Monetizing the Economy: National Banks and Local Economic Development *

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Abstract

This article examines the role of banks in expanding the traded sector of local economies in the United States in the 19th century. The National Banking Act of 1864 created a new class of better-capitalized banks that issued riskless liabilities that circulated as a more stable transactions medium. The improved liquidity of their liabilities was especially important for long-distance exchange. In order to identify the causal impact of this financial change, we use the regulatory feature that national banks faced capital requirements defined by town population cut-offs. Using the capital requirement discontinuity as an instrument for national bank entry, we find that the composition of agricultural production shifted from non-traded crops to traded crops and that employment in trade-related professions and businesses grew. Counties with access to national banks also experienced significant manufacturing output growth from sourcing more inputs, and they innovated more in product markets. These results are consistent with the change in the financial sector improving locations' market access.

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1 Introduction

Local economic activity rarely exists in autarky and instead usually relies on the ability of firms to source inputs for production and sell other inputs and final goods to distant markets. This reliance on trade, even in a domestic setting, suggests that local economies will be sensitive to changes in *intra*-national trade costs.[1] While there has been much focus on the impact of changes in physical trade costs on economic activity, substantial evidence indicates that these are likely only a small component of overall trade costs, and that other frictions play a much bigger role overall (Anderson and Van Wincoop, 2004).

In this paper, we focus on the impact of reducing trade costs stemming from changes in the financial sector. In particular, we study a key reform to the United States banking system, the National Banking Act of 1864, which differentially reduced the financial frictions that exacerbated non-physical trade costs for local economies. This setting allows us to provide causal identification showing that reducing those frictions generated growth and shifted the composition of local activity toward more traded sectors.

While there is a large literature on the importance of financial intermediaries in economic growth, most studies focus on a direct financing channel—i.e. the extent to which individual firms are credit-constrained. However, banks provide more than just credit to firms, and our historical setting provides us with an opportunity to examine whether their ability to create liquid assets and liabilities can be particularly beneficial for information-sensitive long-distance (i.e. trade) transactions (Gorton and Pennacchi, 1990; Stein, 2012).[2] Causally establishing these channels is challenging because financial institutions are not allocated randomly and local economic conditions are likely correlated with the characteristics of the bank itself. In addition, these indirect roles are often difficult to observe, as they are not balance sheet items.

In our setting, the National Banking Act (NBA) created a new class of federally-regulated "national banks" that operated alongside previously existing "state banks." Two characteristics of the setting help us to overcome the challenges to causal identification. First, national banks faced capital requirements according to town population cut-offs. Banks

[1] Indeed, during the latter half of the 19th century, the United States benefited from increased market integration stemming from the expansion of transportation technologies like railroads that significantly reduced physical trade costs and led to substantial growth (Donaldson and Hornbeck, 2016; Hornbeck and Rotemberg, 2019).

[2] For example, their choices about who gets credit impacts the aggregate (mis)allocation of capital in the economy (Bau and Matray, 2020), and they produce information that can alter firm behavior (Frydman and Hilt, 2017).

established in towns with fewer than 6,000 people needed to raise $50,000 of capital, but banks in towns with more than 6,000 (and fewer than 50,000) people were required to raise twice as much. The discontinuous jump means that towns just below the population cut-off faced significantly lower entry costs per capita for establishing a national bank. These town population requirements were binding since banks were not allowed to branch, and this feature of the regulatory environment creates a plausibly exogenous entry cost for new banks in towns near the population cut-off.

Second, the money supply during this period primarily consisted of privately printed bank notes that, in conjunction with deposits, were their main balance sheet liability. Prior to the NBA, these liabilities were not guaranteed to be redeemable for specie if a bank failed nor did they have status as legal tender. As a result, there was significant uncertainty over the value of bank notes, and they primarily circulated locally and traded at a discounts across town borders (Gorton, 1999). This illiquidity made them unsuitable for trade transactions. In contrast, the NBA mandated that all national bank notes were backed 110% in government bonds, and that they be redeemable at any other national bank around the country. These two features transformed national bank notes into riskless liabilities that were significantly more liquid and information-insensitive.

Gaining access to a national bank therefore altered the financial frictions that a local economy faced. First, it directly increased the supply of liquid liabilities (bank notes) circulating locally. Second, it indirectly increased the town's "market access" by eliminating monetary transactions costs with any other town in the country that also had a national bank. Third, while national banks were not allowed to take land as collateral and therefore mostly did not lend to the agricultural sector, they did specialize in short-term loans to the manufacturing sector, which could overcome direct trade-related financing constraints.[3]

We use the different regulatory capital requirements as an exogenous source of variation in gaining a national bank by instrumenting for bank entry with town population being below the 6,000 threshold, according to the most recently published census. We focus on the towns that gained a national bank for the first time in order to capture the impact of joining the national banking network.

Our sample consists of towns that had fewer than 6,000 people in 1870 and no national bank as of 1875, and had between 4,000 and 8,000 people in 1880.[4] Choosing a small

[3]Trade is more dependent on external finance because of the lags between when goods are produced, shipped, received, and paid for. While this constraint has mostly been documented in international trade (e.g. Manova (2013); Xu (2019)), it applies in any setting with long communication and transportation lags, such as in the US in the 19th century.

[4]The analysis is not sensitive to choosing 1875 as the first year we calculate whether a town has a national

population bandwidth of 4,000–8,000 allows us to limit our sample to towns that are likely to be similar in both observable and unobservable characteristics. Among these similar towns, some crossed the 6,000 population cutoff in the 1880 census, which doubled the entry cost for a national bank. The identifying assumption is that there was not a concurrent shock to lower-populated places that would cause them to grow faster after 1880. We control for observable differences in their growth trajectory as proxied by population growth, a town's financial development in the pre-period as proxied by the number of state banks in the town, as well as the area's physical trade costs as proxied by the number of railroads in the county. The predicted first stage is that towns that did not cross the population threshold should be more likely to establish a national bank.

We show that our instrument strongly predicts the likelihood of a town having a national bank in the mid-1880s: having fewer than 6,000 people in 1880 is associated with 30% higher probability of gaining a national bank as of 1885.[5] Controlling for a town's growth trajectory in the pre-period greatly alleviates endogeneity concerns with the relationship between population levels in 1880 and future growth in these places. We also show that pre-period observable characteristics were not significantly different between the towns with a population above 6,000 versus those had below 6,000 population in 1880, both conditionally and unconditionally. The balance on observables further suggests that selection on unobservable characteristics is less of a concern.

Having established that lower regulatory capital requirements increased bank entry, we first show that national bank entry significantly shifted the composition of goods produced toward traded goods while not affecting total agricultural production. Output of traded crops (those listed on the Chicago Board of Trade), such as wheat and oat, crowded out non-traded crops, such as rye and barley. The pure compositional change avoids confounding effects from other bank activities that would also affect the levels of production. It is consistent with the evidence that the regulatory restriction against lending to the agricultural sector was binding (Knox, 1900). We also find that national bank entry did not impact agricultural capital that was financed by short-term credit (proxied by fertilizers expenditure) or long-term credit (proxied by the value of land and fixtures on farms). Indeed, while direct lending was unaffected, the shift toward traded products is a predicted outcome from gaining access

bank. We show robustness to other years in the appendix.

[5]This finding are consistent with Fulford (2015), Gou (2016) and Carlson et al. (2018) which also use the population cut-offs governing national banks' regulatory capital requirement in the late 19th and early 20th centuries. This result follows an older literature by Sylla (1969) and Sylla (1982) that the high capital requirements imposed by the National Banking Act hindered financial development.

to a more liquid medium exchange that reduced transactions frictions.

We further demonstrate the positive impact of national banks on trade using direct measures of local trade activity as proxied by employment in trading sectors. In particular, we use contemporary business directories with town-level coverage and the full count Censuses of Population to show that there was a relative increase in the number of commission merchants, buyers, and shippers in places that gained national banks. We also show that placebo professions that might capture general growth, such as architects and doctors, did not differentially benefit from gaining a national bank.

Next, we study the impacts of national banks on the manufacturing sector, as manufacturing products are also tradable and therefore the sector likely benefited from the increased trade activity following national bank entry. We use the decennial Census of Manufactures to show that places that gained a national bank experienced significantly greater growth in total production between 1880 and 1890. Accessing national banks caused counties to increase their manufacturing output by 50% relative to 1880 levels. These results are robust to accounting for financial development and physical trade costs proxied by the number of state banks before 1880 and the number of railroads in 1880.

The growth in manufacturing output appears to be driven by growth in inputs and employment whereas manufacturing capital was not significantly affected. These results suggest that national banks were unlikely to have facilitated growth through extending long-term loans for capital acquisition.[6] Instead, outputs growth was likely driven by short-term working capital and liquidity provision operating through the assets side of the balance sheet, as well as transactions costs reduction in inputs and outputs trading operating through the liabilities side.

These reductions in non-physical trade costs from the financial sector are consistent with increases in a location's market access (or "real market potential" (Head and Mayer, 2004)). This measure captures the ease of trading with other markets, and it is a source of agglomeration forces in the economic geography literature (Redding, 2013). Consistent with those models, increases in market access that increase firm activity and output also manifest in increased product market competition. We use the number of patents across counties as a proxy for manufacturing sector product development (R&D) and find that places that gained national banks had more innovation by local inventors.

Lastly, we find that the elevated levels of production persisted until the 1900s.[7] The

[6]This result is consistent with Fulford (2015).

[7]The county-level data on manufacturing do not exist for 1910, and the levels are no longer significantly different by 1920. Given the large amount of changes that likely occurred in WWI, we stop our analysis on

initial growth in conjunction with the growth in trade and innovation may contribute to the persistence. In particular, the short-term changes in trade and innovation activity likely gave places with national banks a comparative advantage in the manufacturing sector over a longer period.

Our identification strategy follows a number of papers studying bank behavior in the postbellum United States, and in particular those that use the regulatory capital requirements based on population as a source of exogenous variation. For example, Gou (2016) uses the introduction of a new population cutoff in the early 20th century to study the effect of capital requirements on bank stability. Similarly to Fulford (2015) and Carlson et al. (2018), we focus on the 6,000 cutoff in the 1880 census, and as in Carlson et al. (2018) we also control for town population growth following the previous census as a proxy for a town's overall growth trajectory. Unlike Fulford (2015), we use a more geographically disaggregated unit than the county, and in contrast to Carlson et al. (2018), we focus on towns that gained a national bank for the first time rather than incumbent entry.[8]

This paper provides empirical evidence that financial intermediation can meaningfully reduce trade costs and thereby positively impact real economic activity. In contrast to Xu (2019) which focuses on a direct financing channel of credit provided to firms, here we show that an indirect channel of providing secure and stable bank liabilities as a form of transactions medium also plays a role. While the large literature on the importance of bank debt liquidity has mostly focused on their fire-sale externalities and their role in raising financial fragility (Diamond and Dybvig, 1983; Stein, 2012; Admati and Hellwig, 2014), this paper studies a context in which they are truly safe assets (backed by federal bonds) and therefore create a Gorton and Pennacchi (1990)-type transactions medium.[9] In that sense, we provide evidence for a sub-national monetary channel in the tradition of Friedman and Schwartz (1965); Romer and Romer (1989).

Furthermore, this paper adds to the literature of the historical determinants of economic growth in the United States. This literature has focused on various factors, such as

the long-term effect at 1900.

[8]The concurrent work by Carlson et al. (2018) focuses on the role of bank competition and thereby requires a different sample of towns. Their analysis primarily focuses on the asset side of the balance sheet and shows implications for bank lending behavior, leverage, and survival during the 1893 Panic.

[9]Quadrini (2017) develops and calibrates a multi-sector model to show how the financial intermediation sector can impact productivity through the bank liability channel. In his paper, bank liabilities provide insurance for economic agents who become less constrained in their investments, which is different from our monetary channel. Kashyap et al. (2002) study the synergy between lending and deposit-taking in liquidity provision, and Pennacchi (2006) shows that the federal safety net provided by deposit insurance promotes banks' ability with liquidity provision. Our paper does not study the implication of stable bank liabilities on lending.

technological innovations that reduced transportation costs (e.g. Donaldson and Hornbeck (2016)), information acquisition costs (e.g. Feigenbaum and Rotemberg (2014)), or changes in demographics (e.g. Sequeira et al. (2018)). This paper is complementary, and contributes to the better understanding of how the banking sector has impacted economic activities in the late 19th century (Rousseau and Wachtel, 1998; Rousseau and Sylla, 2005; Landon-Lane and Rockoff, 2007; Fulford, 2015; Carlson et al., 2018; Weiss, 2018).[10] In particular, our results are consistent with Sylla (1982), which argues that the National Banking Act's high regulatory capital requirements held back economic development by failing to expand the bank note supply sufficiently.

The rest of the paper is organized as follows. Section 2 discusses the historical context around the time period studied, and provides motivating facts for the assets and liabilities channels. Section 3 explains the data collection, sample construction, and the empirical strategy. Section 4 presents the empirical results on the effect of national bank entry on real economic outcomes, such as production in the agricultural and manufacturing sectors, local trade activity and innovation output. Section 5 concludes.

2 Historical Context

2.1 The Free Banking Era

Between the expiration of the charter of the Second National Bank in 1836 and the establishment of the Federal Reserve system in 1913, there was no unified banking system in the United States.[11] The National Banking Act of 1864 marked an intermediate step when federally-regulated banks operated alongside state-regulated banks. The period before the National Banking Act was the Free Banking Era. During the Free Banking Era, bank were chartered by their states (or operated without charters) and were subject to different regulations. State banks were prevented from branching, and interstate banking was forbidden. Regulatory oversight was generally weak, and bank runs and failures were frequent (Grada and White, 2003). There was no formal system of interbank lending nor a lender of last resort, and the banking sector experienced regular periods of booms and busts.[12] As a result,

[10] Both Fulford (2015) and Carlson et al. (2018) attribute the impact of national banks to the credit channel on the asset side of the balance sheet. While Fulford (2015) studies rural counties that gained national banks for the first time, Carlson et al. (2018) studies the role of competitive entry on incumbent banks' lending behaviors.

[11] See Appendix C for more historical background on the First and Second National Bank before the Free Banking Era.

[12] There were two exceptions: the Suffolk Banking System that served New England banks between 1827 and 1858, and a nonprofit collective founded in 1853 (Weber, 2012).

the antebellum banking system was fragmented, loosely regulated, and local economies were exposed to the conditions of their local banks.[13]

A well-known feature of the Free Banking Era was that banks issued their own bank notes which were only redeemable at face value in specie at the originating bank's office. In 1860 on the eve of the Civil War, there were almost 1,600 state banks, each issuing its own bank notes. In large cities, the notes from hundreds of banks circulated at any given time. The fact that there were so many bank notes in different designs means that they were hard to verify and subject to counterfeit. Publications known as "Bank Note Reporters and Counterfeit Detectors" were crucial for determining the legitimacy of a currency. Figure A.1(A) displays an example of a private bank note from Massachusetts with face value $20, where the name and location of the issuing bank is prominently displayed. Figure A.1(B) shows the written description for the same bank's notes in a printed "counterfeit detector," where the $20 bill is described in the bottom left corner.

The lack of regulatory oversight from state legislations meant that banks often issued notes beyond their redemption capabilities, causing uncertainty in the value of their bank notes.[14] Due to the asymmetric information in bank notes value and the physical redemption costs, the bank notes did not generally trade at par with each other, creating numerous and constantly changing exchange rates among the currencies (Gorton, 1999; Ales et al., 2008). The large volatility in state bank notes value over time also indicates significant time-varying idiosyncratic bank risks. For example, Figure 1 plots average discounts of state bank notes in several states relative to banks in Philadelphia.[15] Despite the relatively low cost of acquiring information on the state banks in nearby regions, the discounts and premiums were as high as 10% (Figure 1(A)).

The discounts were more extreme for banks located farther away, as it became more costly to verify the operational status of those banks, with information asymmetry increasing with distance (Gorton, 1999). Figure 1(B) plots the average state bank notes discounts for four states farther away from Philadelphia. The discounts were as high as 80%, which meant that a bank note with face value of $1 in Mississippi would only be worth $0.2 in Philadelphia. The final cost of buying goods in Philadelphia with Mississippi bank notes would therefore

[13] See Rockoff (1991) for a comprehensive review of the key characteristics of the Free Banking Era.

[14] Milton Friedman referred to the phenomenon of banks over-inflating their currency to the point of not being able to meet redemption as 'wildcat banking,' a term that is now frequently applied to the Antebellum period in American banking. Gorton (1996) shows that discounts on bank debt can also arise from a lack of credit history.

