US underwent massive economic and geographic expansion. At the same time the federal government began a significant increase in infrastructure spending throughout the country. We study the connection between these developments. We merge data on county-level federal infrastructure appropriations by congress and census data on farm values, manufacturing capital, and population. Analysis with two-way fixed effects models shows that aggregate federal infrastructure spending had a significant effect on farm values, manufacturing capital, and population, both contemporaneously and cumulatively. Disaggregating infrastructure spending shows that Post Office appropriations had qualitatively different (larger) effects than federal appropriations for other forms of public infrastructure. We discuss the causal interpretation of parameters in light of qualitative evidence about the choice of location for federal expenditures. Overall the results show that American geo-economic expansion was partly led by federal infrastructure spending.

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In the 19th century, the United States massively expanded its territorial claims from the Appalachian Mountains to the Pacific Ocean. The latent power built into these claims became manifest with the expansion of the US economy and population over this territorial expanse. Economic development in this space catapulted the United States from a fledgling state to an economic and military superpower.

How did the United States produce this development? The American national mythos holds that the spirit of "rugged individualism" led the way. In the enduring though highly contested analysis of historian Frederick Jackson Turner, the frontier of the American West was a "safety valve" that enabled small groups of white Americans, acting more or less separately, to escape elite control in the East and carve out the "manifest destiny" of the American nation. The individualistic account is exemplified in American art and literature from the 19th century. For example, artist John Gast's 1872 painting *American Progress* (below) depicts decentralized bands of industrious American farmers journeying left in the painting's frame—to the West—guided only by the divine providence of an angel overhead, carrying a schoolbook and laying telegraph lines.



Conspicuously absent from the individualist framing of American expansion is the role of government as a superintendent of American expansion. Yet a closer look at Gast's work reveals the government's fingerprints on the project. In the right edge of the frame is a busy waterway, deep enough for large ship transport with a suspension bridge connecting two land masses. This water transport provided connections between local markets that grew into broader economic expansion. It also required substantial infrastructure to clear rivers and build bridges, infrastructure that in many cases came from government expenditures. In the left edge of the frame is a small group of Native Americans being pushed off their land by American pioneers. Not pictured is the US military, which was mobilized throughout the century to support this expropriation.

In this paper we reassess the role of government as an architect of the westward expansion of the US economy in the 19th century. Specifically, we analyze the effect of public infrastructure spending by the federal government on the spatial distribution of economic development. While federal government spending on local infrastructure was small compared to state spending (Wallis and Weingast 2018), federal expenditure was substantial—and data on it is available in a consistent panel thanks to Gordon and Simpson (2018). Their analysis shows that, through congressional distributive spending from the "pork barrel," the federal government appropriated large sums to several different types of public infrastructure. The most prominent and relevant for our analysis are communications infrastructure (Post Office appropriations), transportation infrastructure (e.g., river and harbor improvements, canals and roads), and security infrastructure (e.g., army forts and armories).

We posit that these forms of local-level, federally-provided public infrastructure served as an input in local-level aggregate production. This implies that more federal infrastructure spending made other factors of production—standard factors such as land, labor, and capital—more productive. In turn, market signals would generate local-level accumulation of these other factors. This argument means that federal expenditures generated economic development in localities throughout the US: the spatial expansion of the US economy in the 19th century was, in part, a state-led process.

We corroborate this argument by analyzing the effect of federal appropriations on local development in terms of farm values, manufacturing capital, and population at the county level—data on which are available from several series of the US Census. The analysis shows important effects of federal infrastructure spending, with important variation across types of infrastructure. In particular, communications infrastructure (the postal system) had a large, consistent, and significant effect on accumulation of all factors of production we measure. On the other hand, security infrastructure (military appropriations) and federally-provided transportation infrastructure (rivers, harbors, canals, roads) have comparatively very small effects on factor accumulation.

