The Effects of Banking Competition on Growth and Financial Stability: Evidence from the National Banking Era*

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Abstract

How do restrictions on banking competition affect credit provision and economic output? And, how does it affect financial stability? To identify the causal effect of banking competition, we exploit a peculiarity of bank capital regulation in the National Banking Era: opening banks in towns with more than 6,000 inhabitants required twice the equity than below this threshold, thus leading to a locally exogenous variation of entry costs and competition. We construct a novel comprehensive data set comprising the annual balance sheets of national banks, and link it with the results of the decennial census. We show that initially, banks in cities with lower entry costs extend more credit and choose a higher leverage, leading to a local credit boom that is associated with an expansion in the local manufacturing industry. However, banks that are active in a market with lower entry cost are more likely to default or go out of business during a major financial crisis, the Panic of 1893. Altogether, our evidence suggests that banking competition leads to economic growth by inducing credit provision, but may increase the risk of financial instability by increasing bank risk-taking.

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1 Introduction

How does competition in banking affect credit provision and financial stability? And how does it affect real economic outcomes? Despite the importance of these questions to academics and policy makers, there is only limited consensus about their answers. In theory, it is equally plausible for competition among banks to increase or decrease credit provision and risk taking.[1] Therefore, the nature of the questions asked becomes necessarily empirical. However, identifying the causal effect of bank competition empirically is generally challenging and empirical analysis is often constrained by the fact that concentration and competition are typically not exogenous. Hence, absent ideal experiments, empirical studies for the U.S. focus mostly on the deregulation of branching restrictions and bank mergers (see, e.g., Jayaratne and Strahan, 1996, 1998; Black and Strahan, 2002; Dick and Lehnert, 2010; Jiang et al., 2016).

In this paper, we study the effects of banking competition on credit provision and risk taking during the National Banking Era. There are three main reasons why the National Banking Era constitutes a close to ideal laboratory to study the causal effects of banking competition. First, the absence of a central bank, of deposit insurance, and of any bailout prospects imply that banks' behavior is not distorted by the anticipation of government interventions. Second, the prevalence of unit banking ensures that banking markets are local, allowing to compare different, arguably independent markets. Finally, third, minimum capital requirements for national bank entrants give rise to local exogenous variation in the barriers of entry.

While contemporary capital regulation sets limits on banks' leverage, the National Banking Era's capital regulation was considerably different. Rather than specifying a minimum capital ratio relative to assets, as in typical contemporary regulatory frameworks, banks in this period faced a minimum amount of equity that shareholders needed to raise at the founding of a bank. Moreover, the stringency of the requirement varied with the legal population of a bank's location. For example, founding a bank in a town with at least 6,000 inhabitants required the partners of the bank to invest twice the minimum capital that was required in towns with less than 6,000 inhabitants. Hence, fairly similar local markets above and below this threshold had quite different minimum capital requirements for national banks to

[1] With respect to credit volumes, an increase in competition can cause bank credit to increase if deposit supply is upward sloping and loan demand downward sloping (Klein, 1971), but can contract credit if it reduces banks' incentives to invest in banking relationships (Petersen and Rajan, 1995). With respect to risk taking, competition may result in riskier banks if it gives banks incentives to take more risk if their charter values decline (Keeley, 1990; Matutes and Vives, 1996; Allen and Gale, 2004), or less risky banks if competition reduces loan rates and thus reduces moral hazard on the part of borrowers (Boyd and De Nicolo, 2005).

enter the market.

The regulatory requirement further determined that the increases in the required capital due to increases in the local population only applied to newly founded banks, but not to incumbent banks. This is particularly attractive from the viewpoint of identification as different behavior of incumbent banks across markets with different entry costs can only derive from changes in the requirements for new entrants and not from differential regulatory treatment of incumbents.[2] Hence, this allows us to isolate the change in bank behavior that stems from differences in the entry costs of competitors alone.

In order to conduct our analysis, we construct a novel data set that consists of all national bank balance sheets from 1871 throughout 1896. Given that the legally relevant population was determined by the most recent decennial census, a publication of the census induces a variation in the barriers to entry for all those towns that cross the 6,000 inhabitants threshold. We focus on the publication of the 1880 census as the source of variation in barriers to entry and compare outcomes in cities that start with less than 6,000 inhabitants in 1870 and subsequently cross this threshold with outcomes in cities that stayed below 6,000 inhabitants.

Being subject to higher barriers of entry after the census publication, however, may not be entirely exogenous. Mechanically, towns that crossed the threshold in 1880 either had a higher population in 1870, a higher growth rate between 1870 and 1880, or both. Hence, without additional controls, differences in outcomes might be driven by the same factors that pushed population above the threshold. We address this important concern in three ways. First, all regressions include controls for both the initial levels of population and for population growth. Second, we control for unobservable local economic conditions by adding county–level fixed effects (compare, e.g., Khwaja and Mian, 2008), comparing cities located in the same county and geographically close to each other, but subject to different entry costs. Third, we provide evidence that treated and non-treated cities are comparable among a number of observable characteristics, such as population and manufacturing growth prior to the publication of the census as well as railroad access.

Our analysis proceeds in three parts. First, we verify that towns that cross the threshold experience lower entry over the course of the next ten years, from 1881 to 1891, indicating that the barriers to entry are economically meaningful and affect the degree of local competition. We show that towns with exactly one national bank in 1881 and higher entry costs thereafter have an around 36% lower

[2]Differences in the required capital may for instance result in differences in the ownership structure, which in turn is an important determinant of bank governance (see, e.g., Calomiris and Carlson, 2016).

probability of an additional national bank entering the market. Entrants, however, also have the option of avoiding the regulatory requirements by entering the market under a non-national, state charter. When we consider the entry of state chartered institutions, we estimate that markets with higher entry costs have a higher chance of seeing an additional such institution entering. However, on net, markets with higher capital requirements for national banks have around 0.3 less banks of any type — in line with the notion that state banks and national banks are not perfect substitutes.

In the second part of the analysis, after establishing that the publication of the census predicts bank entry, we compare the behavior of incumbent national banks across the different types of markets. We start by considering indicators of credit availability. We document that, after the publication of the census and through the next 10 years, incumbent banks operating in less competitive markets increase their loans and deposits portfolio at a rate 22 percentage points lower than their peers in more competitive markets. Our results are therefore consistent with the idea that banks with more market power restrict rather than increase credit provision.

As the capital requirement served as a barrier to entry, our data also allows us to study whether differences in bank behavior are a response to actual entry or driven by the threat of potential entry. In particular, when studying the dynamics of the differences in credit provision across markets with different entry barriers, we find that credit provision decreases right after the publication in markets with higher barriers to entry. Given that actual additional entry only occurs after time has passed, we interpret this as an indication that incumbent banks attempt to deter banks from entering by increasing credit provision in their local market.