[15] This data is collected in Ales et al. (2008) and the original source is *Van Court's Bank Note Reporter and Counterfeit Detector* published monthly in Philadelphia between February 1839 and December 1858.

be five times the nominal price. Furthermore, under the unit banking structure, local price shocks could also easily lead to more bank failures (Bordo, 1998).

The high levels of relative discounts were sometimes due to falling state bond prices (Rolnick and Weber, 1982) or the anticipation of state bank failures. For example, Illinois banks committed over 5 million dollars between 1836 and 1842 to building a canal that would connect the Illinois River and Lake Michigan, hoping to reduce transportation cost to a larger market. However, this investment completely drained state funds, and caused a wave of state bank failures in Illinois.[16] As a result, the relative discount of Illinois state bank notes averaged at around 70% in 1842, compared to about 15% in the previous year. Similarly, Rockoff (1975) estimates that losses on notes due to bank failures ranged from 7% in Indiana to 63% in Minnesota.

The real costs of uncertainty and volatility from circulating multiple currencies created large frictions in exchange and trade, and called attention of policy makers.[17] In 1863, Senator John Sherman from Ohio cited the uncertain values in bank notes as costly for every citizen. In Congress, he argued for the passage of the National Banking Act explicitly in terms of securing a stable medium of exchange:

> This currency will be uniform. It will be printed by the United States. It will be of uniform size, shape, and form; so that a bank bill issued in the State of Maine will be current in California; a bank bill issued in Ohio will be current wherever our Government currency goes at all; and a bank bill issued in the State of Connecticut will be freely taken in Iowa or anywhere else. There is *no limit to its convertibility*. It will be of uniform value throughout the United States. I have no doubt these United States notes will, in the end, be taken as the Bank of England note now is all over the world, as a medium, and a standard medium of exchange [...] They will be safe; they will be uniform; they will be convertible. Those are all the requisites that are necessary for any system of currency or exchange.[18]

The cost of illiquidity of state bank notes, together with the need to raise money for

[16] https://cyberdriveillinois.com/departments/archives/teaching_packages/early_chicago/doc3.html State bank notes were usually collateralized with state bonds, and significant drops in the value of collateral often caused bank failures.

[17] Weber (2003) shows that antebellum interbank payment system was consistent with trade patterns, which suggests that banks attempted to facilitate trade. See Appendix C for contemporary examples of how the uncertain value of state bank notes led to legal disputes and inconvenience in exchange. More recent scholars, such as Cagan (1963), similarly attribute currency stability to economic growth in the second half of the 19th century.

[18] Senate floor, February 10, 1863; http://www.yamaguchy.com/library/spaulding/sherman63.html

the postbellum federal government, eventually led to the passage of the National Banking Act after the Civil War.

2.2 The National Banking Era

The National Banking Act that initially passed in 1863 and was amended in 1864 aimed to stabilize the banking system and create a network of national banks that were subject to federal regulations. The newly introduced national banks differed from state banks in many important ways in this dual-banking system.

First, national bank notes were required by law to have uniform value and be redeemable at all national banks in addition to the issuing bank. The bank notes were backed 110% by federal bonds, which made them risk-free. Compared to the volatility and uncertainty in the value of state bank notes, the stability and convertibility of national bank notes made them a better medium of exchange.

Second, national banks were subject to more strict federal regulations that were designed to prevent bank failures. To limit risk-taking behaviors, national banks were encouraged to make short-term loans and were not allowed to take land as collateral (White, 1998).[19] These restrictions may have limited capital accumulation that would require long-term credit, and essentially prevented farmers to obtain credit from national banks, given their most valuable collateral would be farmland. In contrast, state banks were often encouraged to extend credit to the agricultural sector, and in fact, some states even required a minimum fraction of loans to farmers (Knox, 1900). In terms of the mechanics of regulatory oversight, the Comptroller of the Currency required five reports on bank operations per year, whereas state banks typically reported their balance sheets once or twice a year to state regulators.[20] The restrictions in banking business and more rigorous oversight resulted in stability in national banks — between 1875 and 1890, the average national banks failure rate was about 0.25%, compared to 2.5% of state banks.[21] The significantly higher state bank failure rate suggests that state bank liabilities were risky during the time period we study. Table 1 provides a summary of some key distinctions between national banks and state banks.

National banks also shared some similarities with state banks. Most importantly, national banks were prevented from branching and operated both privately and locally. More

[19] In contrast, state banks competed with national banks by imposing weaker restrictions on bank portfolios (White, 1982).
[20] See Calomiris and Carlson (2018) for more details on national bank supervision.
[21] Data provided by EH.net.

specifically, any group of 5 or more people could apply for national bank charter together, and the National Banking Act explicitly required that at 75% of the directors must have local residency, limiting their ability to choose locations for bank operation.

To induce state banks' conversion to national banks, the Treasury collected a 2% tax on state bank notes, and increased it to 10% in 1865. The tax greatly diminished state bank's ability to issue and circulate their bank notes. However, state bank notes were still in use for decades.[22] To compete with national banks, state banks gradually adopted checking accounts, which helped them to issue bank debt without being taxed. Checking accounts provided convenience in transactions, but the uncertainty of their value over time and in more distant places remained — a check could only be cleared when both the status of the banks and that of the personal account could be verified. [23] As a result, national bank notes still had significant advantage in facilitating transactions.

Figure 2 shows the evolution of the number and total assets of national banks and state banks from 1863 to 1900. In the aggregate, national banks replaced many state banks in the first few years after the Act (Jaremski, 2014). They grew similarly in both number and total size after 1870, especially between mid-1870s and mid-1880s. We therefore focus on national bank entries during this steady-state growth period in this paper.

In view of the historical context, the National Banking Era provides a unique opportunity to study the impact of financial intermediaries on growth, and it can shed light on the real costs stemming from unstable bank liabilities. Although few private banks issue their own currency in the modern day, the fundamental friction of uncertainty in the value of monetary instruments can be extended to a large variety of assets that are still used for transactional purposes.

3 Data and Empirical Strategy

In this section, we explain our data sources, sample construction, and the empirical strategy for identifying national bank entries.

3.1 Data sources

In order to study the effects of national bank entry between the mid-1870s to mid-1880s on outcomes between 1880 and 1890, we combine several historical data sources. Some

[22] As of the second half of 1870s, many *national* banks still report state bank notes outstanding.

[23] Check clearing also caused more pressure on state banks' reserves, as when checks are deposited and cleared the issuing bank would immediately lose reserves, whereas bank notes could be used to settle transactions without immediate demand for the reserve (Briones and Rockoff, 2005).

examples of the raw sources are shown in Figure 3. First, in order to obtain city- and town-level population, we use the original reports of the 10th and 11th decennial census. (Figure 3(A)) The publicly available digitized census records report total county-level populations as well as population in areas above 2,500 people, but the city- and town-level population data are only available in the original census reports. We therefore manually collected this data on towns and cities.

Second, we use two sources for bank location information. The national bank location data in 1875 is obtained from the Annual Report of the Comptroller of Currency shown in Figure 3(B). Locations of national banks in 1885 are obtained from *The Banker's Almanac and Register* of 1885. As we can see from Figure 3(C), it provides detailed location information for national banks, as well as state banks and private bankers.

We consider three sets of outcomes. The first set is from the decennial Census of Manufactures and the Census of Agriculture from 1860 to 1900.[24] We retrieve output, input, as well as capital for both sectors in each county, and we obtain per capita measures by dividing these values by the total number of male laborers above the age of 21. We focus on per capita measures because county boundaries evolved as new counties were incorporated throughout the 19th century, and therefore total production values could be measured incorrectly.[25] In addition, we choose adult male laborers as denominator for two reasons. First, employment by sector was subject to inconsistent reporting both within and across census years (Carter and Sutch, 1996). Scaling outcomes by the number of adult male population therefore allows us to better compare production outcomes between and across sectors and census years. Second, studying outcomes scaled by the labor force also allows us to better understand the relative magnitudes of the various components in each sector, such as capital and inputs. One drawback with the census data is that all values were reported at the county level. In order to better measure the the effect of national bank entry at the town level, we use the ratio of town population in our sample to all town population in the county as analytical weight in all regressions with county-level outcomes.[26]

Second, we obtain city- and town-level business activities from the *Zell's Classified United States Business Directory* in 1875 and 1887. This directory lists names of all businesses and professionals in a town (see Figure 3(D) for an example), and to the best of our

[24]The Census of Manufacturing does not appear to be available in an easily accessible form for 1910. The next available census of manufacturing is from 1920, but since that was after both WWI and the establishment of the Federal Reserve system, we consider it outside the reasonable period of outcomes to study.

[25]For example, (Hornbeck, 2010) adjusts for farmland size changes.

[26]The census defined town population as the population residing in towns with above 2,500 people.

knowledge, has not been used in prior studies.[27] We counted the businesses in the directory associated with trade-intensive versus not trade-intensive professions for all towns in 1875 and 1887. Since we lack measures of trade flows between towns, we use the number of commission merchants as a proxy for local trade activity, and use the number of architects, a profession that was unlikely to be associated with trade activity, as a placebo occupation. We also complement the *Zell's* with occupational records from the full count censuses of 1880 and 1900.[28]

Third, we examine the effect on local innovation at the county level using historical patent data from Petralia et al. (2016). The data provides counts of all patents granted within counties, which proxy for research and development investments for product differentiation. Summary statistics for the main variables used in this paper can be found in Table 2.

In some specifications, we also control for the number of state banks in a town as well as the number of railroads in a county prior to the outcome period. The state banks location data in 1876 is digitized using *The Banker's Almanac and Register* of 1876. Data on railroad access in 1875 and 1880 is obtained from Atack (2016).

3.2 Instrument for national bank entry

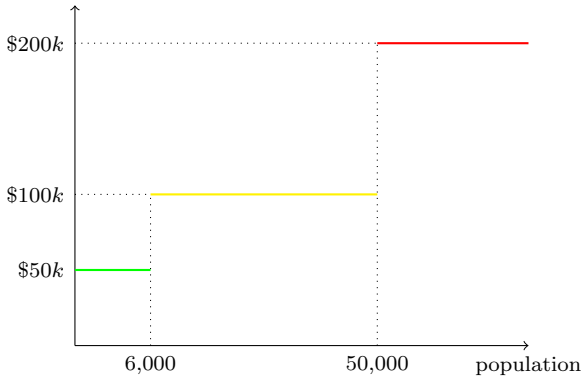
Our empirical design relies on the differences in regulatory capital requirements imposed on national banks based on the size of the town in which the bank was chartered to operate. We study national bank entry between 1875 and 1885, where the variation in capital requirements were based on population in 1880.[29] We focus on capital requirement differences based on the 1880 census instead of the 1870 one for two reasons. First, some towns changed names and incorporation status during the Civil War, causing a misalignment between 1860 and 1870 census, making it difficult to select towns faced the same lower capital requirements in the 1860s and study national bank entry post 1870. Second, in the first few years after the enactment of the National Banking Act, many national banks were formed by conversion from state banks (Jaremski, 2014). These state banks often had large capital stock even though the official requirements were in general low. As a result, the capital requirement stipulated by population cutoff only had a weak impact on entries of national banks in the earlier period.

[27] The 1875 *Zell's Classified United States Business Directory* was digitized by the authors from an original copy in the Boston Public Library. The 1887 directory was obtained from the Baker Business Archives at Harvard Business School.

[28] Including the records from the 1870 census is currently in process.

[29] The mid-1870s to mid-1880s appears to be a steady-state growth period when the respective growth trends of national banks and state banks were similar in the aggregate (Figure 2).

Specifically, the regulation required that capital stock paid in obeyed the following population cutoffs:



We focus on the cutoff at 6,000 and use the indicator of a town having below 6,000 population as an instrument for bank entry.[30] It is worth noting that the $50,000 difference in required capital was not trivial for a town in the 1880s: within our sample, it is about 140 times of average manufacturing wage in 1880. In addition, due to the no-branching rule, bank owners could not apply for a national bank charter in a small town but conduct business with customers from a large town. Furthermore, the residency requirement on bank directors also imposed frictions for towns to seek capital outside of the town.

Figure 4 shows the distribution of town size for all towns with between 2,000 and 10,000 population in 1880, represented by the uncolored bars. The colored bars represent all towns with fewer than 6,000 people in 1870 that did not have a national bank as of 1875. The insufficient mass in the immediate vicinity of the 6,000 cutoff prevents us from taking full advantage of a regression discontinuity design. We therefore study towns within a slightly larger population bandwidth — those with 4,000 to 8,000 population in the 1880 census (represented by the green bars in Figure 4).

Selecting towns with fewer than 6,000 residents in 1870 implies that these towns all faced the same lower entry cost before the publication of the 1880 census. This allows us to use differences in bank entry cost after the 1880 census to study subsequent bank entries and economic outcomes, as some of these towns crossed the 6,000 threshold which doubled a national bank's entry cost. As an example, consider Town A and Town B, each with 4,000 residents as of the 1870 census. In 1880, Town A grew to a population of 5,000, whereas Town B grew to 7,000 people. Without the capital requirement, the larger population in

[30] Gou (2016), Fulford (2015), and Carlson et al. (2018) also use such variations in capital requirements in their respective work.

Town B would likely cause it to have higher demand for banking services. However, the capital requirement imposed a bank entry cost on Town B that was significantly higher than that of Town A.

The location distribution of towns in our sample is shown in Figure 5. Figure 5(A) separately indicates towns that had populations between 4,000 and 6,000 and those between 6,000 and 8,000 as of 1880. The map shows that our sample contains more towns in the northeast, and fewer in the south and the west. Figure 5(B) labels the towns that gained at least one national bank between 1875 and 1885 versus those that did not gain a national bank during this period.[31]

3.3 Pre-period balance

The identifying assumption for our instrument to be valid is that the towns were similar in other respects except for likelihood of bank entry. We address this concern in two ways. First, focusing on a relatively narrow population bandwidth around the 6,000 cutoff partly addresses the concern that the towns were not comparable. Second, we provide evidence that the average observable characteristics of towns in our sample are not significantly different as of 1880 except for in population. Panel A of Table 3 shows that the average difference in 1880 population between the two groups of towns is about 2,100, and the difference is mostly driven by larger population growth from 1870 to 1880. The number of state banks in these towns, number of railroads in 1875 and 1880, as well as log market access cost in 1870 (calculated by Donaldson and Hornbeck (2016)) are all similar for the two sets of towns. Furthermore, average manufacturing and agricultural production, capital, as well as number of establishments were not different between these places, as shown in Panels B and C of Table 3.

The significant differences in population growth from 1870 to 1880 between the larger and smaller towns might raise the concern that crossing the 6,000 cutoff in 1880 may be correlated with later outcomes through non-bank channels. For example, places that rapidly expanded in the previous decade could continue to grow faster due to agglomeration effects. We therefore control for population changes between 1870 and 1880 to account for a town's overall growth trajectory in our analysis as in Carlson et al. (2018). For robustness, we also control for the number of state banks in a town as of 1876 and the number of railroads in 1875 or 1880 in some specifications. The number of state banks could proxy for a town's overall financial conditions before the outcome period, and the number of railroads could

[31] Figure A.2 shows the location distribution of all national banks in 1885.

proxy for the area's overall transportation development. Both factors could also be important determinants for a place's future economic development.

3.4 First stage results

We show that our instrument is relevant for national bank entry through the first stage regression:

$$\mathbb{1}(\text{National Bank})_{i,s} = \beta \times \mathbb{1}(\text{Pop1880} < 6000)_{i,s} + \Gamma' X_{i,s} + \eta_s + \epsilon_i \tag{1}$$

for town i in state s. $\mathbb{1}(\text{National Bank})_{i,s}$ is an indicator variable for having at least one national banks in the town as of 1885, and $\mathbb{1}(\text{Pop1880} < 6000)_{i,s}$ is an indicator variable for having a town population below 6,000 in 1880 census. $X_{i,s}$ denotes town characteristics — population changes between 1870 and 1880, and in some specifications, the number of railroads in 1875 and the number of state banks in 1876. η_s denotes state fixed effects. Results presented in Panel A of Table 4 indicate that having population below 6,000 in 1880 is strongly associated with the likelihood of obtaining a national bank in 1885. This positive relationship is robust to controlling for railroad access and number of state banks in the towns. The point estimate suggests that the lower regulatory capital requirement is associated with roughly a 30% higher chance of having a national bank. Although conversion from state banks to national banks was concentrated in the years between 1863 and 1866, the statistically significant relationship between the number of state banks in a town in 1876 and having a national bank in 1885 suggests the likelihood that some national banks in our sample had been converted from state banks.