Our analysis builds on several important pieces of recent research. First, like Frymer (2017), we argue that government policy engineered the movement of people through space in the 19th century (see also Gailmard and Jenkins 2018). While Frymer focuses on federal land law and partly on racial aspects of American expansion plans, we focus on infrastructure spending and its effect on county-level output, which generated movement of people as a byproduct. Second, we corroborate and expand the findings of Rogowski et al. (2022). They focus specifically on postal systems as a foundation of development. Using different data on postal system expansion, we find a similarly strong effect of the Post Office on the spread of development in the US. However, we also consider several other types of public infrastructure provided in part by the federal government. Interestingly, all other types of public infrastructure have small effects in comparison to the communications infrastructure brought by the Post Office.

1. Background: Congressional Politics and Public Infrastructure

Governmental investment in American economic development prior to the Civil War was largely the domain of the states. As Wallis and Weingast (2018) note, between 1787 and 1860, states spent $450 promoting transportation infrastructure while the federal government spent $54 million. Most of the federal government's investment in the antebellum era went for rivers and harbors improvements and aids to navigation (principally lighthouses); the largest single federal investment project during this era was the National Road (Wallis 2007).

Roughly 90 percent of federal revenues during the antebellum era came from tariffs, with the remainder deriving from public land sales and excise taxes (Pope 1971; Irwin 2017). And federal revenues per capita were four to five times higher than state revenues per capita through 1830, and two times higher from 1840 through 1860 (Wallis 2000). So why did the federal government seem to underperform, relative to the states, in infrastructure investment and improvements? Wallis (2007: 164) argues: "No section, East, West, North, or South, was willing to support a large appropriation that would go exclusively to one region." Thus, projects like rivers and harbors were pursued, as those bills contained many small provisions for House districts (and states) spread throughout the country.

Political constraints also plagued large federal provisions. Internal improvements were vital to American economic development, but the degree to which national politicians were willing to use the power of the federal government to make these projects happen was limited in the early part of the antebellum era. Democratic presidents, for example, often argued that federal funding for internal improvements was unconstitutional, which led to vetoes of ambitious congressional legislation – the Bonus Bill of 1817 by President James Monroe and the Maysville Road Bill of 1830 by President Andrew Jackson – that would have significantly accelerated economic development.[4]

Nonetheless, the federal government *was* leaving a mark in the antebellum era. Stathis (2014) identifies eleven federal landmark laws in the area of transportation prior to the Civil War – and three more during the Civil War years. Two additional landmark laws in the area of "science and technology" also had clear transportation implications. Early enactments pertained to roads while the lion's share beginning in the mid-19th century involved railroads. Two, though, fell outside of these categories and deserve special mention, both of which were enacted in the 18th Congress.

[4] Wallis and Weingast (2018) argue that the impact of the vetoed legislation was considerable – and that federal expenditures on transportation would have been 2.5 to 3 times higher had the legislation been enacted.

The first was the General Survey Act (1824), which authorized the president to make "the necessary surveys, plans, and estimates" of roads deemed to be of national importance, in a commercial or military point of view, or necessary for the transportation of public mail." The second was the First Rivers and Harbors Act (1824), which appropriated $75,000 to improve navigation on the Ohio and Mississippi Rivers by removing sand bars, fallen trees, and other obstructions – and opened the floodgates to many subsequent rivers and harbors laws, which totalled nearly $79 million in appropriations through 1882 (Johnson 1892). Much of the field work administering these two laws – and those that followed from them – fell to the Army Corp of Engineers (Hill 1957).

Alongside transportation investments, the federal government made significant communication investments during the antebellum era. This came chiefly in the organization and expansion of the US Postal System. Stathis (2014) identifies nine federal landmark laws in the Postal System prior to the Civil War, beginning with the creation of the Office of the Postmaster General in 1789 and the Postal Act of 1792, which authorized the postmaster general to appoint postmasters and enter into contracts for the transportation of mail over routes that Congress established. The latter aspect of the Postal Act of 1792 – congressional control over postal routes – was radical, as this power had previously been wielded by the executive (John 1995). With Congress running the show, the expansion of the postal network followed political (electoral) rationales rather than fiscal ones. As John (1995, p. 49) argues:

> Since congressional apportionment was based on population and constituents were constantly clamoring for new routes, there existed built-in bias in favor of expanding the postal network based on population rather than on the basis of the existing pattern of commercial demand. For a time, every state was given a single seat on the House Committee on the Post Office and Post Roads, virtually guaranteeing that post routes would be established in this way.