Considering risk taking behavior, we find that incumbent banks active in markets with higher entry barriers behaved in ways that suggest less risk taking. In particular, we show that the levels of equity relative to assets and relative to loans–the riskiest component of bank's assets–tended to be higher in areas with higher entry barriers. Higher ratios of equity to assets and loans suggest, assuming similar risk profiles of loan portfolios, that these banks were taking less risk. These suggestive findings are reinforced when considering other, ex-post measures of risk taking: We find that incumbent banks in more competitive cities tended to have more loans that went bad that resulted in the banks seizing the collateral associated with the loans.

In addition, we study bank failure rates during and after the Panic of 1893, one of the most severe financial shocks during the National Banking Era that was accompanied by a period of dismal economic performance. We find that the failure rates of incumbent banks were around 1 percentage point lower

for incumbents in the less competitive towns around the Panic, an economically significant effect given the unconditional default probability of 1.6%. Further, banks in less competitive markets are also less likely to voluntarily liquidate their business during times of financial distress, in line with theories of market power increasing charter value. More bad loans and higher failure rates are consistent with greater risk taking. Thus, we find that limits on entry and hence restraining competition tended to restrict credit provision but support financial stability.

Finally, in the third part of our analysis, we look at real economic outcomes. In particular, we investigate whether growth in manufacturing varied across markets with different barriers to entry. In line with exisitng findings that financial conditions matter for real economic outcomes (see, e.g., Peek and Rosengren, 2000; Chodorow-Reich, 2014; Benmelech et al., 2017), we find that additional credit provision by national banks led to real economic growth: Markets with higher barriers to national bank entry experience a 17 percentage points lower growth rate in manufacturing capital and 14 percentage point lower growth rate in manufacturing output between 1880 and 1890.

Altogether, our evidence suggests that charter values play an important role in determining bank behavior during the National Banking Era. As banks become more competitive, they choose to lend more and choose a more risky balance sheet. Importantly, however, while the more risky behavior results in larger bank failures, the associated credit boom translates into higher real economic growth. Hence, our results highlight that there is a trade-off between facilitating the expansion of credit that supports economic growth and financial stability.

The rest of the paper proceeds as follows: We review the related literature in Section 2, before describing our data set in more detail in Section 3. We then provide background on how we use the capital regulation during the National Banking Era to identify the causal effects of banking competition in Section 4. We then first study the effect on entry in Section 5, the effect in bank behavior in Section 6, and the effects in the real economy in Section 7, before Section 8 concludes.

2 Related Literature

The effect of competition on bank behavior has been studied extensively, although no ultimate consensus has emerged. Theoretical predictions are highly sensitive to the assumptions made about the nature of banking. With respect to credit availability and lending volume, an increase in competition will also increase the volume of loans and deposits whenever banks face upward-sloping deposit supply curves

and downward-sloping loan demand curves (Klein, 1971). However, if the nature of banking is more complex and the role of relationships is larger, the opposite may be true and competition among banks may decrease overall credit. For instance, if lending requires high initial monitoring efforts, competition will prevent banks from extracting future rents from borrowers, which might prevent lending altogether (see, e.g., Petersen and Rajan, 1995).[3]

Likewise, theory has ambiguous predictions with respect to risk taking. Competition potentially increases bank risk taking as it may decrease the charter value of banks and hence destroy the incentives of bankers to behave prudently. (see, e.g., Keeley, 1990; Allen and Gale, 2004).[4] Yet other theories predict that competition decreases the overall riskiness of bank lending as it induces lower interest rates, which in turn mitigates moral hazard concerns of bank borrowers (see, e.g., Koskela and Stenbacka, 2000; Boyd and De Nicolo, 2005).[5]

Given the sensitivity of theoretical predictions, empirical evidence becomes even more important. There is a number of key contributions that indicate that competition — while increasing the efficiency of bank management and bank stability — does not necessarily increase credit provision. In particular, classic empirical evidence by Petersen and Rajan (1994, 1995) shows that young firms can borrow at lower rates in more concentrated markets, suggesting that credit availability may be higher in less competitive markets. Moreover, a series of seminal empirical papers exploit the removal of branching restrictions to identify the effect of competition, see in particular Jayaratne and Strahan (1996, 1998),[6] show that the deregulation of branching increases the threat of take-overs and thereby induces bank mangers to make more efficient lending decisions. Despite an increase in bankruptcy rates — documented by Dick and Lehnert (2010) — competition results in better bank performance. However, the evidence also suggests that while the deregulation of branching restrictions leads to better bank management, it does not lead to more credit provision.[7]

[3]Another, related argument is made by Marquez (2002), who shows that competition among banks increases information dispersion, impacting banks' screening ability.

[4]See also Repullo (2004) and Matutes and Vives (1996).

[5]See Martinez-Miera and Repullo (2010) for a synthesis, showing conditions for which the relationship of competition and risk taking is U-shaped.

[6]Moreover, the real effects of increased banking competition are studied by Black and Strahan (2002) and Cetorelli and Strahan (2006), who show that less concentration in the banking sector induces concentration to decline among banks' creditors. Further important papers on the real effects of branching restrictions are Stiroh and Strahan (2003), Zarutskie (2006), Rice and Strahan (2010), and Cetorelli (2014). Additional evidence from France on the real effect of banking competition is provided by Bertrand et al. (2007), who show that liberalization of the banking industry makes banks less likely to bail out under-performing firms, thereby increasing the efficiency of the firm sector. Finally, more recent papers use changes in local concentration resulting from bank mergers to instrument competition, see Scharfstein and Sunderam (2013); Liebersohn (2017)

[7]Jayaratne and Strahan (1996) find some indications that credit supply may have increased, but argue that the finding is not robust.

Given the increase in the efficiency in bank management through the threat of takeover as well as improved transparency and monitoring of banks (Jiang et al., 2016), the lifting of branch restrictions also led to an increase in the overall safety of the banking system (Jayaratne and Strahan, 1998). Similarly, Carlson and Mitchener (2009) — providing evidence from the Great Depression — find beneficial effects of increased competition on financial stability. In particular, they show that that banks that had to compete with a large, diversified bank either tended to become more efficient–and more likely survive a large shock–or exited the market.[8]

Studying the effects of banking competition by exploiting the lifting of branching restrictions — while extremely useful and important — is, however, naturally limited by a series of factors. First, the lifting of branching restrictions took place in an environment in which deposit insurance and the prospect of bank bailouts might have influenced bank behavior, hence potentially masquerading the raw effects of competition. Second, while the lifting of branching restrictions arguably increased banking competition locally, it also changed the bank landscape through a number of other channels. For instance, it changes the ability of banks to diversify (Goetz et al., 2016), potentially also biasing results on bank risk-taking. Moreover, it is associated with a wave of bank mergers that are in a complex interplay with other political economic forces (Agarwal et al., 2012; Calomiris and Haber, 2014).

Therefore, we argue that our paper's empirical setting has two key advantages over existing studies on the effect of banking competition. First, local variations in entry cost during the National Banking Era do not coincide with variations in other market characteristics, such as the ability to diversify across markets. Second, given the absence of ex-ante and ex-post government interventions, it allows us to provide evidence on the effects of competition that occur in absence of any government interventions.