The relevance of the instrument for national bank entry can be further demonstrated using falsification tests with alternative population cutoffs near the 6,000 threshold. These falsification tests address the concerns that national banks tended to establish in smaller and maybe younger towns due to expectations for higher future growth. We show that the strong first stage results are unlikely to be induced by factors other than the capital requirements in the National Banking Act, as indicated by results presented in Panel B of Table 4.

Next, we show that pre-period observable characteristics were not sorted by the population cutoff at 6,000, conditional on population growth and state fixed effects. Figure 6 plots unstandardized coefficients from the regression

$$Y_{i,s} = \beta \times \mathbb{1}(\text{Pop1880} < 6000)_{i,s} + \Delta pop_{i,s} + \eta_s + \epsilon_i, \tag{2}$$

where $Y_{i,s}$ denotes various county-level outcomes from the Census of Manufacturers and Census of Agriculture in the periods 1870 and 1880, railroad access in 1875 and 1880, market access cost in 1870, as well as the town-level number of state banks in 1876. The number of state banks in 1876 and railroad access in 1875 and 1880 could be considered proxies of general conditions of a place's financial development and market access, which could influence growth potential in later decades. Similarly to Table 3, towns that were above or below the 6,000 cutoff did not have significant differences in all of these characteristics. Moreover, changes in per capita manufacturing and agriculture production, capital and number of establishments from 1870 to 1880 were also not significantly different. Similarity in all these observable characteristics provides reassuring evidence that our instrumental variable constructed from population cutoff does not correlate with local economic conditions prior to national bank entries.

The relationship between the population cutoff at 6,000 and bank entry remains robust in wider population ranges around the 6,000 cutoff, and we provide more details in Appendix B. We choose the more conservative sample size for our main results since a greater population window raises concerns about comparability between the larger and smaller places. In addition, our first stage results are also robust to selecting a base year before the 1880 census and end-year after the 1880 census, and in Table A.1 we provide two examples for periods between 1873 and 1883, and between 1877 and 1887. Furthermore, we present evidence in Figure A.3 that national bank entries did not cluster in years right before the 1880 census was published, both in our sample and in the aggregate. In sum, national banks did not appear to have entered to a towns due to anticipation of their higher future growth, but bank entries were significantly affected by the population-based instrument.

4 Results

In this section, we present the results on how access to national banks impacted the local economy. We start by studying changes in the agricultural sector, as national banks provided limited lending to farmers due to their inability to extend loans collateralized by farmland. This condition provides us an ideal setting to fully explore the impact of stable bank liabilities on local economic development.

4.1 Changes in the agriculture sector

Agriculture was a growing sector in the late 19th century, especially in the west. On one hand, the rapid expansion of the railroad network reduced transportation costs of

agricultural products (Donaldson and Hornbeck, 2016); on the other hand, national banks provided limited credit to farmers due to their inability to take farmland as loan collateral. This lending restriction likely limited farmers' ability to acquire new farmland or improve their current property (Fulford, 2015; Knox, 1900).

We focus on the one-period difference in county-level agricultural outcomes per capita between 1880 and 1890 and estimate:

$$\Delta Y_{i,s} = \beta \widetilde{\mathbb{1}}(\text{National Bank}) + \Gamma' X_{i,s} + \eta_s + \varepsilon_{i,s} \tag{3}$$

for town i in state s. $\widetilde{\mathbb{1}}(\text{National Bank})$ is an indicator of having at least one national bank in 1885, instrumented by the indicator of a town's population being below the cutoff at 6,000. β is the main coefficient of interest, which measures the change of the output response to having a national bank. X_{is} is a vector of control variables, and η_s denotes state fixed effects, which capture certain state-level characteristics that could affect manufacturing production growth such as state tax or subsidy for agricultural production. Time-invariant characteristics of the counties are subsumed by the differences. The outcome variables of interest are calculated as per capita based on the male population above the age of 21.

We study three outcomes — agricultural outputs, value of land and fixtures (fences and buildings), as well as expenditure on fertilizers per capita. Changes in agricultural outputs are useful in gauging national banks' overall impacts on the agriculture sector. To better disentangle the various effects of national banks, we use changes in the value of farmland and fixtures as a proxy for the access to long-term credit, which was usually granted over a longer period on mortgage security (Pope, 1914). In contrast, credit for expenditure on fertilizers is considered as "working capital," as fertilizers were common inputs in the agricultural production. Therefore, fertilizers expenditure is a proxy for short-term credit accessibility. One additional advantage to study changes in fertilizers expenditure is that commercial fertilizer was first introduced in the 1840s, which was long before our sample period. Therefore, differences in the adoption of fertilizers was unlikely due to factors such as access to new innovation or information.

We find that none of agricultural production, farm's land and fixture value, or fertilizer expenditure was affected by national banks, as shown in Table 5. The results are consistent with national bank's limited provision of long-term credit for agricultural expansion and improvement on mortgage security. The insignificant results on changes in fertilizer expenditure further indicate that national banks did not play a significant role in short-term credit provision for agricultural inputs either. One possible explanation is that farmers did

not have strong relationships with national banks because of the lending restrictions, and it also prevented them from taking out short-term loans from national banks.

Although total agricultural production was unaffected by entries of national banks, we show in Table 6 that production shifted significantly from non-traded crops to traded crops. "Traded crops" are defined as crops that were exchanged on the Chicago Board of Trade, which include wheat, oats, buckwheat, and Indian corn. In 1880, non-traded crops were only about 9.4% of total production, because American agricultural products exports increased greatly in the last quarter of the 19th century (Pope, 1914). The point estimates in Column 5 and 6 mean that 75% or all of production shifted from non-traded crops towards traded crops.

While we cannot completely rule out the possibility that traded crops were more capital-intensive in some ways, the insignificant impact of national bank entries on both long-term and short-term credit obtained by farmers indicates that bank lending played little role in the agriculture sector in our sample overall.[32] The results provide evidence that national banks may have impacted production decisions through providing more secure bank liabilities that facilitated transactions and trade. The shift towards traded crops production is also consistent with our finding on increased trade activity following national banks' entry.

4.2 Trade activity

We provide further evidence on the positive effect of national bank entry on local trade activity with both town- and county-level outcomes in this subsection.

4.2.1 Growth in trade-related occupations

We capture inter-regional trade flows by proxying it with trade-related occupations.[33] Commission merchant was a profession that sourced products from one place and sold at another. The merchants did not directly participate in production, but simply profited by facilitating trade and sales. Therefore, the number of commission merchants in a town can serve as an indicator of the volume of products sourced from potentially distant areas. We examine changes in town-level number of commission merchants, collected from the *Zell's Classified United States Business Directory* in 1875 and 1887.

[32] Fulford (2015) finds that national banks positively affected agricultural sector production through providing working capital and liquidity in rural counties. Our samples may have little overlap as we use town-level population instead of county-level population for identification.

[33] There was no official domestic trade flow statistics in the 19th century United States.

We estimate the baseline Equation 3 to study the effect of gaining national banks on local trade activity by replacing the outcome variable to the changes in the number of commission merchants in a town between 1875 and 1887. Results are reported in Table 7. The IV estimates in Columns 5 and 6 of Panel A suggest that gaining a national bank between 1875 and 1885 is associated with 1.3 to 1.5 more commission merchants within a town in 1887. The effect is large compared to the mean of 0.14 in 1875. As a placebo test, we also analyze the relationship between national bank entries and changes in the number of architects — a profession that was likely to operate locally. we find no effect of national banks in all specifications, as shown in Table 7 Panel B.

To complement our analysis with the business directory data, we also use the full count census of 1880 and 1900 which contains more occupation categories. We contrast growth in trade-related workers (buyers and shippers) to occupations that were unlikely to be affected by trade (architects, doctors, and teachers).[34] As before, we scale the number of workers in these occupations by county-level male population above the age of 21. The outcome variables are the growth rates in shares of the occupations as outcome variables.

We find that gaining a national bank positively impacted trade activity at the county level. Gaining a national bank led to 1.6 to 1.7 times higher changes in the share of buyers and shippers between 1880 and 1900, as shown in Panel A of Table 8. We again find no significant impact of national banks on changes in the share of architects as shown in Panel B of Table 8. More placebo test results using growth in shares of doctors and teachers can be found in Table A.3.

Both town-level and county-level results show that gaining access to national banks led to more trade-related activity. The evidence is consistent with national bank's ability to provide more secure bank liabilities that could facilitate transactions with distant counterparties. The lower transactions frictions with national bank currencies may have propelled manufacturing sector growth by eliminating nominal price risks in sourcing inputs from and selling outputs to more locations, and providing local manufacturers greater access to inputs and outputs markets. However, we do not rule out national banks' impact on trade activity through the traditional lending channels. In fact, the significant greater change in manufacturing inputs per capita following national bank entry provides evidence that national banks likely provided short-term credit to the manufacturers. The short-term credit could also have been used for trade finance, which would also lead to increased local trade activity.

[34]The full count census of 1890 was lost in a fire.

4.2.2 Complementary evidence from prices

We also provide some complementary evidence on how national banks may have reduced transactions costs by comparing price changes in "trade-sensitive" goods versus "local" goods following national bank entry. Sellers of traded products had to bear the price risk associated with the uncertain currency values between their towns and the towns where they sourced the products. Therefore, price uncertainty was likely to drive up costs, leading to higher sale prices locally. On the other hand, selling locally produced goods did not involve transactions with non-local bank notes.

We collected data on the price of tea, New Orleans molasses, and starch from 1864 to 1880 in 9 towns from the supplementary reports on *The Average Retail Prices of Necessaries of Life* in *Statistics of Wages* published by the census office in 1886. These 9 towns had their first national banks between 1866 and 1878. We categorize tea and New Orleans molasses as "trade-sensitive" goods, as they were either imported and distributed from the ports, or produced specifically in New Orleans. Starch, on the other hands, is categorized as "local" good as it was likely to be locally produced from corn.

We find that the price of tea and New Orleans molasses dropped significantly with the access to national banks, whereas the price of starch was not impacted. As shown in Table 9, the price of tea dropped by about 30 cents after the towns had national banks, relative to the average price of $1.2 per pound (a 25% drop). Similarly, the price of New Orleans molasses dropped by about 25 cents per gallon from $1.1 per gallon (a 23% drop).

The results suggest that national banks may have helped to reduce transaction cost by providing a stable medium of exchange, and therefore positively impacted trade-intensive economic activity.

4.3 Growth in the manufacturing sector

Having shown that national bank entry led to increased local trade activity, we turn to study the effect of national banks on the production in the manufacturing sector, since manufacturing outputs are considered as tradable products. We examine whether the gaining a national bank also led to higher manufacturing production as well as the possible driving forces.

We find that national bank entry led to economically and statistically significant higher growth in manufacturing production per capita between 1880 and 1890 even though we do not focus on the "manufacturing belt" states as in Jaremski (2014) and Carlson et al. (2018). We estimate the main specification in Equation 3 using differences in manufacturing production

per capita as the outcome variable. The IV estimates from Table 10 show that gaining a national bank led to about $229 to $310 higher growth in manufacturing production per capita, which are about $6,360 to $8,620 in 2018 dollars. The average effect is 50% of the average of pre-period levels in 1880, which is very economically significant.

The smaller and statistically insignificant OLS estimates reported in Column 1-2 in Panel A indicate that national banks did not selectively enter into high-growth places. There may be two reasons why this was the case. First, location selection was greatly limited by the residence requirement for national bank's directors. The National Banking Act required that a national bank must have at least 5 directors, and at least 75% of them must have resided locally. This residence requirement generated frictions in selecting locations for bank operation, such that places that would likely benefit the most from national banks may not have suitable directors for them. Second, even in this later period, some national banks may have been converted from state banks. Since state banks were known to lend more to farmers (Knox, 1900), places with more state banks previously might have had a relatively underdeveloped manufacturing sector. As a result, there would be no significant effect of national banks on subsequent manufacturing growth overall.

Having established the main effects on manufacturing production per capita, we repeat the same analysis on two different subsamples to demonstrate robustness. The first subsample excludes all counties that had towns both above and below the 6,000 cutoff, and the second subsample excludes California and Pennsylvania. Results are shown in Panel B of Table 10.

The purpose for using the first subsample is to facilitate interpretation of the magnitude of the point estimates. There are a few counties containing both towns above and below the 6,000 cutoff, and using per capita manufacturing production calculated with county-level data could be less interpretable for these counties. As shown in Columns 1-3, after excluding these places, we still find a significant increase in manufacturing production per capita of similar magnitude to the baseline results.

The second subsample addresses concerns that changes in town size and growth were both due to gold rushes and discoveries of coal mines in each state, respectively. Gold rushes and new discoveries of coal mines were unlikely an important factor in our results. There were only a few gold rushes in the late 19th century United States compared to earlier of the century, and the coal industry was already relatively mature. Between 1870 and 1890, only the late 1870s Bodie Gold Rush in California (Sprague, 2011) and discovery of coking

coal in the Connellsville region of southwestern Pennsylvania[35] could have impacted places in our sample. Results from Column 4-6 suggest that excluding towns in California and Pennsylvania has little impact on the main results.

We report more robustness and placebo test results in Appendix 5. Results reported in Table A.4 show that our main results are robust to alternative definition of labor force and inflation adjustment. In Panel A of Table A.4, we calculate manufacturing production per capita by scaling production by male population between 18-44 years old, or the "prime-age" male labor. In Panel B, we adjust 1880 production value to 1890 dollars. Reliable CPI series was only published after the establishment of the federal reserve system in 1913, however, based on a limited price index, the Bureau of Labor Statistics estimates that there was about 10% deflation between 1880 and 1890.[36]

We also conduct a set of pre-period placebo tests using changes in manufacturing production per capita from 1870 to 1880 as the outcome variable, and results are reported in Table A.5. We find no evidence that gaining a national bank between 1875 and 1885 had an impact on manufacturing growth in the 1870s, which further rules out the possibility of pre-trend in growth having simultaneous effects on town size and subsequent growth.

4.3.1 Decomposing growth in the manufacturing sector

Given the significant effect on manufacturing production, in this subsection we examine the components of manufacturing growth, including inputs, employment, and capital between 1880 and 1890. We re-estimate the baseline specification in Equation 3 with the different components of manufacturing sector as the dependent variable, and present the results in Table 11.

Manufacturing inputs value increased significantly more after gaining access to national banks. The IV estimates in Columns 5 and 6 of Panel A indicate that gaining a national bank led to \$154 - \$205 more in manufacturing inputs per capita, which are about \$4,280 and \$5,700 in 2018 dollars or 54% of the average level in 1880. The magnitudes here suggest that the increase in inputs value was responsible for 66% of the total output increase, assuming constant returns to scale. Similarly, gaining a national bank also led to significant growth in manufacturing employment. The IV estimates in Columns 5 and 6 of Panel B show that about 11-16 more people per 100 males above age 21 were employed in the manufacturing sector following national bank entry. However, the impact of national banks

[35]Source: https://eh.net/encyclopedia/the-us-coal-industry-in-the-nineteenth-century-2/
[36]Source: https://www.officialdata.org/

on manufacturing capital was positive but statistically insignificant, as shown in Panel C of Table 11. The magnitude ($56-$132) is also smaller compared to effects of national banks on manufacturing inputs.[37]

The results above on the decomposition of manufacturing output indicate that national banks led to significant growth through increased inputs and employment, but that their impact on capital investment was limited. There are several possible explanations for the null effect on capital. First, regulations encouraged national banks to make short-term loans rather than long-term loans (White, 1998). These loans provided working capital to meet short-term liquidity needs rather than long-term investment demands. The short-term credit may have also facilitated inputs sourcing, and the lack of long-term credit provision limited manufacturers' ability to acquire physical capital such as manufacturing factory land. Second, since the national banks were unit banks, their ability to diversify their loan portfolio with borrowers across different places was limited, which could discourage them from expanding their balance sheets. Third, large values of firm investment could not be easily accommodated, as a national bank could lend no more than 10% of its capital stock to one entity.[38] Broadly, many requirements impeded investment in the manufacturing sector, suggesting that the effect of national banks from the asset side of the balance sheet is limited.

One caveat to our interpretation is that manufacturing capital was estimated by establishment owners and was subject to mis-measurement in the census, which would bias the results toward zero. *Remarks on the Statistics of Manufactures* for the 1880 census explains how factory owners may not have correctly estimated the value of all physical capital used in production. For example, a manufacturer who rented a piece of factory land may or may not count the land as a part of capital. The measurement error is therefore likely to weaken the relationship between national banks and manufacturing capital growth.