To facilitate this demand-based process, members of Congress encouraged their constituents to generate petitions for their preferred, new routes. Beginning in 1792, thousands of petitions were

sent to Congress, and with them a measure of constituent sentiment for the expansion of postal routes.

Expenditures for security were also important for economic development. And federal spending on the military during the antebellum era was considerable. As Katznelson (2002: 91) notes, "expenditures on the military dwarfed all other outlays in the federal budget, accounting for at least 72 percent of the total each year and sometimes up to 94 percent of the federal spending each year but one between 1808 and 1848." And from 1848 through 1861, military spending was about half of all federal spending. The size of the military – the army and navy – in normal times (outside of wars) was relatively small, hovering between 10,000 and 20,000 men through the mid-1850s, before ramping up slightly before the Civil War (Gartner 2006). This small, but flexible, military force was crucial for westward expansion. And the fortifications the military constructed were a symbol of security for homesteaders and a notice to Native peoples "that the United States government intended to exert its jurisdiction and to enforce its decisions on the western frontier" (Prucha 1969: 179).

2. Theory

We posit that county-level aggregate output is a function of county-level factors of production: land, labor, capital, public infrastructure, and the county's latent growth potential. This is a fairly standard aggregate production function approach. Different counties will combine these inputs in different ways and produce different goods, but we assume county-level output is increasing in each factor for all counties.

The central idea behind state-led economic development is that government appropriations affect public infrastructure, which in turn affects economic output. If both links in this causal chain hold, then a county which obtains larger federal appropriations thereby obtains an increase in a crucial factor of county-level economic output. Congressional bargaining over pork barrel spending is bargaining over economic growth at the level of congressional districts.

Federal appropriations could affect several types of infrastructure at the county level. Post Office appropriations could improve the communications infrastructure between a county and other areas throughout the country, helping to identify new markets to access and signal need in the county for additional factor investment. Rivers and harbors appropriations provided a type of transportation infrastructure, improving access to markets for both inputs and outputs. Military appropriations could affect security infrastructure in a county, reducing uncertainty around investments in other factors of production.

In standard models of aggregate output (e.g. Barro 1990), public infrastructure could affect output by two channels: first, by a direct effect of infrastructure on production; second, an indirect effect of making all the other factors more productive. That is, better infrastructure could increase the effect that other factors have on output. For example, in the production function

$$Y = gIL^{a}P^{b}K^{c}$$

denote Y as output, g as latent growth potential, I as infrastructure, L as land, P as labor supply (or population), and K as capital. The exponents a, b, c capture the returns to scale for each factor. In this case, more infrastructure I would lead directly to more output, holding fixed the level of all other factors. In addition, the marginal product of a factor—for example, capital—is

$$\frac{\partial Y}{\partial K} = cgIL^{a}P^{b}K^{c-1}$$

which is increasing in I. Thus, infrastructure makes other factors more productive—which generates incentives for county producers to accumulate more of them.

A challenge for estimating the effect of infrastructure on economic output is that we lack county-level output or income data. This makes it impossible to estimate county-level aggregate production functions of even the simple structure presented above, which directly capture the effect of infrastructure. However, we can investigate the indirect effect implied by this structure, by examining the effect of county-level infrastructure on county levels of other factors of production. In particular, as detailed further below, we obtain measures of county-level manufacturing capital, farm land value, and labor force (population). If county-level

infrastructure makes other county-level factors more productive, then the value of those factors in the county grows as county infrastructure expands. Market signals would produce incentives to accumulate those factors at the county level.

However, a remaining challenge for even this indirect analysis is the influence of latent county-level growth potential. If latent growth potential were observed by market participants, this too would generate incentives to increase other factors at the county level. Unfortunately, we lack any compelling measure of this potential: even if contemporaneously observable to market participants, it is not observable by us retrospectively. Thus, county-level growth potential presents the problem of unobserved heterogeneity across counties.