The differences in the empirical setup hence also explains the differences in findings to the existing literature. In contrast, to the overall sentiment of the literature on the lifting of branching restrictions, we find strong indications that banking competition increases credit supply. Moreover, we also find that competitive banks choose a more risky balance sheet, resulting in larger bank failures. Our findings hence lend support to the notion that competition among banks rather increases bank risk taking (Jimenez et al., 2013; Braggion et al., 2017)[9] rather than increasing the safety of the banking system (Jayaratne and Strahan, 1998; Klaus, Martin, and Simon, Klaus et al.; Carlson and Mitchener, 2009).

[8]See also Berger and Hannan (1998), who argue that monopolistic markets see less failures due to a lack of market discipline rather than less risky behavior.

[9]Additional cross-country evidence on bank failures is provided by Beck et al. (2006), who show that more monopolistic markets see less bank failures.

However, we also find that while the more risky behavior results in larger bank failures, the associated credit boom preceding the failures translates into higher real economic growth. Hence, an additional contribution of our paper is to provide micro-evidence that causally connects the increased access of credit and credit booms that supports economic growth and to financial instability, in line with existing findings from, e.g., Rancière et al. (2008); Rajan and Ramcharan (2015); Mian et al. (2018).

3 Data

This paper combines information from five different sources, at the bank, city, and county level.

First, we start out by constructing a novel, comprehensive dataset of annual balance sheets of all U.S. national banks between 1871 and 1896. To assemble this data set, we applied a novel combination of optical character recognition (OCR) and layout recognition techniques to the Comptroller of the Currency's Annual Report to the Congress.[10] We flagged potential errors through a battery of checks, including the application of balance sheet identities and legal constraints on the balance sheet. Subsequently, all flagged observations were hand-checked. We extract the charter number, state, county, and city of each bank, geo-locate the cities, and record the dates of all relevant events for each bank (entry, receivership, liquidation, rechartering).

Second, we complement our data on national banks with information on the existence and location of state-chartered banks, kindly shared with us by Jaremski and Fishback (2018), who documents the existence of state banks, trusts and savings banks using the "Rand McNally's Directory of Bankers and Lawyers".

Third, the information on city names, location, and population per decennial census is based on a novel dataset by Schmidt (2017), which is itself based on the Decennial Census reports digitized by Jacob Alperin-Sheriff and by U.S. Census Bureau and Steiner (2017). In addition, corrections for city name changes, as well as city mergers (and even relocation) were done manually.

Fourth, railroad data comes from Atack (2013), which documents railroad tracks by county and year, allowing us to determine the year in which a city gains access to a railroad. A city is assumed to have access to a railroad if there is at least one railroad track passing within 10 miles of the center of a city.

Finally, we use real economic outcomes at the county-level from the Decennial Census, provided by Haines (2004). In particular, the census provides information on manufacturing capital invested, the

[10] See Figure 14 for an example of a bank balance sheet in the annual reports Appendix.

value of manufacturing products produced, as well as the number of manufacturing establishments.

4 Background and identification strategy

We start out by describing the details of capital regulation during the National Banking Era and how they can be used to identify the effect of bank competition on bank behavior.

4.1 Capital regulation and entry restrictions during the National Banking Era

During the National Banking Era, banks' leverage ratios were not directly constrained by capital regulation. Instead, regulators required a minimum *amount* of equity (of "capital stock") in order to establish a bank. After opening, banks were free to choose their own leverage subject to the willingness of depositors to keep their deposits at the bank. Therefore, as several authors have argued before us (see, e.g., Sylla, 1969; James, 1978; Jaremski, 2013), capital requirements were a constraint on entry rather than on leverage.

Importantly, this minimum amount of capital required to open a bank depended on the population of the towns were each bank was to be located.[11] In towns with up to 6,000 inhabitants, newly founded banks were required to maintain at least $50,000 in capital. After crossing this population threshold, this requirement doubled to $100,000, and increased further to $200,000 in towns with at more than 50,000 inhabitants.[12]

$$\text{"Capital stock paid in"} \geq \begin{cases} \$50,000 & \text{if population } \leq 6,000 \\ \$100,000 & \text{if population } \in (6,000, 50,000] \\ \$200,000 & \text{if population } > 50,000 \end{cases}$$

There are two additional details of the national banks capital regulation that turn out to be useful for our identification strategy. First, the legal population of a location was determined by the most recently published decennial census. Second, the regulatory capital requirement only applies to national banks that are entering the market, but not to incumbent banks, which did not had to increase their capital if

[11] Branching regulations restricted banks to operate a single office in a single town. Given the relatively high transportation cost at the time this also significantly mitigates concerns about what constitutes the appropriate locality of banking markets.

[12] In 1900, the capital regulation was refined such that banks founded in towns with less 3,000 inhabitants were required only to raise $25,000 in capital paid-in, studied in more detail by Gou (2016). Moreover, banks were not allowed to pay out dividends until the bank had accumulated a surplus funds of at least 20% of the regulatory capital determined in the banks charter. See James (1978) and Champ (2008) for details.

the towns they operate in increase in size. See, for instance, a contemporary evaluation of the regulatory requirements in "Pratt's Digest of the National Bank Act and Other Laws Relating to National Banks from the Revised Statutes of the United States" (Pratt, 1886):

> *"The population of a place in the United States is legally determined by the last previous census. Thus a bank organized at any time between 1880 and 1890 would generally be bound by the census of 1880. Exceptions might of course arise, as, for instance, where new towns are started in the interval, and other proof of population might then be accepted by the Comptroller. Small variations in population between censuses, would not be regarded. A bank organized with $50,000 capital in a small place might continue with that capital if the population should increase to any number. It thus sometimes happens that we find banks in some towns and cities that appear to have less than the minimum capital required by law. They were either organized when the places were smaller, or were organized in villages absorbed by cities lying near. (page 12) "*

The fact that the legal population is determined by the most recent census implies that, even though each towns population is changing constantly, the minimum requirement for entrants only changes when the census is published. In line with the regulatory statutes, Figure 3 shows that all banks in our sample that are founded between 1882 and 1891 fulfill the regulation: While banks can choose to have more capital than required, banks that are founded in cities with more than 6,000 inhabitants always have at least $100,000, whereas bank in cities with less than 6000 inhabitants have never less than $50,000, but potentially less than $100,000.[13]

The fact that the capital requirement only applies to national bank entrants, but not to incumbent banks, implies that incumbent banks regulatory requirements are not affected by the publication of the census directly. I.e., incumbent national banks are not required to adjust their regulatory capital when the population of their town crosses the 6,000 threshold and their required regulatory capital is entirely unaffected. This is very attractive from the standpoint of identification as the any observed changes in the behavior of incumbent banks are arguably driven by changes in the local market structure rather than changes in the banks' capital structure. This is particularly important, as a change in the minimum amount of capital required may affect the ownership structure and hence the management of banks, as shown by Calomiris and Carlson (2016).[14]

[13]Note that national banking regulation allowed banks to be founded with a capital amount lower than required, but the owners needed to commit to raising the required among within one year.