So far, the results indicate that national banks facilitated manufacturing production from the assets side primarily by providing working capital. Given the large magnitude of impacts of national banks on manufacturing outputs and inputs, we explore other channels that could also have spurred the growth in the manufacturing sector. In Section 2, we provided an overview of the significant exchange frictions stemming from illiquid state bank notes. Since the National Banking Act required that the national bank notes must be redeemable at all national banks at par, we hypothesize that places with access to national

[37] Carlson et al. (2018) find positive effect on manufacturing capital growth following new national bank entry, and suggest that banking competition leads to economic growth by inducing credit provision.

[38] That is to say, a bank with $50,000 of capital stock could lend no more than $5,000 to a firm.Source: National Banking Act of 1864, Sec. 29

bank notes experienced significant reduction in transaction cost when trading with distant regions. As a result, value of manufacturing production and inputs could both increase with greater access to inputs and outputs markets. We provide evidence for this channel next.

4.4 Growth in innovation

As the late 19th century was a part of the Second Industrial Revolution, when organized industrial R&D within firms emerged and science and technology were applied to product development (Bruland and Mowery, 2006), we postulate that the significant manufacturing production increase could also be driven by innovation. We examine whether national banks also had a significant impact on local innovation activity in this subsection.

We use the the number of patents obtained by residents within a county as measure for innovation activity (Petralia et al., 2016).[39]. We first show that the number of patents can be a reasonable proxy for the manufacturing sector's research and development outcome by plotting the relationship between manufacturing and agricultural production per capita and the log number of patents obtained by local inventors in the previous decade in Figure 7. The plots show that local innovation output measured by the number of patents granted is strongly correlated with manufacturing production per capita, but is only weakly correlated with agriculture production per capita. Assuming patents contributed to total factor productivity, these correlations indicate that they were primarily innovations that benefited the manufacturing sector.

Having established that patents are a suitable proxy for manufacturing sector's innovation, we examine the percentage changes in the number of patents granted from the decade following 1870 and 1880 using the specification of Equation 3.[40] Gaining a national bank led to 105 to 134 percentage points higher increase in the number of patents across the two decades, as shown in Table 12. The magnitude is economically significant, compared to the mean of 64 percentage points and standard deviation of 138 percentage points. We also conduct placebo tests by replacing the outcome variable with percentage changes in number of patents between the previous two decades (1860s and 1870s) and report the results in Table A.6. The insignificant results imply that the difference in innovation output growth was not due to pre-existing trends.

Assuming that firms primarily relied on internal financing for R&D like they do in the modern period in the United States (Hall, 2002; Bougheas, 2004), the results also indicate

[39]Plant- or sector-level innovation measure is not available for our sample period
[40]We include the 10 years between 1871 to 1880, and 1881 to 1890, respectively.

that the positive effect of national banks on innovation was not through the bank lending channel. Instead, the evidence is consistent with that manufacturers gained greater market access and were exposed to a greater varieties of products when product price uncertainty across locations is reduced after gaining a national bank locally. As a result, manufacturers may have incentive to to innovate and therefore become more competitive in a larger market and expand product lines.

The increased trade and innovation activity could both help to explain the significant growth in manufacturing production after national bank entries. Taken together, national banks likely facilitated manufacturing sector growth from both the assets and the liabilities sides of their balance sheets. On the assets side, short-term loans may have provided the working capital and liquidity for input sourcing and trade finance. On the liabilities side, granting easy access to secure and liquid bank liabilities may have increased production value by reducing transactions cost in trade and hence allowing local manufacturers to access more customers and produce more differentiated goods.

4.5 Long-term effects and spillover effects

In this part, we study whether the positive impacts of national banks on manufacturing production persisted over time led to any impacts on neighboring counties. The initial significant growth in the manufacturing sector may last for a longer time period due to the presence of agglomeration economies in manufacturing (Kline and Moretti, 2014). In addition, greater industrialization, greater market access through trade and more innovation activity could also turn into comparative advantages in manufacturing production, which may sustain higher manufacturing production over a longer period (Sequeira et al., 2018). We test this hypothesis next.

4.5.1 Long-term effects of national banks

To measure the long-term effects of national banks, we estimate a dynamic differences-in-differences model from 1860 to 1900, which makes it possible to visualize any pre-trends before the 1880 census was published and the persistence afterward. Specifically, we estimate the following:

$$Y_{ist} = \sum_k \beta_k \widetilde{\mathbb{1}}(\text{National Bank}) \times \mathbb{1}_{\{year=k\}} + \sum_k \gamma_k X' \times \mathbb{1}_{\{year=k\}} + \eta_{st} + \alpha_i + \varepsilon_{it}, \qquad (4)$$

where Y_{ist} is the outcome in town i in state s at year t. We include leads and lags before and after 1880, and omit 1880 so that all outcomes are relative to the treatment period. β_k is the coefficient of interest, and it measures the elasticity of the output response to gaining a national bank in each of the lead and lag years. As before, $\widetilde{\mathbb{1}}$(National Bank) is the instrumented variable. γ_k allow the control variables X' to have time-varying effects. η_{st} are state-year fixed effects so that we compare outcomes within states and years, and α_i are town fixed effects that control for time-invariant characteristics such as geographical location and land quality.

The full IV and reduced form dynamic difference-in-difference coefficients for manufacturing production plotted in Figure 8 show that the positive effect of national banks on manufacturing production between 1880 and 1890 persisted beyond a decade into 1890s as well. The figures also indicate that there were no differential pre-trends between the places that received national banks versus those that did not, instrumented by the population cutoff at 6,000.[41] Data from the 1910 Census of Manufacturers is not available, and we find no differential effect using the 1920 outcomes. However, 1920 was after the WWI and the establishment of the federal reserve system. We therefore do not attribute the result to conversion of growth.

4.5.2 Spillover effects

We also investigate whether there are indirect effects of national bank entries on the neighboring counties. On one hand, more active trade and increased innovation output could create positive spillover effects on the neighboring counties; on the other hand, manufacturing production could become more concentrated in places that obtained national banks, leading to reallocation of manufacturing production away from the surrounding places.

We estimate the same dynamic differences-in-differences specification as in Equation 4 above, but replace the outcome variable to the changes in manufacturing production per capita of adjacent counties. We find positive point estimates for neighboring counties' manufacturing production per capita in 1890 and 1900, but the effects are noisy (see Figure 9), suggesting some positive net effects of national banks on adjacent counties.

[41] We only show 2 pre-shock period coefficients here, as 1840 and 1850 census does not change the flat patters of the pre-shock trend.

5 Conclusion

Financial intermediaries can facilitate economic growth through both the asset-side channel, such as providing long-term investment credit and short-term working capital, and the liability-side channel, such as issuing secure bank liabilities that could facilitate transactions across space and over time. This paper studies the late 19th century United States after the passage of the National Bank Act of 1864, and exploits a population-based capital requirement of national banks to study the causal effects of bank entry on the local economy, as well as provide empirical evidence on the importance of stable bank liabilities in the real economy.

We establish that a lower regulatory capital requirement defined discretely by town population strongly and robustly predicts a higher likelihood of national bank entry. The national banks significantly shifted from non-traded crops to traded crops despite having little impact on overall agricultural production, access to long-term credit (proxied by value of farmland and fixtures), or short-term credit (proxied by fertilizers expenditure). This change in the composition of economic activity through non-credit channels provides evidence that the stability of national bank liabilities had first-order effects on the composition of output.

We also find that other measures of local trade activity increased following national bank entry. We find significant and persistent greater increase in manufacturing production per capita following national bank entry. While manufacturing inputs, and employment also increased, capital did not significantly scale up. The results indicate that national banks extended limited long-term credit for capital acquisition, and the effect of national bank entry on manufacturing sector growth comes from lowering transactions costs with stable national bank notes and short-term credit provision. The increased trade activity facilitated by national bank's secure liabilities could also expose manufacturings to greater market access and therefore encourage in-firm innovation. We find that innovation activity, proxied by patents granted, also increased significantly after gaining a national bank.

Together, the initial significant growth in the manufacturing sector as well as increased trade and innovation could contribute to the persistently higher level of manufacturing production for at least two decades. Overall, our results indicate that financial sector developments that reduce trade costs can significantly impact the size and importance of the traded sector in the economy.

6 Bibliography

Admati, A. and M. Hellwig (2014): *The Bankers' New Clothes: What's Wrong with Banking and What to Do about It*, Princeton University Press.

Ales, L., F. Carapella, P. Maziero, and W. E. Weber (2008): "A Model of Banknote Discounts," *Journal of Economic Theory*, 5.

Anderson, J. E. and E. Van Wincoop (2004): "Trade costs," *Journal of Economic literature*, 42, 691–751.

Atack, J. (2016): "Historical Geographic Information Systems (GIS) database of U.S. Railroads for 1870 to 1890," .

Bau, N. and A. Matray (2020): "Misallocation and capital market integration: Evidence from India," Tech. rep., National Bureau of Economic Research.

Bordo, M. D. (1998): "Currency Crises (and Banking Crises) in Historical Persepctive," *Stockholm School of Economics Research Report*.

Bougheas, S. (2004): "Internal vs External Financing of R&D," *Small Business Economics*, 22, 11–17.

Briones, I. and H. Rockoff (2005): "Do Economists Reach a Conclusion on Free-Banking Episodes?" *Economic Journal Watch*, 2.

Bruland, K. and D. C. Mowery (2006): "Innovation through Time," *The Oxford Handbook of Innovation*.

Cagan, P. (1963): "The first fifty years of the national banking system," *Banking and Monetary Studies, edited by Deane Carson*, 15, 42.

Calomiris, C. W. and M. Carlson (2018): "Bank Examiners' Information and Expertise and Their Role in Monitoring and Disciplining Banks Before and During the Panic of 1893," .

Carlson, M., S. Correia, and S. Luck (2018): "The Effects of Banking Competition on Growth and Financial Stability: Evidence from the National Banking Era," .

Carter, S. B. and R. Sutch (1996): "Fixing the Facts: Editing of the 1880 US Census of Occupations with Implications for Long-Term Labor-Force Trends and Sociology of Official Statistics," *Historical Methods*, 29, 5–24.

Dewey, D. R. (1910): "State Banking Before the Civil War," *National Monetary Commission, 61st Congress, 2nd Session*.

Diamond, D. W. and P. H. Dybvig (1983): "Bank runs, deposit insurance, and liquidity," *Journal of political economy*, 91, 401–419.

Donaldson, D. and R. Hornbeck (2016): "Railroads and American economic growth: A "market access" approach," *The Quarterly Journal of Economics*, 131, 799–858.

Feigenbaum, J. J. and M. Rotemberg (2014): "Information and Investment: Impacts of the Introduction of Rural Free Delivery," .

Friedman, M. and A. J. Schwartz (1965): *A monetary history of the United States, 1867-1960*, Princeton University Press.

Frydman, C. and E. Hilt (2017): "Investment banks as corporate monitors in the early twentieth century United States," *American Economic Review*, 107, 1938–70.

Fulford, S. L. (2015): "How Important Are Banks for Development? National Banks in the United States, 1870–1900," *Review of Economics and Statistics*, 97, 921–938.

Gorton, G. (1996): "Reputation Formation in Early Bank Debt Markets," *Journal of Political Economy*, 104, 346–397.

——— (1999): "Pricing Free Bank Notes," *Journal of Monetary Economics*, 44, 33–64.

Gorton, G. and G. Pennacchi (1990): "Financial intermediaries and liquidity creation," *The Journal of Finance*, 45, 49–71.

Gou, M. (2016): "Did capital requirements promote bank stability in the early 20th century United States?" .

Grada, C. O. and E. N. White (2003): "The Panics of 1854 and 1857: A View from the Emigrant Industrial Savings Bank," *The Journal of Economic History*, 63, 213–240.

Hall, B. H. (2002): "The Financing of Research and Development," *Oxford Review of Economic Policy*, 18.

Head, K. and T. Mayer (2004): "The empirics of agglomeration and trade," in *Handbook of regional and urban economics*, Elsevier, vol. 4, 2609–2669.

Hornbeck, R. (2010): "Barbed Wire: Property Rights and Agricultural Development," *Quarterly Journal of Economics*, 125, 767–810.

Hornbeck, R. and M. Rotemberg (2019): "Railroads, reallocation, and the rise of American manufacturing," Tech. rep., National Bureau of Economic Research.

Jaremski, M. (2014): "National Banking's Role in U.S. Industrialization, 1850-1900," *Journal of Economic History*, 74, 109–140.

Kashyap, A. K., R. G. Rajan, and J. C. Stein (2002): "Banks as Liquidity Providers: An Explanation for the Coexistence of Lending and Deposit-Taking," *The Journal of Finance*, LVII, 33–73.

Kline, P. and E. Moretti (2014): "Local Economic Development, Agglomeration Economies, and the Big Push: 100 Years of Evidence from the Tennessee Valley Authority," *The Quarterly Journal of Economics*, 129.

Knox, J. J. (1900): *A History of Banking in the United States*, BradFord Rhodes & Company.

Landon-Lane, J. and H. Rockoff (2007): "The Origin and Diffusion of Shocks to Regional Interest Rates in the United States, 1800-2002," *Explorations in Economic History*, 44, 487–500.

Manova, K. (2013): "Credit constraints, heterogeneous firms, and international trade," *Review of Economic Studies*, 80, 711–744.

Pennacchi, G. (2006): "Deposit Insurance, Bank Regulation, and Financial System Risks," *Journal of Monetary Economics*, 53, 1–30.

Petralia, S., P.-A. Balland, and D. Rigby (2016): "Unveiling the Geography of Historical Patents in the United States from 1836 to 1975," *Scientific Data*.

Pope, J. E. (1914): "Agricultural Credit in the United States," *The Quarterly Journal of Economics*, 28, 701–746.

Quadrini, V. (2017): "Bank Liabilities Channel," *Journal of Monetary Economics*, 89(C), 25–44.

Redding, S. J. (2013): "Economic geography: a review of the theoretical and empirical literature," *Palgrave handbook of international trade*, 497–531.

Rockoff, H. (1975): *The Free Banking Era: A Reconsideration*, New York: Arno Press.

——— (1991): *Unregulated Banking: Chaos or Order?*, London: Macmillan Academic and Professional Ltd., chap. Lessons from the American Experience with Free Banking.

Rolnick, A. J. and W. E. Weber (1982): "Free Banking, Wildcat Banking, and Shinplasters," *Federal Reserve Bank of Minneapolis Quarterly Review*.

Romer, C. D. and D. H. Romer (1989): "Does monetary policy matter? A new test in the spirit of Friedman and Schwartz," *NBER macroeconomics annual*, 4, 121–170.

Rousseau, P. L. and R. Sylla (2005): "Emerging Financial Markets and Early US Growth," *Explorations in Economic History*, 42, 1–26.

Rousseau, P. L. and P. Wachtel (1998): "Financial Intermediation and Economic Performance: Historical Evidence from Five Industrialized Countries," *Journal of Money, Credit and Banking*, 30, 657–678.

Sequeira, S., N. Nunn, and N. Qian (2018): "Immigrants and the Making of America," *Review of Economic Studies*, Forthcoming.

Sprague, M. (2011): *Bodie's Gold*, University of Nevada Press.

Stein, J. C. (2012): "Monetary policy as financial stability regulation," *The Quarterly Journal of Economics*, 127, 57–95.

Stephen K. Williams, L., ed. (1901): *Reports of Cases Argued and Decided in the Supreme Court of the United States (1843-1846)*, 11, The Lawyer's Co-Operative Publishing Company.

Sylla, R. (1969): "Federal policy, banking market structure, and capital mobilization in the United States, 1863–1913," *The Journal of Economic History*, 29, 657–686.

——— (1982): "Monetary innovation in America," *The Journal of Economic History*, 42, 21–30.

Weber, W. E. (2003): "Interbank Payments Relationships in the Antebellum United States: Evidence from Pennsylvania," *Journal of Monetary Economics*, 50, 455–474.

——— (2012): "Clearing Arrangements in the United States before the Federal Reserve System," .

Weiss, C. (2018): "Contractionary Devaluation Risk: Evidence from U.S. Silver Coinage Agitation, 1878-1900," .

White, E. N. (1982): "The membership problem of the National Banking System," *Explorations in Economic History*, 19, 110–127.