We address this heterogeneity bias with fixed effects regression models. Fixed effects models are adequate when county-level growth potential is fixed over time at the county level. We discuss the fixed effects estimator we use, and remaining threats to valid estimation, in the next section.

In view of this discussion, we obtain the following hypotheses that are testable in regression models.

> Hypothesis 1: Infrastructure and labor force. Given county-level fixed effects, county-level federal appropriations are associated with greater county-level population.
>
> Hypothesis 2. Infrastructure and capital. Given county-level fixed effects, county-level federal appropriations are associated with greater county-level manufacturing capital.
>
> Hypothesis 3. Infrastructure and farm land. Given county-level fixed effects, county-level federal appropriations are associated with greater county-level farm land value.

All of these hypotheses address the link between economic infrastructure and economic output. If infrastructure makes other factors more productive, then it should raise their value and in turn, through market signals, raise their levels.

The fixed effects models rule out an alternative interpretation of a positive correlation, whereby factor levels increase due to latent county-level growth potential, which may be correlated with public infrastructure even if infrastructure has no effect on output. If these hypotheses hold in fixed effects models, then we have evidence that the spatial economic development of the US in the 19th century was partly a state-led event.

3. Data and Methods

We investigate the effect of federal infrastructure projects on local economic growth using data on federal appropriations compiled by Gordon and Simpson (2018). These data include all appropriations approved by Congress targeting specific geographic localities between 1789 and 1882. Importantly, appropriations of this type represent the vast majority of federally subsidized infrastructure investment during the 19th century.

Gordon and Simpson (2018) split appropriations into seven categories: (1) forts, arsenals, and armories; (2) river improvements; (3) harbor improvements; (4) lighthouses, beacons, and buoys; (5) public buildings; (6) roads and canals; (7) mints and assay offices. In this study, we include appropriations from all categories that include geolocations, forcing us to exclude river improvements and roads and canals. We then match appropriations from the remaining five categories to the county receiving the appropriation.[5] All appropriations are adjusted to 1900 dollar values based on consumer prices in the year the appropriation was authorized.

We aggregate the amount of spending targeting each county over time in two different ways. First, we pool appropriations spent over the course of a decade, which corresponds to how frequently the outcome variables on economic production are measured. This way of measuring appropriations should allow us to estimate the short-term effect of federal spending, but it may

[5] To do so, we use information on historical county boundaries from the Atlas of Historical County Boundaries.

be biased downward if the effect of federal projects permanently boost local economies. Therefore, we present additional spending measures that include the cumulative sum of appropriations targeting a county up to the specific point in time in which the outcome is measured. This approach may better estimate the impact of federal spending since the appropriations in many cases produce permanent, or semi-permanent, pieces of infrastructure, such as forts or lighthouses. In both cases, we rescale the aggregate expenditures by taking the log of the value plus one.

In addition to measuring the effect of aggregate spending on economic growth, we break the results down by spending category. These analyses allow for differentiation by the type of infrastructure and the way of measuring appropriations, i.e. some types may have short-term effects while others have longer-term effects. Here, we also include information on a significant source of federal spending not captured in the appropriations data—post-offices. The locations of nearly all post-offices created during the 19th century were selected by the executive branch, instead of by congressional statute, resulting in their exclusion from Gordon and Simpson's (2018) dataset. Because of this, we are unable to match specific sums of appropriations for post-offices to particular counties; however, we can use data on the number of post-offices in each county at various points in time. Specifically, we draw on Blevins and Helbock's (2021) data on all of the post-offices in operation in U.S. history. As with the appropriations data, we match the location of post-offices to counties based on their geographic location and create a summary measure of the number of post-offices in operation in a county across each point in time.[6]

As described above, we examine outcomes that are meant to capture factors in the county-level factors of production function, namely, farm values, manufacturing capital, and the size of the labor force, which we proxy based on the size of the county's population. These variables are drawn directly from U.S. census reports, although each becomes available at different points in the time series. While county populations are included in every census, data on