[14]Note, however, that the variation in the capital requirement for new entrants may alter the *type* of entrant across markets.

[FIGURE 3 ABOUT HERE]

Finally, it is important to emphasize that the regulatory requirements for national banks do not apply to banks that enter the market under a non-federal charter, such as savings banks or state banks. As will be discussed below, higher entry costs for national banks represent a comparative advantage for institutions which can avoid the strict regulatory requirements of national banks.

4.2 Identification

In order to study the effect of bank competition on bank behavior, we hence exploit that the publication changes entry costs differentially across others similar local markets. We focus on the publication of the 1880 census and the subsequent differences in bank behavior over the next decade. Focusing on this time period has the additional benefit that we can observe how the choices made by banks during the 1880s affected their performance in the Panic of 1893, one of the most severe stress events in the National Banking Era (Friedman and Schwartz, 1963).

To be precise, we restrict our data to banks in towns that had less than 6,000 inhabitants according to the 1870 census and had at least one national bank in 1881. We choose 1881 as the 1880 census results was published on the 2nd of March 1882- making 1881 the last data point before the publication of the census.[15] Moreover, we focus on towns with an existing national banks as we are interested in studying the response of incumbent banks to changes in the barriers of entry to their local market. However, note that this data restriction also necessarily implies that our analysis of entry is concerned with the margin of whether a town gets an additional bank next to an existing bank rather than the margin of having a bank at all.

We focus on the northeastern "manufacturing belt"[16] where the banking system was relatively dense and exclude the south and the west to alleviate concerns that that our results are driven by peculiarities of these regions (such as Reconstruction in the South and the frontier in the West). Moreover, as existing evidence by Jaremski (2014) shows, the manufacturing belt was the area in which national banks were

Hence, any bank entering a market with higher capital requirements necessarily has better capitalized competitors. We shed some light on this further below by analyzing whether the differences in behavior is driven by actual entrants or the threat of entry.

[15]The annual OCC reports document bank balance sheets for October.

[16]Bank in our sample are from the following states: Connecticut, Delaware, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia.

most important for economic development.

We define a local market as *treated* and hence subject to higher entry costs for national banks if it had less than 6,000 inhabitants in the census of 1870, but more than 6,000 in the census of 1880. The control group consists of all cities that had less than 6,000 inhabitants in the 1870 and the 1880 census. Formally, we define $\mathbb{1}_{\text{pop}>6000}$ an indicator variable that takes the value one if city c passes the 6000 inhabitants threshold in the census of 1880 and zero otherwise, i.e.,

$$\mathbb{1}_c^{\text{pop1880}>6000} = \begin{cases} 1 & \text{if pop1880}_c \geq 6,000 \\ 0 & \text{if pop1880}_c < 6,000 \end{cases}.$$

We arrive at a sample of 749 cities with at least one national bank in 1881. Of those 749 cities, 69 cities are *treated* and cross the 6,000 inhabitants threshold according to the census of 1880. We are able to identify 816 national banks that exist throughout 1881 to 1891, of which 82 are in markets that are subject to higher entry costs after the publication of the census.

In order to identify an effect of a variation of entry costs on banking behavior, the variation in entry costs would need to be purely random and hence exogenous. However, having more than 6000 inhabitants as of 1880 and hence being subject to higher entry costs is not entirely exogenous. Cities that cross the threshold may either already have a higher population in 1870 to begin with, or experienced a fast population growth between 1870 and 1880, or both. These differences in the evolution of a town's population in turn may be causing differences in bank entry and bank behavior after 1880. For instance, if average town growth decreases in town size, i.e., flattens out over time, we may simply pick up an effect of older towns having slower growth and hence less bank entry.

In order to address this first order concern about identification, Table 1 shows observable characteristics for treated and non-treated cities prior to the publication of the census.

[TABLE 1 ABOUT HERE]

Clearly there are differences in population levels. In 1870, treated cities have on average around 2,500 more inhabitants than non-treated cities. In line with the larger population, they also have higher average levels of national bank capital, deposits, outstanding loans, and overall assets.

Given the observable differences across treated and non-treated cities, we control for the level of population as well as the past and the contemporaneous population growth. As long as our outcome

variables—bank entry, loan growth, bank failure, etc.—are a continuous function of population, these controls will suffice. Note that our results also hold when including more complex population controls, such as the squares of both variables, and their product.[17] Such more complex population controls arguably control for the overall trajectory of a city. Moreover our results are also robust when considering only towns right around the 6,000 inhabitant threshold , i.e., in market that have more than 3,000 but less than 9,000 inhabitants as of 1880.

Reassuring for our purposes, other than differences in the city size as measured by population, treated and non-treated cities are similar in a number of other important observable characteristics. First, treated and non-treated cities have fairly similar population growth rates between 1870 and 1880, and the differences in the growth rates are not statistically different. Second, trends in the growth of bank balance sheets prior to the 1881 census are also fairly similar for the two groups of cities with no statistically significant differences in growth rates for bank assets, loans, and capital between 1871 and 1881. Third, other aspects of the cities are also similar, growth rates of manufacturing capital, establishments, and output from 1870 to 1880 are similar. Moreover, both types of cities have similar per capita rates of manufacturing capital and manufacturing output in 1880. Finally, railroad access, which would facilitate trade and possibly growth, was also similar between the two groups of cities throughout 1870, 1880, and 1890.

Furthermore, Figure 1 reveals that the treated cities are fairly even spatially distributed and not clustered in one specific region. A closer look in Figure 2 also shows that there exist multiple counties with one treated and one non-treated city. Hence, in regressions, we can compare cities that are geographically close to each other but subject to different entry costs by including county fixed effects.

[FIGURE 1 ABOUT HERE]

5 The effects of entry costs on entry and competition

In this section, we start out developing hypotheses on how the variation in barriers to entry can affect bank entry and test them econometrically.

[17] This is equivalent to controlling for a second-order Taylor approximation of population.

5.1 Empirical specification

As argued above, a variation in the increased capital requirement for new national banks entrants potentially display a barrier of entry for other bankers that consider to enter the local market using a national bank charter. If the capital requirement is indeed representing an economically relevant constraint, we will expect that there is less entry by national banks in those markets that are above the 6,000 inhabitants threshold after the publication of the 1880 census.

At the same time, given that entry costs are higher for banks chartered as national banks, the comparative advantage for entering the market as an institution chartered under state law increases.[18] Hence, given the higher entry costs for national banks, we expect state-chartered institutions to fill the gap at least partially and enter the market.

Finally, even though higher entry costs only affect national banks, we still expect to observe a lower overall entry if state banks and national banks are not perfect substitutes. In particular, there are indeed a number of reasons to believe that state banks are not perfect substitutes for national banks, as the latter have a comparative disadvantage in issuing bank notes. Moreover, given the relatively lax regulation of state banks, state bank were generally perceived as less safe institutions (White, 1983).