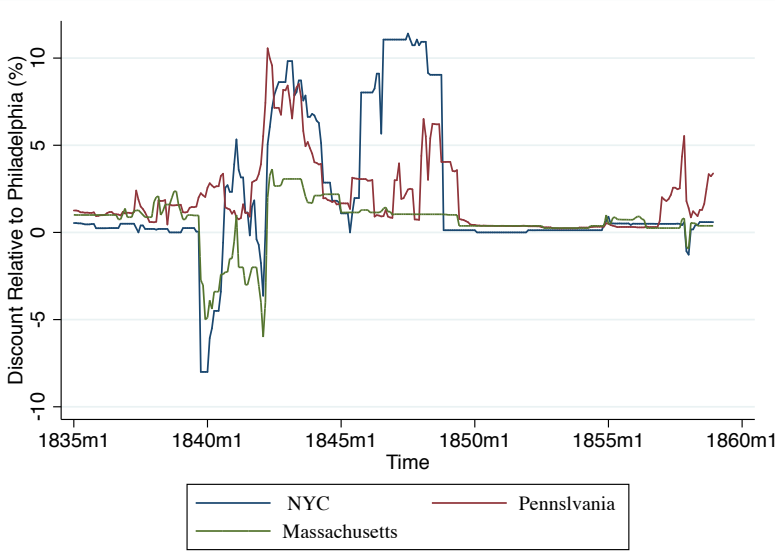
——— (1998): "Were Banks Special Intermediaries in Late Nineteenth Century America," *Federal Reserve Bank of St. Louis Review*.

Xu, C. (2019): "Reshaping global trade: the immediate and long-run effects of bank failures," Tech. rep., Working paper.

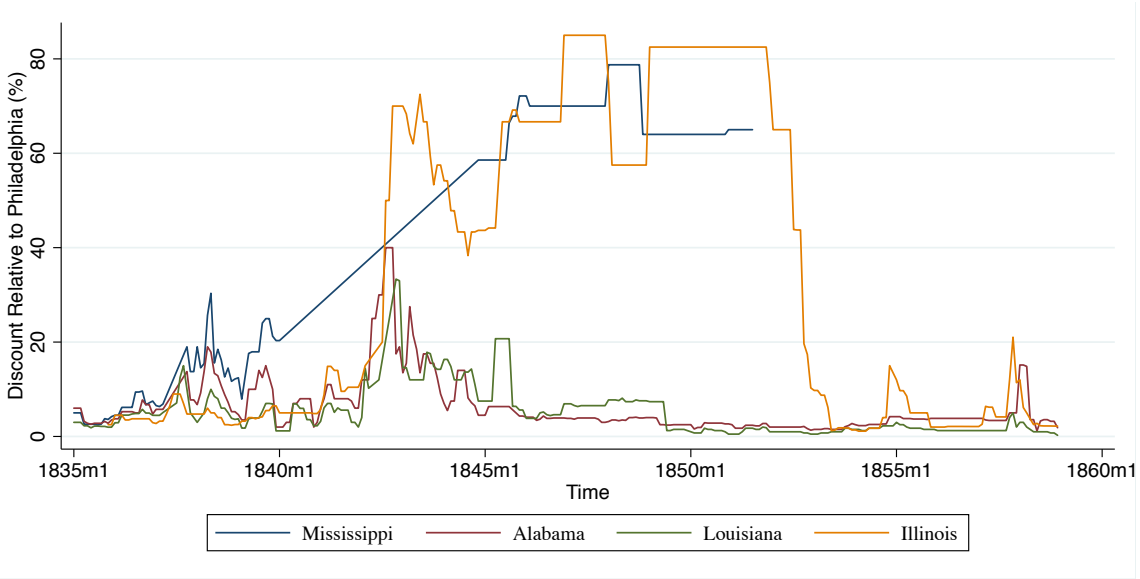
Figures and Tables

Figure 1: Relative Discounts on State Bank Notes Relative to Philadelphia

(A): Regions close to Philadelphia



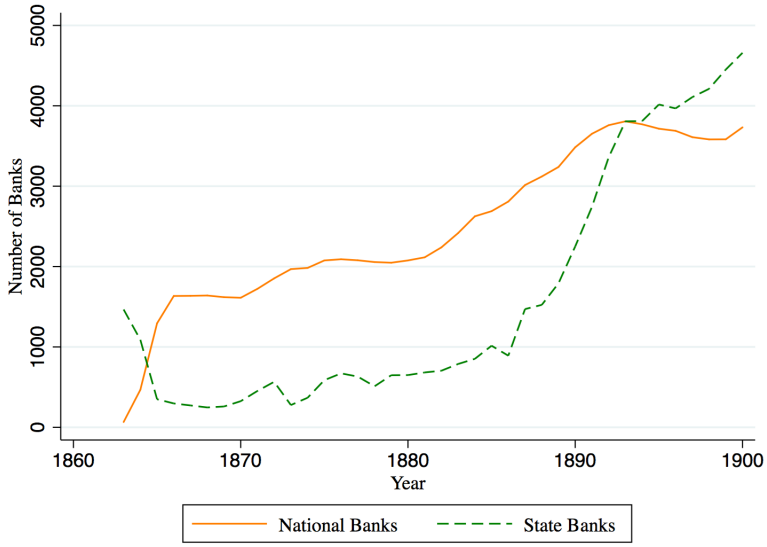
(B): Regions faraway from Philadelphia



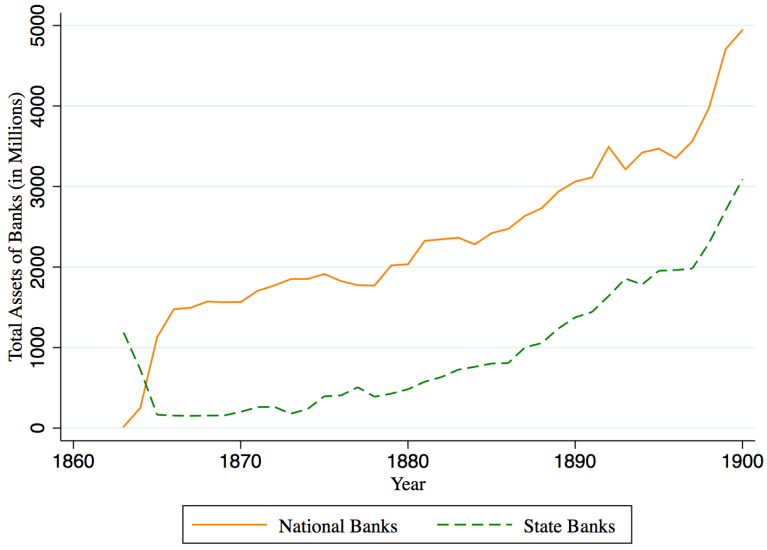
Notes: Figure 1 plots the monthly average discounts on state bank notes relative to banks in Philadelphia. Data is from Ales et al. (2008). The original source is *Van Court's Bank Note Reporter and Counterfeit Detector* published monthly in Philadelphia between February 1839 and December 1858.

Figure 2: National and State Banks: (1863-1900)

(A): Number of banks



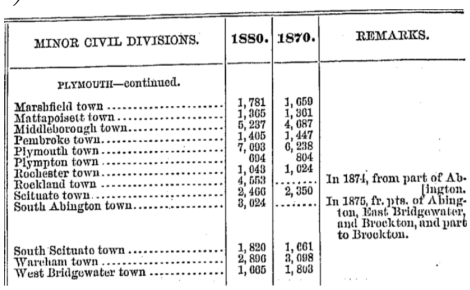
(B): Total assets by bank type



Notes: Figure 2 plots the total numbers and assets of national and state banks in the United States between 1863 and 1900. Data is obtained from EH.net operated by the Economic History Association.

Figure 3: Exhibits of Data Sources

(A): Decennial Census: 1880 and 1890



MINOR CIVIL DIVISIONS.	1880.	1870.	REMARKS.
PLYMOUTH—continued.			
Marshfield town	1,781	1,659	
Mattapoisett town	1,365	1,361	
Middleborough town	5,237	4,087	
Pembroke town	1,405	1,447	
Plymouth town	7,093	6,238	
Plympton town	694	804	
Rochester town	1,043	1,024	
Rockland town	4,553	.....	In 1874, from part of Abington.
Scituate town	2,466	2,350	
South Abington town	3,024	.....	In 1875, fr. pts. of Abington, East Bridgewater, and Brockton, and part to Brockton.
South Scituate town	1,820	1,661	
Wareham town	2,896	3,098	
West Bridgewater town	1,005	1,803	

(B): Annual Report of the Comptroller of Currency (1875)

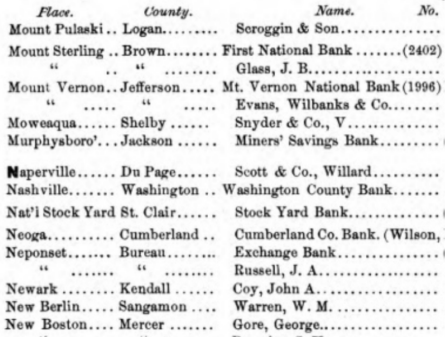
MASSACHUSETTS.

Neponset National Bank, Canton.

CHAS. H. FRENCH, *President.* No. 663. F. W. DEANE, *Cashier.*

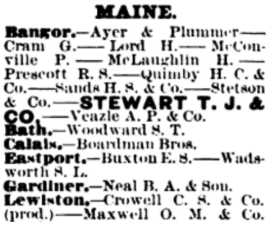
Resources.		Liabilities.	
Loans and discounts	$375,351 71	Capital stock paid in	$250,000 00
Overdrafts	501 43		
U. S. bonds to secure circulation	250,000 00	Surplus fund	35,991 05
U. S. bonds to secure deposits	.....	Other undivided profits	51,823 64
U. S. bonds on hand	.....		
Other stocks, bonds, and mortgages	.....	National bank notes outstanding	218,400 00
		State bank notes outstanding	.....
Due from approved reserve agents	5,363 50		
Due from other banks and bankers	.....	Dividends unpaid	11,275 68
Real estate, furniture, and fixtures	3,200 00		
Current expenses and taxes paid	38 00	Individual deposits	84,222 74
Premiums paid	.....	United States deposits	.....
		Deposits of U. S. disbursing officers	.....
Checks and other cash items	386 78		
Exchanges for clearing house	.....	Due to other national banks	.....
Bills of other national banks	3,118 00	Due to State banks and bankers	.....
Fractional currency	312 69		
Specie	.....		
Legal tender notes	2,191 00	Notes and bills re-discounted	.....
U. S. certificates of deposit	.....	Bills payable	.....
Redemption fund with U. S. Treasurer	11,250 00		
Total	651,713 11	Total	651,713 11

(C): The Banker's Almanac and Register (1885)



Place.	*County.*	*Name.*	*No.*
Mount Pulaski	Logan	Scroggin & Son	
Mount Sterling	Brown	First National Bank	(2402)
"	"	Glass, J. B.	
Mount Vernon	Jefferson	Mt. Vernon National Bank	(1996)
"	"	Evans, Wilbanks & Co.	
Moweaqua	Shelby	Snyder & Co., V	
Murphysboro'	Jackson	Miners' Savings Bank	
Naperville	Du Page	Scott & Co., Willard	
Nashville	Washington	Washington County Bank	
Nat'l Stock Yard	St. Clair	Stock Yard Bank	
Neoga	Cumberland	Cumberland Co. Bank. (Wilson,	
Neponset	Bureau	Exchange Bank	
"	"	Russell, J. A.	
Newark	Kendall	Coy, John A.	
New Berlin	Sangamon	Warren, W. M.	
New Boston	Mercer	Gore, George	

(D): Zell's Business Directory (1875 and 1887)

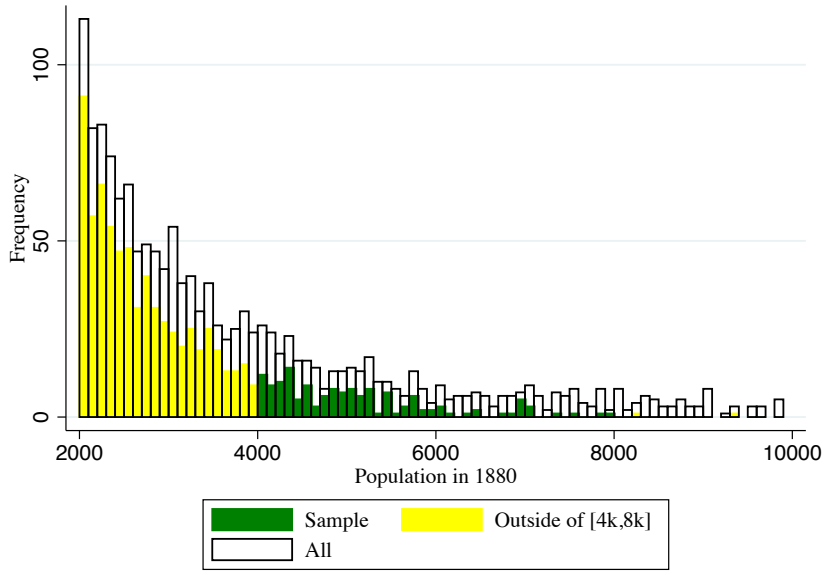


MAINE.

Bangor.—Ayer & Plummer—Cram G.—Lord H.—McConville P.—McLaughlin H.—Prescott R. S.—Quimby H. C. & Co.—Sands H. S. & Co.—Stetson & Co.—**STEWART T. J. & CO.**—Veazie A. P. & Co.
Bath.—Woodward S. T.
Calais.—Boardman Bros.
Eastport.—Buxton E. S.—Wadsworth S. L.
Gardiner.—Neal B. A. & Son.
Lewiston.—Crowell C. S. & Co. (prod.)—Maxwell O. M. & Co.

Notes: Figure 3 displays screenshots of data sources that require hand-digitization used in this study. Figure 3(A) shows the town-level population data source, 3(B) shows an example from the 1875 Annual Report of the Comptroller of the Currency, where banks reported their location and balance sheet conditions. 3(C) shows bank location information from the *Banker's Almanac and Register* in 1885, and 3(D) displays example for local business data.

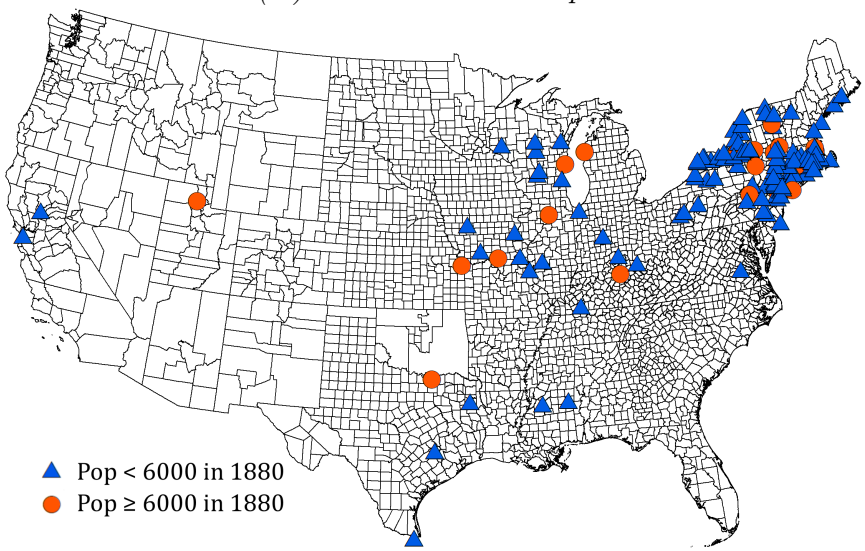
Figure 4: Histograms of Town Population in 1880



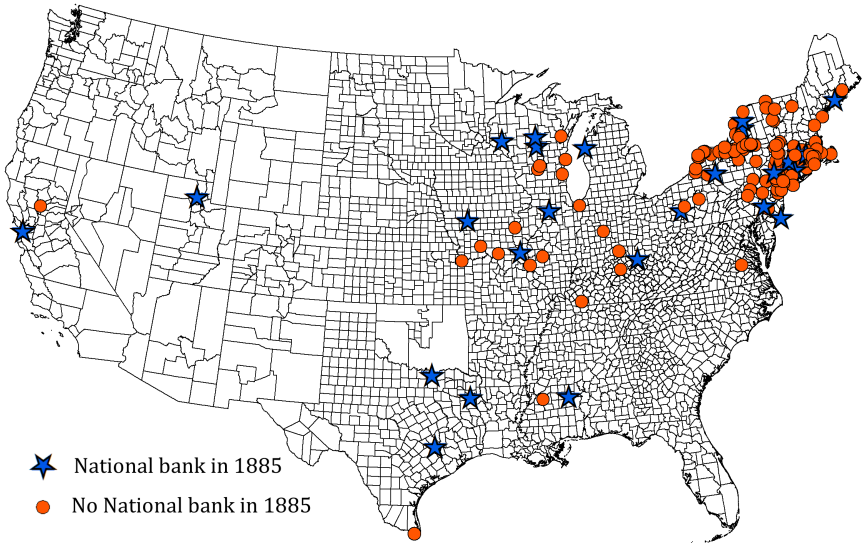
Notes: Figure 4 plots the frequency of all towns with 2,000 to 10,000 population in 1880 census (labeled "All"), as well as after restricting the sample to having below 6,000 population in 1870 and not having a national bank in 1875 (green and yellow bars). The green bars labeled "Sample" show 1880 population distribution. All town population data is digitized by the authors from the original census reports.