[6] During the period we examine, Blevins and Helbock identify 76,056 post-offices in operation. Most of these post-offices are matched to particular latitudes and longitudes, making it easy to match them to historical counties; however, 23,884 post-offices in this sample are missing this information. For this set, we match the post-offices based on other information—most usefully, the historical county name. Ultimately, we are able to match all but 2,094 post-offices in this manner.

manufacturing capital only begins to show up in the census starting in 1840 and information on farm values shows up starting in 1850. To get the most out of these measures, we present the results including all the data possible, but, for compatibility, we additionally restrict the sample to 1850 and later using a balanced panel of counties. As before, farm values and manufacturing capital are adjusted to 1900's dollars, and all of the outcomes are rescaled by taking the log of the value plus one.

We estimate the effect of county-level infrastructure on county-level factors of production using two-way fixed effects OLS models, with fixed effects for counties and decades, which corresponds to the time scale of observation in the census data. Thus, we identify effects based on variation across space in a given decade. We are agnostic about whether effects of infrastructure appropriations depend on the decade totals for a county, or cumulative totals for a county, so we estimate models for each.

The identifying assumption in the regression models is parallel trends. In the present context, the identifying assumption requires that federal selection of sites for infrastructure spending at a given time was not determined by expectations of future economic development, positive or negative. This assumption would be violated if the US Congress allocated more money to districts (treatment) because of an expectation that those districts and surrounding areas would develop economically in the future, even without the allocated money (anticipated outcome). Allocation of treatment due to anticipated outcome would generate a correlation that could not be attributed to causation by the treatment. The identifying assumption likewise requires that Congress did not allocate more money to areas it expected to be economically depressed in the future, in the absence of funds allocation. Such an allocation would obscure a causal effect of treatment; the identifying assumption means that non-correlation should be taken as non-causation.

4. Results

A. Aggregate Spending

First we analyze the effect of aggregate district-level federal spending on census indicators of local factors of production. Table 1 presents results of models of farm values, manufacturing capital, and population. Panel A shows the results for all counties; panel B shows the results for all counties in existence from 1850 to 1880. We log covariates and dependent variables, so that the coefficient represents the percentage change in the dependent variable, for a 1-percent change in the covariate. In each case, we present a model with the logged decade-total appropriations as the independent variable (i.e., the decade-long flow of appropriations); and a model with the logged total or cumulative appropriations as the independent variable (i.e., the total stock). The reason is that our theoretical account is agnostic about which version of public infrastructure matters.

Table 1: Effects of Congressional Appropriations on U.S. Counties

	Farm Values		Manufacturing Capital		Population	
Panel A: Unbalanced panel of all counties						
Appropriations (ln)	0.047***		0.049**		0.026***	
	(0.013)		(0.015)		(0.005)	
Total Appropriations (ln)		0.064**		0.061**		0.015**
		(0.021)		(0.023)		(0.005)
Num. observations	8429	8429	9555	9555	12607	12607
Num. counties	2580	2580	2637	2637	2653	2653
Num. decade	4	4	5	5	9	9
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Decade FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	13.713	13.713	10.243	10.243	9.000	9.000
R^2	0.824	0.824	0.740	0.740	0.846	0.845
Panel B: Balanced panel of counties in existence from 1850 to 1880						
Appropriations (ln)	0.045**		0.039*		0.026***	
	(0.014)		(0.018)		(0.005)	
Total Appropriations (ln)		0.073**		0.070*		0.043***
		(0.024)		(0.030)		(0.009)
Num. observations	6449	6449	6340	6340	6470	6470
Num. counties	1619	1619	1619	1619	1619	1619
Num. decades	4	4	4	4	4	4
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Decade FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	14.229	14.229	10.974	10.974	9.442	9.442
R^2	0.728	0.729	0.695	0.695	0.875	0.876

Note: Entries represent linear regression coefficients with standard errors clustered on counties in parentheses. Observations are at the county-decade level. Panel A reports results from all unique counties found in the data. Panel B reports results for a balanced panel of counties that existed in 1850 and for which full data were available for all successive decades. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$.