In order to study the effect of the capital regulation on the degree of competition in a local market formally, we estimate the following Poisson model:[19]

$$y_c = \exp\left(\alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} + Z_c + \gamma_s + \epsilon_c\right), \tag{1}$$

where y_c is a measure of the number if bank entries between 1882 and 1891 in city c, $\mathbb{1}_c^{\text{pop1880}>6000}$ is as above and Z_c is a set of city-level controls containing the city's population in 1880, the (absolute) growth in population between 1870 and 1880, and 1880 and 1890, the years since the city first received access to a railroad, and two dummy variables that take the value one if the city had railroad access by 1881 and 1891, respectively. Finally, γ_s is a state fixed-effect, that accounts for the fact that the regulatory requirements for state bank differ across states.

We estimate the model for a set of different dependent variables, y_c. For each city c, we calculate the

[18] State banks were subject to comparable capital requirements based on the local population. However, requirements varied widely. For instance, White (1983) shows that in 1895, Massachusetts had the exact same capital requirement for state bank than for national banks, whereas in New Jersey state banks where required to have $50,000 capital paid-in irrespective of the size of the location.

[19] We use Poisson as the outcome variable, such as entry and number of banks, are discrete.

number of new entrants (national, state, or both) between 1882 and 1891, the net entries defined as the number of entries minus the number of exists between 1882 and 1891, or the number absolute number of national banks or state banks in 1891, denoted as n_{1891} and sb_{1891}, respectively. We first estimate the model for national banks and state banks separately and then for the overall number of entrants.

5.2 Findings on bank entry

Before turning to the econometric evidence, we start out by providing visual evidence on the effect of higher entry costs on the degree of local competition. Figure 4 depicts a binned scatterplot of the number of entries of national banks in cities with exactly one national bank in 1881 by city population according to the 1880 census, including linear fits left and right of the 6,000 inhabitants threshold. Focussing on cities with exactly one national bank has the advantage that we can directly calculate the probability of experiencing an additional entry. The picture shows that there is a positive correlation between city size and the number of entries of national banks. However, there is a sharp discontinuity right around the 6,000 inhabitants threshold. In particular, towns that are just above the 6,000 inhabitants threshold have a 20 percentage points lower probability of seeing an additional entry by a national bank between 1882 and 1891 than towns just left of the threshold.

In a similar spirit, Figure 5 depicts the number of national banks per town in 1891 by the population according to the 1880. The pattern observed confirms the visual evidence on new entrants. Figure 5 shows that a city with just less than 6,000 inhabitants has on average around 1.4 national banks in 1891, while a city just right of the threshold has on average a little less than 1.2 national banks in 1891.

The picture slightly changes when we also consider the existence of state-chartered institutions. Figure 6 shows that when we also consider the entry by state-chartered institutions, that the gap between cities just right and just left of the threshold decreases: cities with less than 6,000 inhabitants have on average two banks, while banks just right of the threshold have on average 1.7 banks. This is intuitive, as the more lightly regulated state banks receive a comparative advantage when regulatory requirements for national banks increase. However, the overall net effect on total bank entry remains negative, indeed confirming that national banks and state bank are not perfect substitutes.

[FIGURE 4 AND 5 AND 6 ABOUT HERE]

The visual evidence hence suggests that whenever national banking entrants face a higher capital

requirement, entry of national banks is lower. At the same time, state chartered institutions seem to fill the gap, but yet a difference in the number of banks operating in the local market remains.

We can test this visual evidence more formally and control for observable characteristics using the empirical specification described above. We start out by estimating Equation (1) for the exact sample used in Figures 4 to 6, i.e. for cities with exactly one bank in 1881. We then also estimate the same model with a larger sample if cities, including also those cities that had more than one national bank in 1881.

Results on the number of entries in cities with exactly one national bank in 1881 are reported in Table 4. In line with the visual patterns of Figure 4 and Figure 5, there is a positive and statistically significant correlation between population growth and the number of entries and net entries of national banks. However, after controlling for growth in population, Table 4 reveals also a statistically significant effect of being above the 6,000 inhabitants threshold on the number of entries and net entries between 1882 and 1891. In particular, towns with higher barriers to entry after 1881 have on average around 0.175 less national bank entrants than towns with a lower capital requirement, see column (1) - (6).

In order to address the concern that the our threshold dummy $\mathbb{1}_c^{\text{pop}>6000}$ is picking up an unobserved larger trend, we consider a placebo test in which we move the threshold to 4,000 instead of 4,000, and exclude all cities that had more than 4,000 inhabitants in 1870. Reassuring for our identification strategy columns (7) and (8) show that the coefficient remains negative but is much smaller, and not statistically significant.

We also estimate Equation (1) for using the number of national banks in 1891 as the dependent variable. Focusing on town that had exactly one national bank in 1881 then has the advantage that the coefficient for the entry costs can be interpreted as the difference in the probability of seeing an additional national bank enter. Columns (1) and (3) of Table 5 reveal that those towns that are subject to higher entry costs have a 36 percentage points lower chance of seeing a second national bank enter, a sizable effect given that the conditional chance of receiving an additional entry is around 20 percent.

As indicated above, state banks are not subject to the same regulatory requirements as national banks and may hence simply fill the gap, leaving overall competition unchanged. To test this, we estimate Equation (1) using the number of state chartered institutions as well as the number of total banks entering, the sum of national and state banks, as dependent variables. Column (3) and (4) of Table 5 show the effect of national bank regulation on state bank entry and reveal that in those cities in which entry costs are higher after 1881, state banks are more likely to enter. In 1891, cities with higher entry costs after 1881 have on average have 0.23 more state banks than those with lower entry costs–

even though the coefficient is not precisely estimated. However, column (5) to (6) confirm the visual evidence of Figure 6 and show that after accounting for state bank entry, there is still a statistically significant negative effect on overall bank entry, and markets with higher entry costs for national banks have on average 0.27 banks less.

[TABLE 4 AND TABLE 5 ABOUT HERE]

Finally, we also test the effect of barriers of entry on actual entry for the larger sample of all cities with at least one national bank in 1881. To this end, we again estimate Equation (1) using net entries of national banks and the number of national banks in 1891 as dependent variables. Note that in this regression, coefficients cannot be interpreted as the probability of an additional entry.

Table 6 shows that the effect of higher entry costs while varying the sample size depending on the number of national banks that operated in a given city in 1881. The effect on the overall number of banks in the city remains negative when we include cities with more than one bank in 1881. The effect is essentially unchanged when varying the sample, even though the interpretation of the coefficient is not the same.

[TABLE 6 ABOUT HERE]

Altogether, our evidence suggests that being subject to higher barriers of entry predicts a lower actual probability of entry and is hence a good predictor for the degree of competition in a local market.

6 The effect of entry costs on incumbent banks' behavior

Having verified that capital regulation indeed predicts actual entry and hence competition, we turn to studying the behavior of incumbent national banks. In particular, we compare behavior of incumbent banks in markets with high and low barriers to entry.