Figure 5: Maps of Towns in the Sample

(A): Towns in the sample

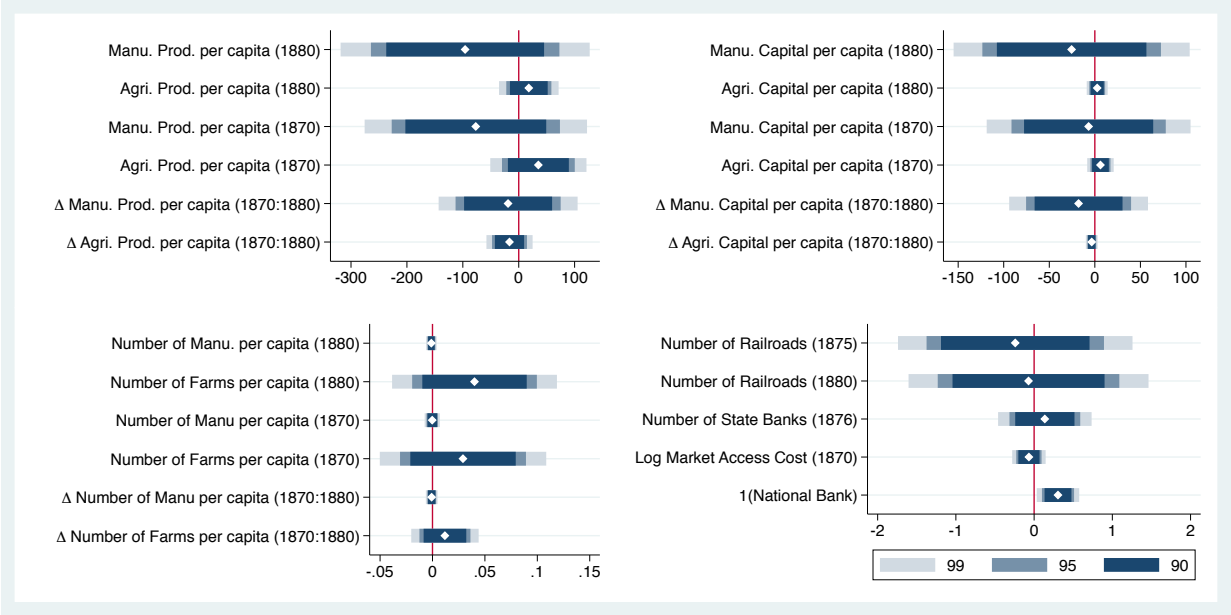


(B): Newly added national banks



Notes: Figure 5 maps the locations of towns in the sample. Panel A plots all towns in the sample above versus below the 6,000 population threshold. Panel B plots the locations of newly added national banks in our sample.

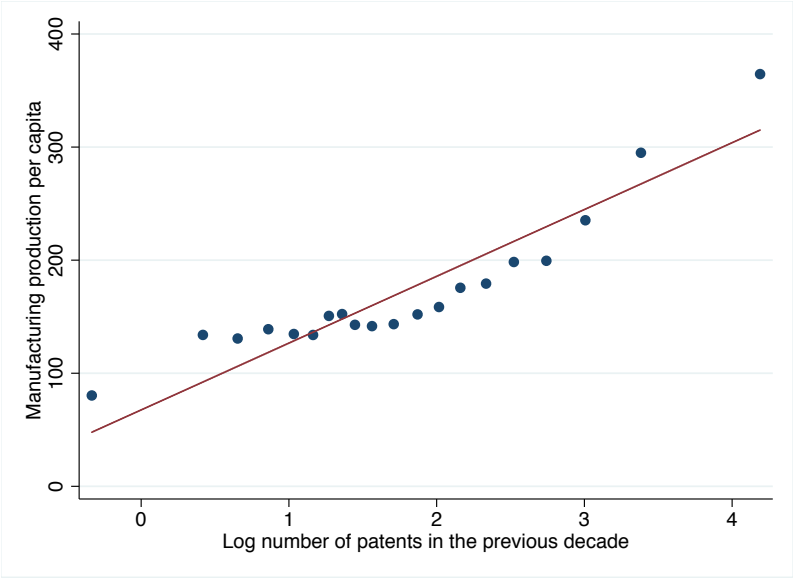
Figure 6: Conditional Covariates Balance



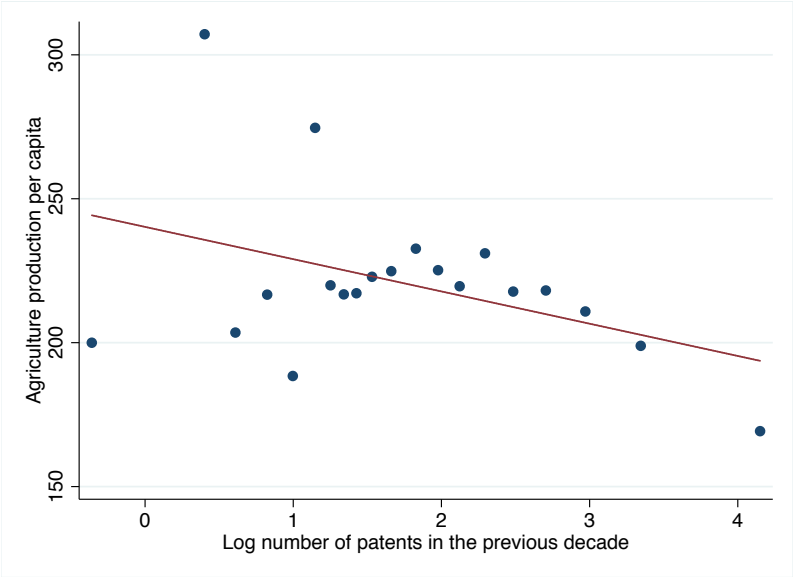
Notes: Figure 6 displays unstandardized coefficients on the indicator of having below 6,000 population in 1880 for various outcomes $Y_{i,s}$ (production, capital and number of establishments/farms) from the regression $Y_{i,s} = \alpha + \beta 1(pop < 6,000)_{i,s} + \Delta pop_{i,s} + \gamma_s + \epsilon_{i,s}$ for town i in state s. The darkest shades represent 90% confidence intervals and the lightest shades represent 99% confidence intervals.

Figure 7: Production per capita and Innovation

(A): Manufacturing production per capita and log number of patents

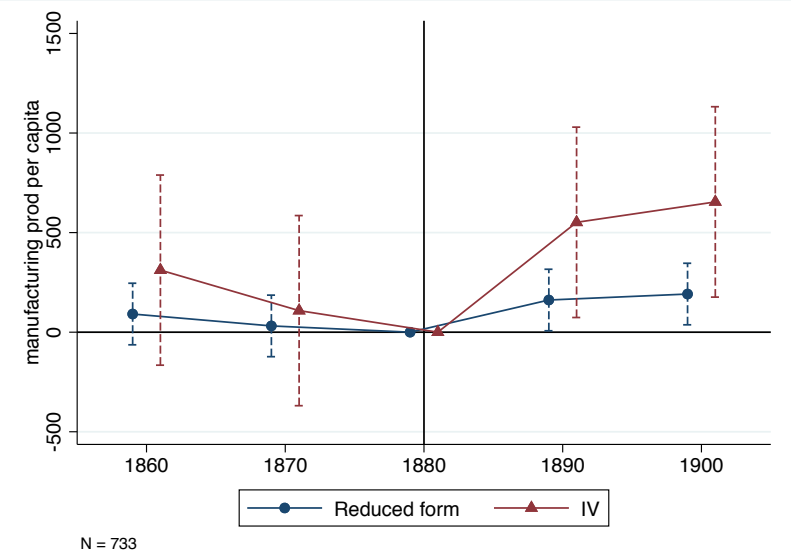


(B): Agriculture production per capita and log number of patents



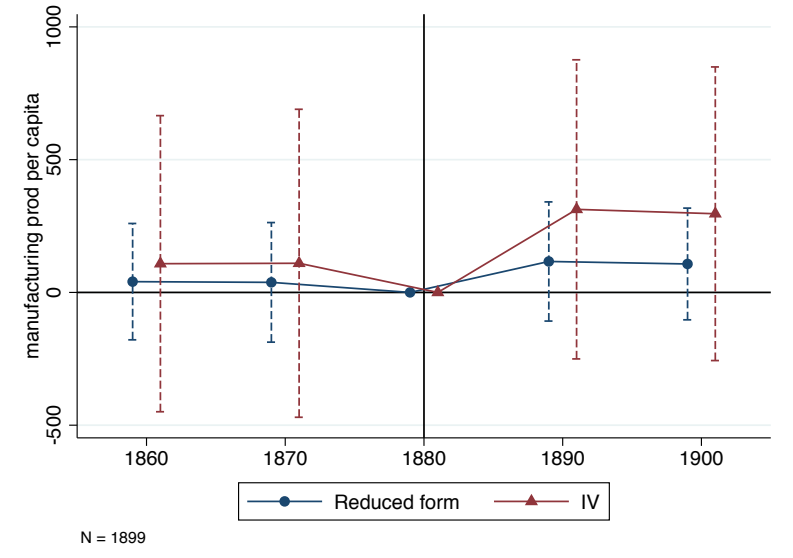
Notes: Figure 7 presents binscatter plots between manufacturing/agriculture production per capita in 1860-1900 census and log number of patents per county in the previous decade. The plots control for total county population, as well as state-year fixed effects.

Figure 8: Persistent Positive Effect on Manufacturing Production



Notes: Figure 8 shows the dynamic diff-in-diff coefficients for the reduced form and the IV estimates of the effect of having a national bank on county-level manufacturing production value. The specification for the IV estimates is $Y_{ist} = \sum_k \beta_k \widetilde{\mathbb{1}}(\text{National Bank}) \times \mathbb{1}_{\{year=k\}} + \sum_k \gamma_k X' \times \mathbb{1}_{\{year=k\}} + \eta_{st} + \alpha_i + \varepsilon_{it}$. 1880 is the omitted year, and the vertical bars represent the 95% confidence intervals.

Figure 9: Spillover Effect on Neighboring Counties



Notes: Figure 9 shows the dynamic diff-in-diff coefficients for the reduced form and the IV estimates of the effect of having a national bank on neighboring counties' manufacturing production value. The specification for the IV estimates is $Y_{ist} = \sum_k \beta_k \widetilde{\mathbb{1}}(\text{National Bank}) \times \mathbb{1}_{\{year=k\}} + \sum_k \gamma_k X' \times \mathbb{1}_{\{year=k\}} + \eta_{st} + \alpha_i + \varepsilon_{it}$. 1880 is the omitted year, and the vertical bars represent the 95% confidence intervals.

Table 1: Comparison of National Banks and State Banks

	State banks	**National banks**
Notes	various backing	backed 110% by federal bonds → uniform value
Capital requirement	low	high → more costly to establish
Monitoring	2 reports/year to state	5 reports/year to OCC → more oversight
Stability	2.5% failure rate	0.25% failure rate → more stable
Lending	no restrictions	high restrictions → less lending to farms

Notes: Table 1 lists key distinctions between national banks and state banks. Bank failure rates are calculated for the period between 1875 and 1890.

Table 2: Summary Statistics

Variable	$\text{Pop}_{1880} \in [4000, 6000]$		$\text{Pop}_{1880} \in (6000, 8000]$	
	Mean	Std. Dev.	Mean	Std. Dev.
Average No. of national banks (1885)	0.4	0.9	0.7	2
Average No. of other financial institutions (1885)	1.1	2.4	1.4	3.2
Average capital (1884, in thousands)	87	48	170	175
Leverage (1884)	3.2	1.0	3.6	1.6
Bank notes per capita (1884)	12.5	10.3	13.6	13.8
Loans per capita (1884)	46.9	35.5	70.3	51.5
Deposit per capita (1884)	37.2	30.3	46.8	31.5
County-level per capita changes (1880:1890):				
Δ Manufacturing production	72.9	163.6	135.6	528.2
Δ Manufacturing inputs	.6	100.6	61.2	445.1
Δ Manufacturing capital	206.4	179.9	284	308.8
Δ Agricultural production	-25.8	35.1	-23.6	23.3
Δ Agricultural fixture value	-136.5	207.1	-92.70	199.8
Δ Fertilizers expenditure	0.3	1.0	0.2	1.1
Δ Commission Merchants (Town-level, 1875-1887)	0	0.52	-0.27	0.93
Δ Architects(Town-level, 1875-1887)	0.26	0.60	0.41	0.67
% Δ Buyers and Shippers (County-level, 1880-1900)	0.89	1.19	0.60	0.73
% Δ Architects(County-level, 1880-1900)	0.75	1.13	0.99	1.68
% Δ Patents(County-level, 1870s-1880s)	0.53	0.72	1.25	3.12
Number of Observations	126		22	

Notes: Table 2 presents descriptive statistics of conditions of national bank in the sample as well as main variables used in the paper. Number of national banks and other financial institutions are obtained from the *Banker's Almanac and Register* of 1885, and bank balance sheet data is from the Annual Report of the Comptroller of Currency in 1884. County-level per capita changes in manufacturing and agricultural sector outcomes are calculated from the decennial Census of Manufacturers and Census of Agriculture in 1880 and 1890. Outcomes are scaled by number of male population above age 21. Town-level changes in the number of commission merchants and architects are calculated from the *Zell's Classified United States Business Directory* in 1875 and 1887. County-level percentage changes in buyers and shippers, and architects are calculated from the full-count census in 1880 and 1900. Percentage changes the number of patents are calculated from historical patent data assembled by Petralia et al. (2016).

Table 3: Pre-period covariate balance

Panel A: Covariate balance

	All	Pop in [4k,6k]	Pop in (6k,8k]	Diff
Population in 1870	3970.9	3881.3	4484.1	602.8*
	(1095.4)	(1032.5)	(1315.0)	(0.02)
Population in 1880	5059.9	4743.6	6871.5	2128.0***
	(924.6)	(526.9)	(541.4)	(0.00)
Δ Population(1870:1880)	1089.0	862.2	2387.5	1525.2***
	(1182.6)	(1055.7)	(1039.8)	(0.00)
No. of state banks in 1876	0.6	0.6	0.8	0.2
	(1.0)	(1.0)	(1.0)	(0.49)
No. of railroads (1875)	4.4	4.5	3.9	-0.5
	(2.7)	(2.6)	(3.0)	(0.39)
No. of railroads (1880)	5.2	5.3	4.6	-0.7
	(2.9)	(2.8)	(3.2)	(0.31)
Log market access cost (1870)	15.8	15.8	15.8	-0.1
	(0.5)	(0.5)	(0.5)	(0.53)
N	148	126	22	148

Panel B: Covariate balance (census outcomes in 1880)

	All	Pop in [4k,6k]	Pop in (6k,8k]	Diff
Manufacturing, production (1880)	625.5	613.4	694.6	81.1
	(458.2)	(445.7)	(530.7)	(0.45)
Manufacturing, capital (1880)	372.4	369.0	391.9	22.9
	(278.6)	(277.0)	(293.8)	(0.72)
Manufacturing, establishments (1880)	23.9	24.2	22.2	-2.0
	(8.5)	(8.2)	(10.0)	(0.30)
Agriculture, production (1880)	148.4	152.3	126.5	-25.8
	(89.8)	(91.9)	(74.9)	(0.22)
Agriculture, capital (1880)	31.7	32.6	26.5	-6.1
	(19.2)	(19.6)	(16.3)	(0.17)
Agriculture, establishments (1880)	230.1	232.9	213.8	-19.1
	(126.6)	(127.5)	(122.7)	(0.51)
N	148	126	22	148

Panel C: Covariate balance (census outcomes in 1870)

	All	Pop in [4k,6k]	Pop in (6k,8k]	Diff
Manufacturing, production (1870)	662.7	666.7	640.3	-26.3
	(500.9)	(511.4)	(446.7)	(0.82)
Manufacturing, capital (1870)	347.4	349.9	333.1	-16.8
	(273.7)	(281.7)	(228.1)	(0.79)
Manufacturing, establishments (1870)	30.4	31.0	26.8	-4.2
	(11.5)	(11.1)	(13.5)	(0.11)
Agriculture, production (1870)	230.4	237.4	191.2	-46.1
	(133.7)	(135.4)	(118.6)	(0.14)
Agriculture, capital (1870)	37.3	38.8	28.6	-10.2
	(24.9)	(25.4)	(19.8)	(0.08)
Agriculture, establishments (1870)	220.2	222.2	208.7	-13.5
	(125.1)	(124.0)	(133.4)	(0.64)
N	147	125	22	147

Notes: Table 3 compares the average characteristics of towns above versus below the 6,000 cutoff in or before 1880. The first column shows the means (and standard deviations in parentheses) for each variable for All towns in our sample. The second and third columns restrict the sample to places with 4,000 to 6,000 population in 1880 census and 6,000 to 8,000, respectively. The last column shows the differences in means (and p-values in parentheses) on balance t-tests between the two samples. All values for census outcomes are per-capita based on the male population above age 21. * p<0.1, ** p<0.05, *** p<0.01.