The results indicate clear support for hypotheses 1-3, and are broadly similar across the two panels of counties. Appropriations have a statistically significant effect on accumulation of factors of production. For example, in the panel of all counties, a 1 percent increase in appropriations raises farm values by about 0.05%; raises manufacturing capital by 0.05%; and raises population by about 0.025%. These coefficients are statistically significant at the .01 level.

The only coefficients that fail to meet the .01 level of significance are those for the effect of appropriations (stock or flow) on manufacturing capital, in the balanced panel of counties. Here, the coefficients are significant at the .05 level.

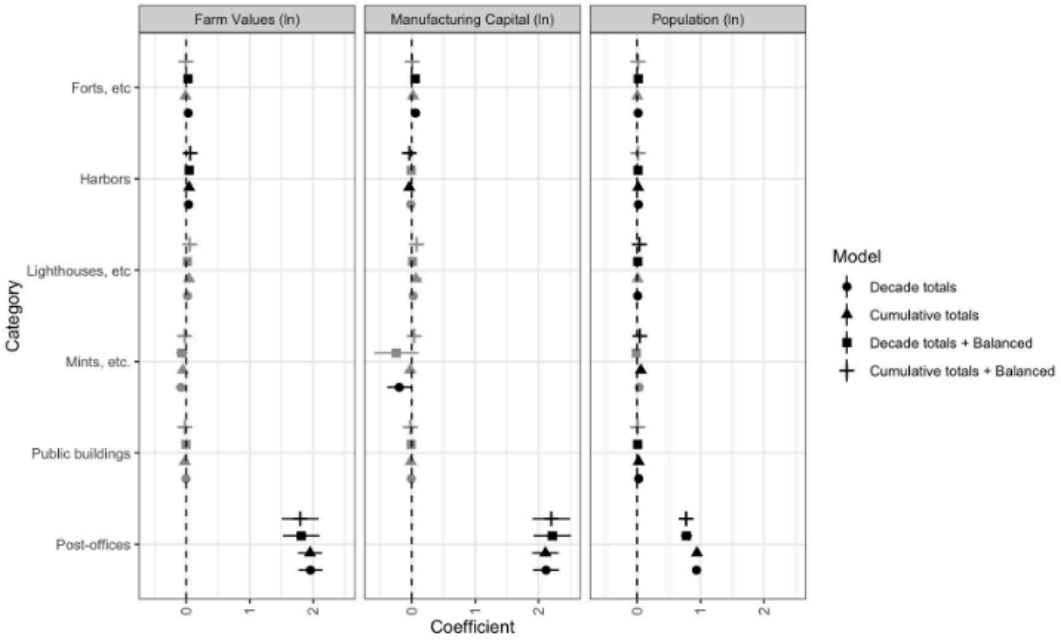
Overall, we obtain a clear story from this analysis. Aggregate federal appropriations to the county level are strongly associated with higher factor levels at the county level. This is true for all three factors we analyze: farm values, manufacturing capital, and population. Further, these relationships are consistent with a *causal* effect of public infrastructure on spatial economic development in this crucial period of US history. The causal channel we posit is that greater public infrastructure spending in a specific place made other factors more productive in that place, and market signals resulted in greater levels of those factors. A causal story is plausible insofar as, for example, the federal government did *not* distribute appropriations on the basis of expected future county-level economic growth that would have occurred in the absence of appropriations

B. Spending by Category

The previous results aggregate federal spending by category, but our data permits finer-grained analysis of the effects of different categories of federal appropriations. Here we analyze the effects of federal spending in each category.

Specifically, we analyze the effect of several different types of public infrastructure: security infrastructure (for example, army forts); transit and shipping infrastructure (lighthouses, harbors, etc.); communications infrastructure (post offices); and general government infrastructure (mints, public buildings). The results are depicted in figure 1.

Figure 1: Effects of Federal Appropriations by Category



Note: Includes the coefficients and 95 percent confidence intervals from models estimating the effects of federal infrastructure spending in counties. All variables are measured as log(value + 1). Post-offices is the count of post-offices in a county in the decade, and is measured consistently across the models. Bolded values are statistically significant at the 95 percent confidence level.