6.1 Empirical specification

As indicated above, focusing on incumbent banks in the analysis has the key advantage of isolating the effect that stems from changes in the degree of competition in the local market as opposed to changes in the banks' capital structure. Incumbent banks are themselves not directly affected by the change in

entry cost as they do not have to adjust their regulatory capital themselves.[20] Therefore, a change in the behavior of incumbents can arguably be attributed to the change in the degree of local competition.[21]

To conduct the analysis, we estimate the following model:

$$y_b = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta X_b + \gamma_s + \epsilon_b \tag{2}$$

where $\mathbb{1}_c^{\text{pop1880}>6000}$ is as above, γ_s is a state fixed effect, and X_b is a set of city and bank-level controls, including the population and population growth, railroad access, bank size and and bank capital ratio in 1881, as well as the age of the bank.

We consider several outcome variables. First, to test the impact of competition on credit availability, we use as our outcome variables the growth rate of loans, total assets, total equity, reserves, and deposits[22] at the bank level between 1881 and 1891 for incumbent national banks. Moreover, to study the effect of competition on risk taking and financial stability, we consider a set of additional metrics. First we look at the balance sheet ratios such as the leverage, the capital ratio, before also testing the effect of barriers on entry on the probability of seizing collateral and on the probability to default or to voluntarily liquidate during the recession around the Panic of 1893.

To address concerns that results are driven by unobservable local economic conditions, we further exploit the richness of our data and study differences in bank behavior year-by-year with county-time fixed effects. In particular, we estimate the following panel regression at the bank-level:

$$y_{bt} = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} \times \text{Census-publication} + \delta X_{bt} + \tau_t + \gamma_{ct} + \epsilon_{bt} \tag{3}$$

where y_{bt} is the annual growth rate of the bank-level variables described above, $\mathbb{1}_c^{\text{pop1880}>6000}$ is as above and interacted with a dummy variable that takes the value one after the publication of the census. X_{bt} is a set of time-varying city and bank-level controls, and τ_t is a time fixed effects.

The particular advantage of this approach is that it allows us to include a county-time fixed effect

[20] Figure 15 in the Appendix provides evidence that incumbent banks, founded before 1881, indeed do not see a shift in their regulatory capital.

[21] Moreover, as shown above incumbent banks in markets with barriers to entry for national banks may face stronger competition from state banks. Hence, studying the differential behavior of incumbent banks also provides evidence on the potential behavior of entering state banks.

[22] Bank equity is defined as the sum of capital paid in (regulatory capital), surplus fund, and unpaid dividends. Reserves are defined as the sum of cash and due from a reserve agent. Cash is the sum of specie, currency, and legal tender.

γ_{ct}, which absorbs local economic conditions in the spirit of Khwaja and Mian (2008). While our main specification in principle also allows for a county fixed effect, the relatively low number of observations impacts statistical power.[23] This is less a concern in a larger panel regression with many years of observations. We estimate the Equation (3) for data from 1872 to 1891, i.e., from the publication of the 1870 census until the last year before the publication of the 1890 census.

6.2 Findings on incumbent bank behavior

We start by looking at credit availability and analyze whether differences in behavior across the two types of markets can be explained by actual entry or the threat of potential entry. We then analyze differences in risk taking behavior across the two types of markets.

Credit provision Table 2 shows summary statistics of the banks in cities with either one or two national banks in 1881. Figure 7 shows loan growth of incumbent national banks between 1881 and 1891 as a function of the population of the city a bank is located in. Eyeballing the difference across the different markets, the figure indicates that incumbent banks that operate in a market with higher entry costs increase their loan portfolio by around 20 percentage points less between 1882 and 1891 than national banks just left of the threshold that operate in a market with lower entry costs.

To test this visual evidence more formally, we estimate Equation (2). Table 7 reports the results. Indeed, national banks that were founded before 1881 but are in markets with higher entry costs after 1881 expand their loan portfolio at a 22 percentage points lower rate between 1881 and 1891. Hence, banks operating in markets with higher entry costs hence provide less credit than their peers in more competitive markets.

In line with the lower availability of credit, Table 8 shows that these banks also have a 17.5 percentage points lower growth in deposits and a 10 percentage points lower growth in overall assets. There is no statistically significant difference in the growth of reserves, cash and note issuance or total equity.[24]

[TABLE 7 AND TABLE 8 ABOUT HERE]

[23] Note that our cross-sectional regression are nonetheless robust to using county fixed effects.

[24] Equity is defined as the sum of capital paid in other claims of the owners such as the surplus fund and undivided profits.

As robustness check, we also estimate a panel regression, see Equation (3), using data from 1871 until 1891. Table 9 shows that bank in less competitive markets expand their loan portfolio at and around 2.5 percentage points lower rate, their deposits at an 1.7 percentage points lower rate and their overall balance sheets at an 1.2 percentage points lower rate, see column (1), (3), and (5)— roughly in line with our estimates for the ten-year growth rates. Importantly the results are also robust to including county-time fixed effects, which absorb local economic conditions in the spirit of Khwaja and Mian (2008), see column (2), (4), and (6).

[TABLE 9 ABOUT HERE]

Mechanism Our evidence suggests that incumbents banks that are operating in markets with higher entry costs restrict the availability of credit. Naturally, it is of interest to study the channel through which the increase in entry costs leads do a decline in credit provision. In particular, it incumbent banks may expand their lending only in those markets that experienced actual entry as banks competed over market share. Alternatively, however, the additional credit provision could also result from incumbents being more expansive in their loan provision in an attempt to deter potential entrants, as suggested by classic theories of firm competition Milgrom and Roberts (1982a,b).

In order to shed light on this question, we first estimate Equation (2), reducing the sample to only those cities in which no entry occurs between 1881 and 1891. The result are shown in the Table 10 in the Appendix. Table 7 shows that we find about the same effect of the entry restriction on loan growth between 1881 and 1891 when we focus on this specific subset of cities. These results indicate that there was a meaningful expansion of credit by incumbent banks even when there had not been any entry, which is consistent with the idea that incumbent banks expand credit provision to prevent entry.

Further information on the mechanism through which barriers of entry affect bank outcomes can be attained by studying the timing of the effect in more detail. To this end we estimate the following equation in which we interact the treatment with time fixed effects:

$$y_{bt} = \alpha + \sum_{t=1871}^{1891} \beta_t \mathbb{1}_c^{\text{pop1880}>6000} \times \tau_t + \delta X_{bt} + \tau_t + \gamma_{ct} + \epsilon_{bt},$$

where y_{bt} is the loan growth of bank b from t to $t+1$, and coefficient are normalized to 1880. Section 8 show the coefficients across time. Section 8 shows that the effect on loan growth appears immediately after the publication of the census. Given that actual entry takes much more time, it indicates that the

effect is resulting from the actual threat of entry, which is reduced for treated banks.

[FIGURE 8 ABOUT HERE]

Risk-taking Next to studying the effect on credit availability, we investigate the effect of barriers of entry on measures of bank risk taking. In order to study the effect on bank risk taking more generally, we first estimate Equation (2) using various balance sheet measures as dependent variables. We start by looking at the ratios of equity relative to assets and to loans–which tend to be bank's riskiest assets. Assuming equally risky loan portfolio's and cash holdings, larger equity buffers indicate that the bank was pursuing a more conservative investment strategy.