Table 4: First Stage Regressions

Panel A: First stage regressions

	1(National Bank)	
	(1)	(2)
1(pop<6k)	0.305***	0.286***
	(0.104)	(0.0997)
Δ Pop(1870:1880)	0.000135***	0.000133***
	(0.0000354)	(0.0000341)
No. of railroads (1875)		-0.00349
		(0.0159)
No. of state banks (1876)		0.137***
		(0.0398)
State FE	Y	Y
Adj. R^2	0.229	0.289
N	148	148

Panel B: First stage: alternative cutoffs

	(1) 5000	(2) 5500	(3) 6000	(4) 6500	(5) 7000
Population Cutoff	0.0646	0.103	**0.305*** **	0.219*	0.209
	(0.0729)	(0.0922)	(0.104)	(0.113)	(0.147)
State FE	Y	Y	Y	Y	Y
Δ Pop control	Y	Y	Y	Y	Y
Adj. R^2	0.180	0.183	0.229	0.199	0.188
N	148	148	148	148	148

Notes: Panel A of Table 4 presents results from the first stage regressions: $x_t = \alpha + \beta * 1(\text{Pop1880} < 6000) + Z_t + \epsilon_t$ where x_t is either an indicator of gaining at least one national bank, or the number of national banks. Panel B presents results of the first stage regression using indicator of having at least one national banks in 1885 as dependent variable, and various population cutoffs as the RHS variable. * p<0.1, ** p<0.05, *** p<0.01.

Table 5: National Banks and Local Agricultural Sector (1880-1890)

Panel A: Changes in agricultural production outputs per capita

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
𝕀(National Bank)	-11.36	-3.316			-9.331	3.708
	(7.140)	(7.816)			(19.33)	(24.90)
𝕀(pop<6k)			-4.097	1.253		
			(9.396)	(9.280)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	-25.48	-25.48	-25.48	-25.48	-25.48	-25.48
Std. Dev. of Dep. Var.	33.54	33.54	33.54	33.54	33.54	33.54
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Panel B: Changes in farmland value per capita

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
𝕀(National Bank)	12.46	-4.666			37.25	32.21
	(32.40)	(35.33)			(87.91)	(112.7)
𝕀(pop<6k)			16.36	10.89		
			(42.25)	(41.91)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	-130.0	-130.0	-130.0	-130.0	-130.0	-130.0
Std. Dev. of Dep. Var.	205.9	205.9	205.9	205.9	205.9	205.9
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Panel C: Changes in expenditure on fertilizers per capita

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
1(National Bank)	0.269	0.0279			0.185	-0.164
	(0.243)	(0.270)			(0.659)	(0.860)
1(pop<6k)			0.0812	-0.0554		
			(0.319)	(0.321)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	0.276	0.276	0.276	0.276	0.276	0.276
Std. Dev. of Dep. Var.	1.030	1.030	1.030	1.030	1.030	1.030
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Notes: Table 5 presents results from OLS, reduced form, as well as IV estimates. Dependent variable is changes in agricultural production, value of farmland and fixtures (fences and buildings), and expenditure on fertilizers per capita between 1880 and 1890. Control variables include number of state banks in a town as of 1876, as well as number of railroads in 1880. Regressions are weighted by share of town population in the sample in 1880.* p<0.1, ** p<0.05, *** p<0.01.

Table 6: National Banks and the Shift in Agricultural Production

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
𝕀(National Bank)	-0.0167*	-0.0247**			**-0.0710*** **	**-0.102*** **
	(0.00856)	(0.00949)			(0.0267)	(0.0375)
𝕀(pop<6k)			-0.0312***	-0.0345***		
			(0.0110)	(0.0111)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Fractions in 1880	0.0943	0.0943	0.0943	0.0943	0.0943	0.0943
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Notes: Table 6 presents results from the OLS, reduced form, and IV estimates of the effects of national banks on changes in the fractions of non-traded crops to total crops measured in bushels between 1880 and 1890. All columns include town population changes between 1870 and 1880 as a control variable. Additional control variables include the number of state banks in town as of 1876 and number of railroads as of 1880. Regressions are weighted by share of town population in the sample in 1880. * p<0.1, ** p<0.05, *** p<0.01.

Table 7: National Banks and Local Business (Town-Level)

Panel A: Changes in the number of commission merchants

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
𝕀(National Bank)	0.0624	0.189			**1.278****	**1.447****
	(0.137)	(0.141)			(0.624)	(0.650)
𝕀(pop<6k)			0.390**	0.413***		
			(0.159)	(0.156)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Average No. in 1875	0.135	0.135	0.135	0.135	0.135	0.135
N	148	148	148	148	148	148
KP F-stat					8.676	8.212

Panel B: Changes in the number of architects (placebo test)

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
𝕀(National Bank)	0.0126	0.0302			0.193	0.201
	(0.119)	(0.125)			(0.427)	(0.453)
𝕀(pop<6k)			0.0590	0.0573		
			(0.142)	(0.142)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Average No. in 1875	0.00676	0.00676	0.00676	0.00676	0.00676	0.00676
N	148	148	148	148	148	148
KP F-stat					8.676	8.212

Notes: Table 7 presents results from the OLS, reduced form, and IV estimates of the effect of national banks entries on changes in number of trade-related business (commission merchants) and local-oriented business (architects). Changes are from 1875 to 1887. All columns include town population changes between 1870 and 1880 as a control variable. Additional control variables include the number of state banks in town as of 1876 and number of railroads as of 1875. Regressions are equal-weighted. * p<0.1, ** p<0.05, *** p<0.01.

Table 8: National Banks and Local Business (County-Level)

Panel A: Percentage changes in share of buyers and shippers

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
1(National Bank)	-0.213	-0.158			1.583*	1.727*
	(0.261)	(0.274)			(0.835)	(0.883)
1(pop<6k)			0.556**	0.574**		
			(0.269)	(0.270)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	0.850	0.850	0.850	0.850	0.850	0.850
Std. Dev. of Dep. Var.	1.139	1.139	1.139	1.139	1.139	1.139
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Panel B: Percentage changes in share of architects (placebo)

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
1(National Bank)	-0.0157	0.123			-0.548	-0.478
	(0.305)	(0.314)			(0.839)	(0.870)
1(pop<6k)			-0.192	-0.159		
			(0.319)	(0.315)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	0.788	0.788	0.788	0.788	0.788	0.788
Std. Dev. of Dep. Var.	1.221	1.221	1.221	1.221	1.221	1.221
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Notes: Table 8 presents results from the OLS, reduced form, and IV estimates. Dependent variables in Panel A and B are percentage changes in shares of buyers and shippers, and architects, among males above 21 years old from 1880 census to 1900 census, respectively. All columns include town population changes between 1870 and 1880 as a control variable. Additional control variables include the number of state banks in town as of 1876 and number of railroads as of 1880. Regressions are weighted by share of town population in the sample in 1880. * p<0.1, ** p<0.05, *** p<0.01.

Table 9: Price Levels and Existence of National Banks

	(1) Price of Tea	(2) Price of Molasses	(3) Price of Starch
$\mathbb{I}$(National Bank)	**-0.294*** **	**-0.250*** **	-0.0105
	(0.0844)	(0.0651)	(0.00775)
Year FE	Y	Y	Y
Pre-NB Mean	1.238	1.120	0.120
N	115	105	117
Adj. R^2	0.229	0.350	0.147

Notes: Table 9 presents results from estimating $P_{it} = \alpha + \beta 1(\text{National Bank})_{it} + \gamma_t + \varepsilon_{it}$ for tea, New Orleans molasses, and starch in 9 towns over 1864 to 1880. The first years of having at least one national bank in these town range from 1866 to 1878. Standard errors are clustered by year. *** p<0.01, ** p<0.05, * p<0.1.

Table 10: National Banks and Growth in Manufacturing Production

Panel A: Changes in manufacturing production per capita

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
𝕀(National Bank)	39.87	57.43			**228.5****	**310.0****
	(32.97)	(36.16)			(100.4)	(136.0)
𝕀(pop<6k)			100.4**	104.8**		
			(42.28)	(42.29)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	82.21	82.21	82.21	82.21	82.21	82.21
Std. Dev. of Dep. Var.	251.2	251.2	251.2	251.2	251.2	251.2
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Panel B: Changes in manufacturing production per capita — subsamples

	OLS	RF	IV	OLS	RF	IV
	(1)	(2)	(3)	(4)	(5)	(6)
1(National Bank)	56.13		312.0**	76.35*		386.3**
	(39.56)		(123.2)	(38.64)		(171.1)
1(pop<6k)		140.0***			114.9**	
		(50.78)			(44.38)	
State FE	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y
Same Treatment in County	Y	Y	Y			
Excluding CA and PA				Y	Y	Y
Mean of Dep. Var.	98.33	98.33	98.33	80.44	80.44	80.44
Std. Dev. of Dep. Var.	260.4	260.4	260.4	258.6	258.6	258.6
N	123	123	123	139	139	139
KP F-stat			12.55			7.987

Notes: Table 10 presents results from OLS, reduced form, as well as IV estimates. Dependent variable is changes in manufacturing production per capita between 1880 and 1890. All columns include town population changes between 1870 and 1880 as a control variable. Additional control variables include the number of state banks in town as of 1876 and number of railroads as of 1880. Regressions are weighted by share of town population in the sample in 1880. In Panel B, Column 1-3 report results on counties where either all towns in sample are above or below the 6,000 cutoff. Column 4-6 report results on all states except for California and Pennsylvania. * p<0.1, ** p<0.05, *** p<0.01.

Table 11: National Banks and Growth in Manufacturing Inputs, Employment, and Capital

Panel A: Changes in manufacturing inputs per capita

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
𝕀(National Bank)	27.01	34.75*			**153.5*** **	**205.4** **
	(18.41)	(20.53)			(58.61)	(81.69)
𝕀(pop<6k)			67.40***	69.40***		
			(23.43)	(23.83)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	9.643	9.643	9.643	9.643	9.643	9.643
Std. Dev. of Dep. Var.	193.3	193.3	193.3	193.3	193.3	193.3
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Panel B: Changes in manufacturing employment per capita

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
1(National Bank)	0.0194	0.0351*			0.113**	0.164**
	(0.0188)	(0.0209)			(0.0557)	(0.0760)
1(pop<6k)			0.0494**	0.0555**		
			(0.0242)	(0.0245)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	0.0740	0.0740	0.0740	0.0740	0.0740	0.0740
Std. Dev. of Dep. Var.	0.0868	0.0868	0.0868	0.0868	0.0868	0.0868
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Panel C: Changes in manufacturing capital per capita

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
𝕀(National Bank)	2.508	44.01			55.86	132.0
	(37.18)	(41.16)			(101.5)	(133.1)
𝕀(pop<6k)			24.53	44.62		
			(48.42)	(48.90)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	218.0	218.0	218.0	218.0	218.0	218.0
Std. Dev. of Dep. Var.	204.7	204.7	204.7	204.7	204.7	204.7
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Notes: Table 11 presents results from OLS, reduced form, as well as IV estimates. Dependent variable is changes in manufacturing inputs, employment, and capital per capita between 1880 and 1890. All columns include town population changes between 1870 and 1880 as a control variable. Additional control variables include the number of state banks in town as of 1876 and number of railroads as of 1880. Regressions are weighted by share of town population in the sample in 1880.* p<0.1, ** p<0.05, *** p<0.01.

Table 12: National Banks and Local Innovation Activity

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
𝕀(National Bank)	0.350*	0.422**			**1.049****	**1.393****
	(0.180)	(0.203)			(0.516)	(0.702)
𝕀(pop<6k)			0.461*	0.471*		
			(0.235)	(0.241)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	0.640	0.640	0.640	0.640	0.640	0.640
Std. Dev. of Dep. Var.	1.379	1.379	1.379	1.379	1.379	1.379
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

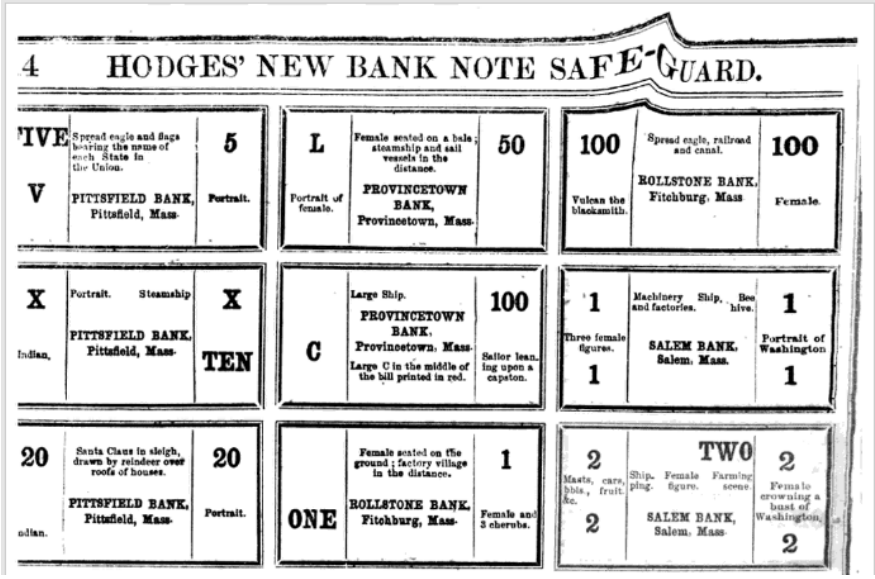
Notes: Table 12 presents results from the OLS, reduced form, and IV estimates of the effects of national banks on county-level innovation activity. Dependent variable is percentage change in total number of patents from the decade of 1870s(1871 to 1880) to the decade of 1880s(1881 to 1890) per county. All columns include town population changes between 1870 and 1880 as a control variable. Additional control variables include the number of state banks in town as of 1876 and number of railroads as of 1880. Regressions are weighted by share of town population in the sample in 1880. * p<0.1, ** p<0.05, *** p<0.01.

Appendix A: Figures and Tables

Figure A.1: Bank note from the Pittsfield Bank in Massachusetts

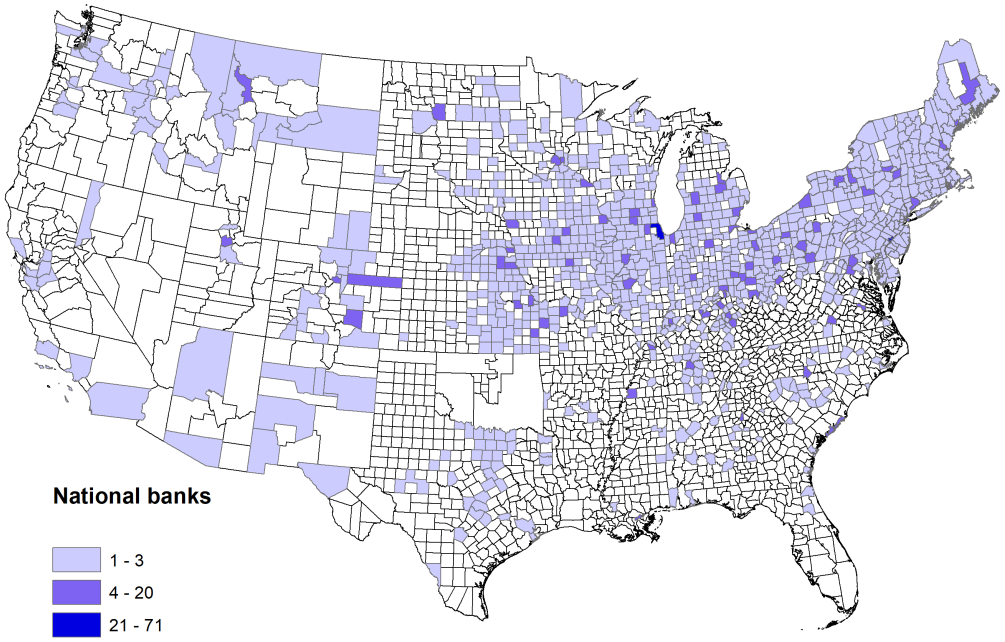
(A): Bank note from the Pittsfield Bank in Massachusetts

(B): Page from Hodges' New Bank Note Safe-Guard



Notes: Figure A.1(A) gives an example of a private banknote that was printed in 1853. The note is for twenty dollars, redeemable for specie at the Pittsfield bank. Figure A.1(B) displays an page from the *Hodges' New Bank Note Safe-Guard*, first published in 1859. It is an example of one of the many publications dedicated in helping merchants and brokers to detect counterfeit bank notes. It describes the physical appearance of over 10,000 bank notes, "embracing every genuine note issued in the United States and Canada." The description for the Pittsfield bank $20 note from figure A.1(A) is shown in the bottom row of the first column and accurately describes the note.