A clear pattern stands out from this figure: at the county level, Post Office appropriations, and only Post Office appropriations, are significantly associated with an increase in any factors of production; and Post Office appropriations are significantly associated with all three factors of production.

As figure 1 indicates, a 1% change in Post Office spending is associated with a roughly 2% change in farm values and manufacturing capital—an enormous effect. This magnitude is consistent across several different measures of Post Office appropriations. The effect of Post Office appropriations on population is consistently around 1% or just below. On the other hand, for every other category of appropriations, the effect on all three factors of production is small, and the 95% confidence interval often overlaps 0.

Table 2: Effects of Different Types of Infrastructure by Category

	Farm Values		Manufacturing Capital		Population	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Unbalanced panel of all counties						
Forts, etc.	0.032**	−0.012	0.061*	0.021	0.017*	0.002
	(0.011)	(0.020)	(0.026)	(0.039)	(0.007)	(0.007)
Harbors	0.036*	0.045*	−0.015	−0.039*	0.021**	0.017*
	(0.016)	(0.018)	(0.015)	(0.019)	(0.007)	(0.007)
Lighthouses, etc.	0.019	0.043	0.025	0.068	0.009*	0.007
	(0.013)	(0.038)	(0.018)	(0.045)	(0.004)	(0.006)
Mints, etc.	−0.082	−0.053	−0.196*	−0.022	0.033	0.059**
	(0.044)	(0.034)	(0.098)	(0.040)	(0.019)	(0.020)
Public Buildings	−0.005	−0.022	−0.008	−0.015	0.026***	0.025***
	(0.008)	(0.011)	(0.012)	(0.015)	(0.006)	(0.006)
Post-Offices	1.959***	1.951***	2.117***	2.108***	0.936***	0.943***
	(0.097)	(0.097)	(0.104)	(0.105)	(0.027)	(0.027)
Num. observations	8429	8429	9555	9555	12607	12607
Num. counties	2580	2580	2637	2637	2653	2653
Num. decades	4	4	5	5	9	9
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Decade FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	13.713	13.713	10.243	10.243	9.000	9.000
Adj. R^2	0.836	0.836	0.683	0.683	0.881	0.881
Panel B: Balanced panel of counties in existence from 1850 to 1880						
Forts, etc.	0.027*	−0.005	0.055*	0.008	0.020***	0.014
	(0.011)	(0.022)	(0.026)	(0.047)	(0.005)	(0.009)
Harbors	0.047*	0.060**	−0.008	−0.037*	0.015*	0.013
	(0.018)	(0.022)	(0.019)	(0.019)	(0.006)	(0.007)
Lighthouses, etc.	0.017	0.053	0.014	0.079	0.010*	0.035**
	(0.014)	(0.041)	(0.021)	(0.057)	(0.005)	(0.012)
Mints, etc.	−0.071	−0.025	−0.243	0.037	−0.013	0.043***
	(0.047)	(0.015)	(0.178)	(0.024)	(0.030)	(0.010)
Public Buildings	−0.005	−0.021	−0.009	−0.021	0.009*	0.009
	(0.007)	(0.012)	(0.014)	(0.020)	(0.004)	(0.005)
Post-Offices	1.812***	1.797***	2.217***	2.200***	0.778***	0.772***
	(0.146)	(0.147)	(0.150)	(0.151)	(0.045)	(0.045)
Num. observations	6449	6449	6340	6340	6470	6470
Num. counties	1619	1619	1619	1619	1619	1619
Num. decades	4	4	4	4	4	4
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Decade FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	13.713	13.713	10.243	10.243	9.000	9.000
Adj. R^2	0.740	0.741	0.637	0.637	0.891	0.892

Note: Entries represent linear regression coefficients with standard errors clustered on counties in parentheses. Observations are at the county-decade level. Post-offices is the count of post-offices in a county in the decade, and is measured consistently across the models. All other explanatory variables are values of appropriations spent in a county over the preceding decade (in columns 1, 3 and 5) or over the entire preceding period in time (in columns, 2, 4 and 6). All explanatory and outcome variables are logged, and all explanatory variables are standardized.Panel A reports results from all unique counties found in the data. Panel B reports results for a balanced panel of counties that existed in 1850 and for which full data were available for all successive decades. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$.