[FIGURE 9 AND 10 ABOUT HERE]

Figure 9 and Figure 10 indicate that incumbent banks active in markets with higher barrier to entry indeed had a more conservative business model according to the mentioned metric. Estimating the Equation (2), we find that incumbent national banks in markets with lower barriers to entry that had a lower leverage ratio in 1891, a higher capital ratio,[25], a lower ratio of loans to equity, and a higher ratio of cash to assets, see Table 11. In particular, we estimate that less competitive incumbents choose a 27 percentage point lower leverage, and a 2 percentage points higher capital ratio. As mentioned above, this results is not driven by the regulatory capital required as the change in regulation in 1881 does not apply to incumbent banks.

[TABLE 11 ABOUT HERE]

Clearly, to conclude that high leveraged institutions behave more risky than less leveraged institutions, one would need to control for the risk profile of the loan portfolio, which is unobservable to us. Therefore, we also study alternative measures of risk taking that can be seen as an ex-post measure of risk taking. On the asset side, we measure ex-post asset quality by the seized when loans went bad, referred to as "other real estate and mortgages owned" (OREO) . Higher holdings of these assets indicate that the bank had made riskier loans previously and had to seize collateral when the borrower defaulted. On the liability side, we study differences in the use of bills payable and rediscounts. These funding instruments

[25]The leverage ratio is defined as the difference between total assets and equity over equity. The capital ratio is defined as the ratio of equity over assets.

are indicative of risk taking as they tended to short-term, high interest rate, secured transactions which banks referred to when other sources of funding were scarce; we test whether banks in more competitive environments were more or less likely to use these particular liabilities.[26]

We start out by studying whether there are difference across incumbent banks in their holdings of OREO. As described above, OREO represents collateral seized when borrowers defaulted. Having OREO to assets ratios is a sign that the bank has had more or larger borrowers default.

[TABLE 12 AND 13 TABLE ABOUT HERE]

Table 12 shows that in 1891, bank that have been operating in less competitive market are much less likely to have a collateral seized when loans went bad on their balance sheet, see column (1). Moreover the difference across the two types of banks seems to widen during the Panic of 1893 and the magnitude of the difference is increases in 1893, see column (2). This can be taken as an indication that banks with a larger market power generally seem to choose less risky borrowers. In line with that finding, less competitive banks are less likely to make use of expensive funding via rediscounts and bills payable during the Panic of 1893, see column (4). However, the difference is not statistically significant.

As a final test, we look at the experience of banks during and after the Panic of 1893. The Panic of 1893 was one of the most severe financial disturbances of the National Banking Era and has been attributed partly to concerns about the US commitment to the gold standard and partly to concerns about the economy (Friedman and Schwartz, 1963; Carlson, 2013). Amid the panic, there were serious disruptions to the payment system and a significant number of bank closures, some permanently and some temporarily. This panic was followed by one of the most severe economic downturns in US history (Davis, 2004). Banks that had taken larger risks in the period preceding the Panic of 1893 would presumably be more exposed to depositor flight during the panic and the downturn that followed.

Thus, whether the banks in the sample survived until 1898 or whether they failed / voluntarily liquidated provides a further test of the riskiness of their business model. Banks that were judged by the examiners to be insolvent were placed in receiverships and are considered to have failed. Banks could alternatively decide to wrap up their business and voluntarily liquidate if they thought their prospects were not especially good or if they judged to be in trouble, but still solvent. We provide a complete

[26]Rediscounts and bills payable are a form of short-term, expensive, secured interbank funding. Banks typically used this form of funding to meet a surge in demand for funds, such as processing the autumn crop harvest; however, a number of studies have also found that this type of funding was used more extensively, and at higher cost, by banks that were experiencing difficulties White (1983); Calomiris and Mason (1997); Calomiris and Carlson (2018).

list of all banks that were placed under receivership or closed their door voluntarily in Table 16 and Table 17 in the Appendix.

We calculate two dummy variables that indicate whether a receiver is appointed between 1892 and 1896, or whether the bank decides to voluntarily liquidate between 1892 and 1898.[27] We then estimate Equation (2) as a probit model, now using the dummy variables on failure and liquidation as the dependent variable. Table 13 reports results on default and voluntary liquidations.

Table 13 reveals that there is a statistically significant difference in the probability of failure of incumbent banks across the different types of markets: More monopolistic incumbent banks have a 1 percentage point lower failure probability— considerable given an unconditional default probability of 1.7 percentage points. Moreover, monopolistic banks are also less likely to voluntarily liquidate during the crisis. While the unconditional probability of a voluntarily liquidation is given by 2.7 percentage points, incumbent bank in less competitive market are 1.4 percentage points less likely to give up their business during the crisis. While the former can be taken as a sign of additional risk taking by competitive banks, the latter can be interpreted as an indication that charter values are higher in the less competitive markets, reducing the incentive to close banks in times of distress.

7 Evidence on manufacturing growth

7.1 Empirical specification

Finally, after studying how competition affects credit availability and risk taking, we test whether competition at the bank level mattered for economic output. In doing so, we build on previous work looking at the role of National banks in fueling development in the National Banking Era, such as Jaremski (2014) and Fulford (2015).[28] Following Jaremski, we focus on the effects of credit provision by national banks on manufacturing outcomes as opposed to farming outcomes.

To study the real effects, we use data from the decennial census on capital establishments and output

[27] In addition to capturing the impact of the economic downturn, this longer time period captures failures from the panic in the event that the time that the official liquidation commenced lagged the actual decision to liquidate by some years.

[28] Jaremski (2014) uses institution level data on banks and county level data on manufacturing; identification in his setup comes from looking at a shock in the mid-1860s just as the country is returning to peace-time footing after the Civil War. By comparison, we are looking at a later period in which development is further along and less likely to be complicated by the end of the Civil War. Fulford (2015) looks at county-level bank data and manufacturing. He uses a similar identification strategy, but at a higher level of aggregation. Moreover, his paper focuses on the margin whether a town a receives a national bank or not rather than studying whether a town has a single or more national banks. Thus we view our analysis as a useful complement to this previous research, bolstering that work and integrating it with other analysis of how entry barriers affected competition, credit availability, and risk taking.

value in the manufacturing industry. This data is only available at the county level. Given that county border change over time making estimates of manufacturing growth potentially inaccurate, we study the effect on manufacturing at the city-level directly. A meaningful link between the county level and the city-level data can be established if manufacturing outcomes are closely correlated with urban population. Under this assumption, one can calculate a population weighted city-level of manufacturing variables as follows:

$$y_{ct} = \frac{pop_{ct}}{\sum_{c=1}^{n} pop_{ct}} y_{county},$$

where y_c is the outcome variable of the census at the county level pop_{ct} is the population is population of location c at time t, and n is the number of cities in the county.[29]

At the city level, we then estimate the following equation:

$$y_c = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta Z_c + \gamma_s + \epsilon_c, \tag{4}$$

where y_c is again the harmonized growth from 1880 to 1890 in the value of products in manufacturing, the capital invested in manufacturing, and the number of manufacturing establishments, now at the city level. Z_c is a set of city-level controls such as the city's population, population growth, and railroad access.