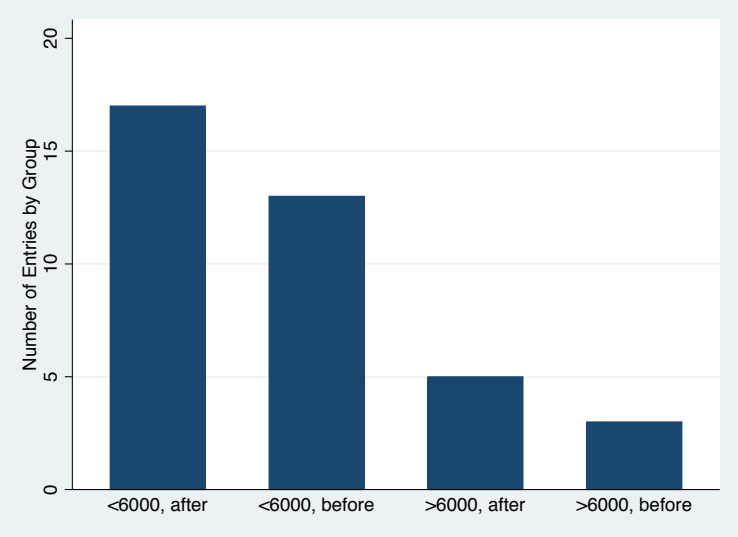
Figure A.2: Distribution of national banks in 1885



Notes: Figure A.2 plots the location distribution of all national banks as of 1885. Each area represents a county. The white areas did not have a national bank as of 1885, and the lighter to darker shades represent 1-3, 4-20, and 21 or more national banks within the county.

Figure A.3: Timing of Entry

(A): New National Banks in Sample



(B): All New National Banks between 1876 and 1884

Notes: Panel A of Figure A.3 shows number of new national banks in our main sample before or after census publication year, and whether population in 1880 census crossed the 6,000 threshold. Panel B shows coefficients and standard error bars of coefficients on year dummy variables from the following regression: $NumberNewBanks_{s,y} = \beta_y * 1(year = y) + \gamma_s * 1(state = s) + \epsilon_{s,y}$.

Table A.1: Alternative Sample Periods for First Stage Regressions

	1(National Bank)	
	(1)	(2)
1(pop<6k)	0.185**	0.274***
	(0.0904)	(0.0848)
Δ Pop(1870:1880)	0.000109***	0.000116***
	(0.0000330)	(0.0000299)
State FE	Y	Y
Start Year	1873	1877
End Year	1883	1887
N	155	147

Notes: A.1 presents first stage results with alternative sample periods. The first column shows national bank entry likelihood between 1873 and 1883, and the second between 1877 and 1887. In both samples, town population was below 6,000 in 1870, and between 4,000 and 8,000 in 1880. Additionally, there was no national bank as of the start year (1873 and 1877, respectively).

Table A.2: Alternative Samples for First Stage Regressions

Panel A: National Bank Entries and Town Population (2,000 to 10,000)

	1(National Bank)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1(pop<6k)			0.134	0.342***	0.331***	0.356***	0.240***
			(0.0831)	(0.0795)	(0.0708)	(0.0736)	(0.0669)
Population in 1880	0.0000365***		0.0000476***	0.000179***		0.000137***	
	(0.00000979)		(0.0000120)	(0.0000161)		(0.0000168)	
Population in 1870				-0.000175***		-0.0000947***	
				(0.0000155)		(0.0000171)	
Δ Pop(1870:1880)		0.000146***			0.000177***		0.000117***
		(0.0000132)			(0.0000146)		(0.0000160)
State FE						Y	Y
N	826	826	826	826	826	826	826

Panel B: National Bank Entries and Town Population (3,000 to 9,000)

	1(National Bank)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1(pop<6k)			0.0571	0.229**	0.298***	0.361***	0.294***
			(0.115)	(0.108)	(0.0861)	(0.106)	(0.0835)
Population in 1880	0.0000141		0.0000234	0.000147***		0.000156***	
	(0.0000196)		(0.0000271)	(0.0000294)		(0.0000309)	
Population in 1870				-0.000174***		-0.000130***	
				(0.0000220)		(0.0000254)	
Δ Pop(1870:1880)		0.000135***			0.000168***		0.000136***
		(0.0000193)			(0.0000214)		(0.0000246)
State FE						Y	Y
N	333	333	333	333	333	333	333

Panel C: Population Cutoff and Presence of National Banks

	1(National Bank in 1875)		1(National Bank)	
	(1)	(2)	(3)	(4)
1(pop<6k)	-0.194*	-0.186***	-0.0747	-0.0629
	(0.105)	(0.0662)	(0.108)	(0.0681)
Population in 1880	-0.0000903**		-0.00000662	
	(0.0000449)		(0.0000462)	
Population in 1870	0.0000860***		0.000000177	
	(0.0000264)		(0.0000271)	
Δ Pop(1870:1880)		-0.0000867***		-0.00000126
		(0.0000252)		(0.0000260)
State FE	Y	Y	Y	Y
Adj. R^2	0.311	0.314	0.243	0.245
N	341	341	341	341

Notes: Panel A and B of Table A.2 presents first stage results with alternative population ranges around the 6,000 cutoff. Panel A uses the sample where 1880 population $\in [2,000, 10,000]$ and Panel B uses the sample where 1880 population $\in [3,000, 9,000]$ Panel C expands the main sample (population in 1880 $\in [4,000, 8,000]$ and population in 1870 $< 6{,}000$) by adding towns already had national banks as of 1875.

Table A.3: National Banks and Local Business (County-Level) – Placebo Tests

Panel A: Percentage changes in share of doctors

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
1(National Bank)	-0.0113	0.0147			0.0654	0.0872
	(0.0323)	(0.0329)			(0.0899)	(0.0918)
1(pop<6k)			0.0229	0.0290		
			(0.0338)	(0.0330)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	-0.132	-0.132	-0.132	-0.132	-0.132	-0.132
Std. Dev. of Dep. Var.	0.154	0.154	0.154	0.154	0.154	0.154
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Panel B: Percentage changes in share of teachers

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
1(National Bank)	0.0305	-0.0278			-0.0400	-0.0835
	(0.0795)	(0.0816)			(0.217)	(0.224)
1(pop<6k)			-0.0140	-0.0278		
			(0.0832)	(0.0820)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	-0.0513	-0.0513	-0.0513	-0.0513	-0.0513	-0.0513
Std. Dev. of Dep. Var.	0.417	0.417	0.417	0.417	0.417	0.417
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Notes: Table A.3 presents results from the IV estimates as well as reduced form estimates. Dependent variables in Panel A and B are percentage changes in shares of doctors and teachers among males above 21 years old from 1880 census to 1900 census, respectively. Regressions are weighted by share of town population in the sample in 1880. * p<0.1, ** p<0.05, *** p<0.01.

Table A.4: Robustness Tests: National Banks and Growth in Manufacturing Production

Panel A: Scaling production by male labor between 18-44 in age

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
1(National Bank)	63.12	89.92*			375.2***	509.7**
	(45.77)	(50.25)			(145.4)	(200.3)
1(pop<6k)			164.8***	172.2***		
			(58.27)	(58.34)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	108.0	108.0	108.0	108.0	108.0	108.0
Std. Dev. of Dep. Var.	320.1	320.1	320.1	320.1	320.1	320.1
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Panel B: Inflation-adjusted manufacturing production per capita

	OLS	RF	IV	OLS	RF	IV
	(1)	(2)	(3)	(4)	(5)	(6)
1(National Bank)	52.66		254.9**	81.31*		421.4**
	(35.57)		(127.1)	(48.69)		(183.1)
1(pop<6k)		86.14**			142.4**	
		(41.86)			(56.98)	
State FE	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y
Scaled by Males above 21yrs	Y	Y	Y			
Scaled by Males between 18-44yrs				Y	Y	Y
Mean of Dep. Var.	151.0	151.0	151.0	201.5	201.5	201.5
Std. Dev. of Dep. Var.	252.9	252.9	252.9	318.1	318.1	318.1
N	148	148	148	148	148	148
KP F-stat			10.68			10.68

Notes: Table A.5 presents results from OLS, reduced form, as well as IV estimates. Dependent variable is changes in manufacturing production per capita between 1880 and 1890. Control variables include number of state banks in a town as of 1876, as well as number of railroads in 1880. Regressions are weighted by share of town population in the sample in 1880. * p<0.1, ** p<0.05, *** p<0.01.

Table A.5: Placebo Test: National Banks and Local Manufacturing Sector (1870-1880)

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
1(National Bank)	-48.69	-32.18			-61.85	-51.20
	(39.71)	(41.69)			(140.4)	(148.9)
1(pop<6k)			-18.97	-14.69		
			(47.49)	(47.37)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	-36.30	-36.30	-36.30	-36.30	-36.30	-36.30
Std. Dev. of Dep. Var.	217.9	217.9	217.9	217.9	217.9	217.9
N	147	147	147	147	147	147
KP F-stat					8.686	8.215

Notes: Table A.5 presents results from OLS, reduced form, as well as IV estimates. Dependent variable is changes in manufacturing production per capita between 1870 and 1880. Control variables include number of state banks in a town as of 1876, as well as number of railroads in 1880. Regressions are weighted by share of town population in the sample in 1870. * p<0.1, ** p<0.05, *** p<0.01.

Table A.6: Placebo Test: National Banks and Local Innovation Activity (1870-1880)

	OLS		RF		IV	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{I}$(National Bank)	-0.781	-1.094**			-0.502	-0.849
	(0.489)	(0.548)			(1.325)	(1.743)
$\mathbb{I}$(pop<6k)			-0.220	-0.287		
			(0.644)	(0.661)		
State FE	Y	Y	Y	Y	Y	Y
Controls	N	Y	N	Y	N	Y
Mean of Dep. Var.	0.793	0.793	0.793	0.793	0.793	0.793
Std. Dev. of Dep. Var.	1.982	1.982	1.982	1.982	1.982	1.982
N	148	148	148	148	148	148
KP F-stat					15.74	10.68

Notes: Table A.6 presents results from OLS, reduced form, as well as IV estimates. Dependent variable is percentage change in total number of patents between 1860s(1861-1870) and 1870s(1871-1880). Control variables include number of state banks in a town as of 1876, as well as number of railroads in 1880. Regressions are weighted by share of town population in the sample in 1870. * p<0.1, ** p<0.05, *** p<0.01.

B Supplementary notes on the first stage results

B.1 First stage regressions in alternative samples

We choose the 4,000 to 8,000 population range in order to obtain a sample of towns that are largely comparable and hence less likely to be subject to omitted variable bias. The first stage regressions are robust and more statistically significant with wider population ranges. In Panel A and B of Table A.2, we present first stage regression results for 1880 population between 2,000 and 10,000, as well as between 3,000 and 9,000 in 1880, respectively. In both cases, having fewer than 6,000 population is strongly associated with the likelihood of obtaining a national bank once we control for population levels or changes.

In Panel C of Table A.2, we expand our main sample to include all towns that already had a national bank as of 1875. The first two columns suggest that when all of these towns faced lower entry cost in the 1870s, smaller towns were less likely to obtain a national bank. Column (3) and (4) show that our 1880 population cutoff is not correlated with the *existence* of national bank in 1885. This is likely due to state bank conversions—larger towns were more likely to have state banks and subsequently more national banks converted from those state banks. This force operates in the opposite direction as the instrument. Although state banks usually had much lower capital requirements than $50,000, in reality they often operated with much larger capital (Knox, 1900), and the conversion to national bank charters was minimally constrained by the capital requirement defined in the National Banking Act. We therefore focus on the changes in access to national banks by studying the towns with no national bank as of 1875.

B.2 Timing of entry

National banks were allowed to maintain the capital levels as of the time of their charter, so one particular endogeneity concern is that banks could accurately forecast economic and population growth, and would rush to obtain a charter before the 1880 census was published. For example, a town with population below 6,000 in 1870 correctly anticipateed that it would cross the population threshold in 1880 and established a bank in 1879, before population in census was updated. This behavior of "racing the census" would bias the OLS estimates upward because the bank entry would be correlated with the outcomes. However, it would actually weaken the first stage and the reduced form relationship in the instrument.

In addition, we empirically correlate the new national bank entries to the years around the new census publication. First we compare new national bank entries right before the

1880 census in our sample of towns, and then we look at the towns in the entire country. Figure A.3 presents the results. In Panel A, we compare number of new national bank entries by population in 1880 census for the towns in our sample. The first and third bars shows the number of new entries right after the new census was published, and the second and fourth bars shows the number of new entries right before it. For towns below the threshold, there is more entry, which is consistent with our first stage results. For both population groups, more entry occurred *after* the new census was published rather than before.

In Panel B, we look at national bank entry in the entire country. We present coefficients on year dummy variables from the following equation:

$$NumberNewBanks_{s,y} = \beta_y * 1(year = y) + \gamma_s * 1(state = s) + \epsilon_{s,y}, \tag{5}$$

and compare the coefficients relative to 1880. The result also show that there was no spike in entry before the new census and that in fact, more new national banks established after 1881 than before. The empirical evidence suggests that there was no census racing behavior.

In fact, our first stage results are robust to selecting any year ranges that starts prior to the 1880 census and ends in the 1880s. We choose the range from 1875 to 1885 to capture a relatively stable time period in terms of economic activities and relative growth in national and state banks.

C Additional historical context

C.1 Banking system before the National Banking Act

The idea of establishing a unified banking system across the United States was several decades earlier than the passage of the National Banking Act. The First Bank of the United States, charted for a term of twenty years by the Congress on February, 1791, operated in Philadelphia and was the nation's *de facto* central bank. Alexander Hamilton, the first Secretary of the Treasury, believed a national bank was necessary to stabilize and improve the nation's credit, and proposed federal mint as common currency. However, the bank faced widespread resistance due to concerns of expanding federal power, which was famously led by the Secretary of State Thomas Jefferson. The bank charter was not renewed and expired in 1811.

In 1816, the Second National Bank started operation with similar functions as the First Bank of the United States. As of 1832, the Second National Bank operated more than 30 branches nationwide. However, the political clashes over the power of a national bank system eventually led to failure of its charter renewal in 1836, which marked the beginning of the Free Banking Era.

C.2 Additional evidence of bank debt illiquidity in the Free Banking Era

The large number of floating exchange rates created inconvenience in economic activity. For example, a case record compilation of the United States supreme court between 1843 and 1846 (Stephen K. Williams, 1901) contains a case regarding the value of a loan, and how its value had changed over time:

> [...] the defendant did [...] receive the amount of said loans from the plaintiffs in the bank notes of Virginia and of other States, which, [...] were depreciated considerably below the current value of the bank notes of this district [...]

The frictions stemmed from state bank notes illiquidity was especially detrimental to interstate transactions. As a contemporary traveler illustrated the magnitude of the cost in his diary (Dewey, 1910):

> Started from Virginia with Virginia money; reached the Ohio River; exchanged $20 Virginia note for shinplasters and a $3 note of the Bank of West Union
>
> [...] At Maysville wanted Virginia money; couldn't get it.

[...] reached Fredericktown; there neither Virginia nor Kentucky money current; paid a $5 Wheeling note for breakfast and dinner; received in change two $1 notes of some Pennsylvania bank, $1 Baltimore and Ohio Railroad, and balance in Good Intent shinplasters; 100 yards from the tavern door all notes refused. [...]