Table 2 presents the model output and coefficients on which Figure 1 is based. There are four key takeaways from these results, beyond those apparent in Figure 1. First, forts, arsenals, and armories (coded as "forts, etc."), have a consistently estimated effect on outcomes when measured only over the proceeding decade. Second, spending on harbors projects has a strong effect on farm values, but not manufacturing capital. Third, the coefficients on lighthouses, beacons, and buoys (coded in "lighthouses, etc.") are consistently positive, although imprecisely estimated. Fourth, appropriations are much more consistently associated with subsequent increases in population.

However, these points do not change the fundamental picture from this analysis: Post Office appropriations have qualitatively different effects than federal appropriations for other forms of public infrastructure. Under the identifying assumption of the fixed effects models, federal spending on infrastructure did indeed have a profound effect on the spatial distribution of economic development in the 19th century, but this effect is overwhelmingly due to communications infrastructure provided by the Post Office. Thus, our findings corroborate those of Rogowski et al. (2022) on the powerful effects of postal system infrastructure, while also showing that these findings do not extend to other forms of public infrastructure.

5. Discussion

The spread of economic development throughout space was one of the most important components of the American political economy in the 19th century. This spread consolidated the ideology of "manifest destiny" and set the stage for US emergence as a global economic superpower in the 20th century. What caused this development?

The mythos suffused in American popular history, art, and writing holds that a unique national character, possibly assisted by the Turnerian safety valve of the open Western frontier, was the primary cause. In this paper, we investigate a different source: government expenditure targeted at the local level. We observe that geographically-targeted government appropriations tended to fund local public infrastructure. For example, the vast share of 19th century appropriations to congressional districts focused on items such as army forts; post offices;

harbors and lighthouses; mints; and other public buildings. Further, we argue that local public infrastructure may operate as a complement to other factors of production in local production functions throughout the US; that is, public infrastructure can increase the productivity of other factors of production already present in the district. If this is true, then greater public infrastructure in a given locality would generate market signals in factor markets that lead to the increase of those factor levels in that locality. In other words, an increase in public infrastructure would not only increase the productivity of those factors already in place; it would lead to accumulation of more of them. Overall, this would mean that greater local public expenditure causes greater local economic output, such that the spread of economic activity throughout space in the US was directly underwritten by the US government.

We investigate the effect of federal expenditures at the local level on local factors of production. Consistent with an effect of public infrastructure, we find in fixed-effects regression models that greater federal spending at the county level is associated with greater farm value; manufacturing capital; and population at the county level. Thus, federal expenditure explains spatial variation in these three crucial factors of production. A causal interpretation of the results requires that federal expenditures were not allocated to counties on the basis of expected future county-level growth that would have occurred in the absence of the federal expenditures.

In addition, we disaggregated federal expenditures into categories to investigate their contributions. We find that the effect of local federal appropriations on local factors of production is overwhelmingly due to communications infrastructure, or in other words Post Office expenditures. Very little of the effect of federal expenditure on local factors of production is due to transportation infrastructure (harbors, lighthouses) or security infrastructure (army forts).

Our discussion of the relative effect of different types of public infrastructure is necessarily speculative and touches on “scope conditions” for these results. For example, it seems implausible that transportation infrastructure has very little effect on economic development. It seems more plausible that it was adequately provided by state expenditures (Wallis and Weingast 2008) or by private firms with indirect public support (e.g. railroads, see

Hornbeck and Rotemberg 2024), and that direct federal expenditure was not the crucial factor for providing this infrastructure. Similarly, it seems implausible that security infrastructure has very little effect on economic output, and more plausible that security was already fairly well established, or provided by a large civilian population as or more effectively than an army outpost could provide it. On the other hand, the communications infrastructure underwritten by the Post Office was more directly a government function, and given the national scale of an efficient network, the federal government was more clearly essential to provide it.

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