7.2 Results

We estimate Equation (4) for data disaggregated at the city level between 1880 and 1890. Our results suggest that areas with lower entry barriers–which also tended to have banks where lending was growing more rapidly–tended to have more rapid growth in manufacturing. In particular, Table 14 indicates that cities with higher entry costs for national bank after 1881 experience a lower growth in manufacturing capital as well as in manufacturing output. The growth of value of manufacturing output and capital invested between 1880 and 1890 is around 17 and 15 percentage points lower, respectively in areas with higher entry barriers for banks. Moreover, the number of manufacturing establishments is also lower, but the coefficient is small and not significant.

[29]Hornbeck (2010) provides a method to adjust county-level outcomes by using the change in the size of the county. Such an adjustment, while helpful when considering farming outcomes, may not necessarily be helpful when considering farming outcomes. Note that our method of dis-aggregating results to the city level does not require to account for changes in county borders.

[TABLE 14 ABOUT HERE]

Our findings confirm the notion that financial outcomes matter for real economic outcomes (see, e.g., Peek and Rosengren, 2000; Chodorow-Reich, 2014; Benmelech et al., 2017). Moreover, our results also confirm the evidence provided by Jaremski (2014) that suggests that areas more conducive to national bank entry tended to have faster manufacturing growth.

8 Discussion

How does competition in banking affect credit provision and financial stability? And how does it affect real economic outcomes? The peculiarities of the National Banking Era allow us to identify the effect of competition on credit, financial stability, and real economic outcomes when bank behavior is undistorted by the prospect of government interventions.

Our evidence suggests that charter values play an important role in determining bank behavior. A higher degree of competition makes bank to choose a riskier business model. Importantly, however, risky behavior is not necessarily undesirable as it is associated with credit provision that translates into higher real economic growth. However, riskier bank business models also lead to higher failure rates during times of financial distress and arguably decrease financial stability. Altogether, we are able to identify a trade-off between facilitating the expansion of credit that supports economic growth and financial stability.

Despite the historical nature of our study, the findings presented nonetheless have important implications for the understanding of contemporary banking. On the one hand, our findings imply that any policy that increases charter values is likely to increase financial stability, but potentially at the cost of reducing credit availability. On the other hand, as we identify the pure effects of banking competition — the forces that are at play in absence of government interventions — our results also provide a sense of how financial institutions behave in less regulated environments such as the less regulated shadow banking system.

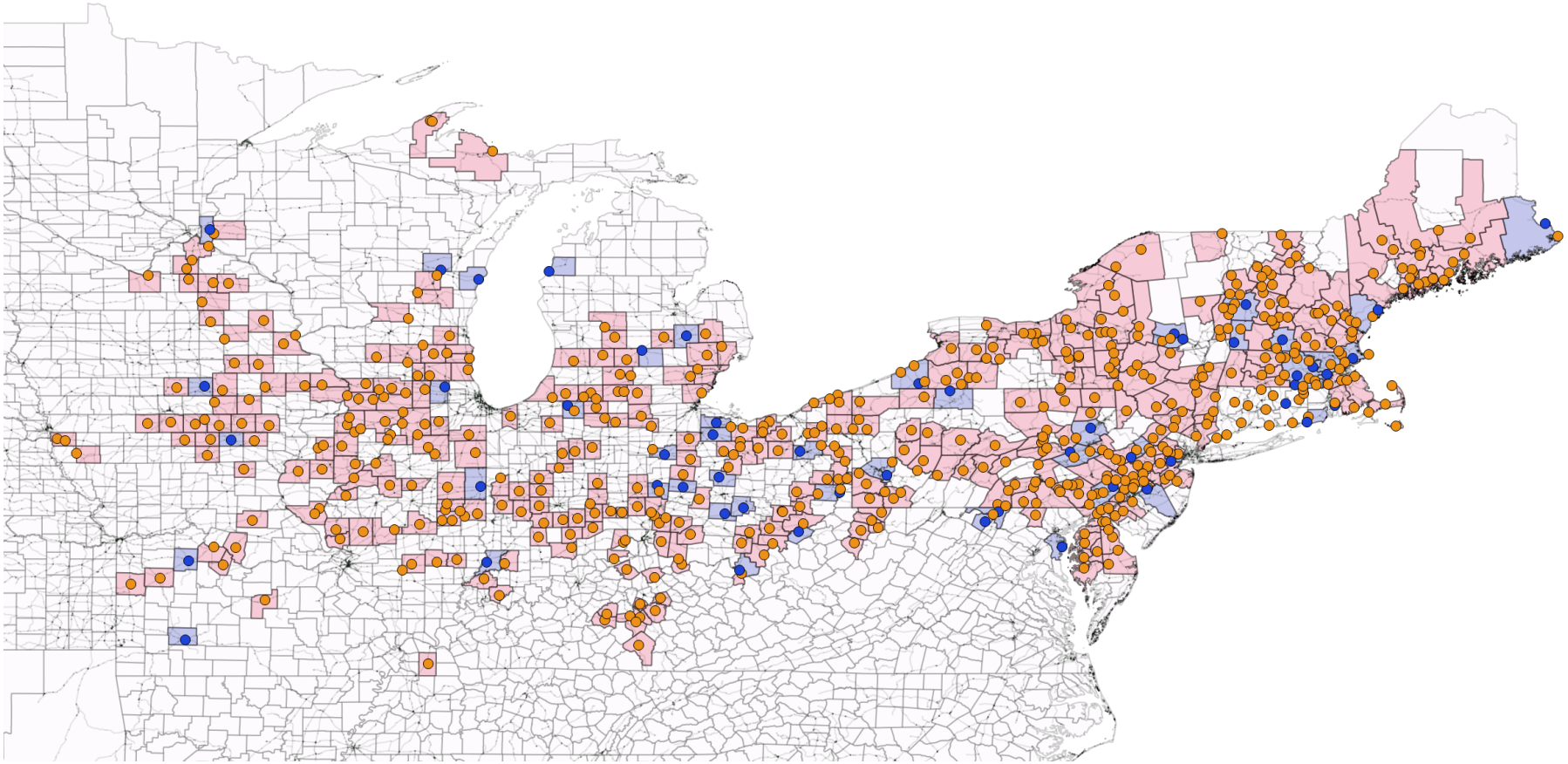


Figure 1: *Spatial distribution of cities with at least one bank in 1881 and less than 6000 inhabitants prior to 1880. Cities are blue/non-transparent if* $\mathbb{1}_c^{pop>6000} = 1$ *and orange/transparent if* $\mathbb{1}_c^{pop>6000} = 0$*. County borders are from 1890 and railroads that are in operation by 1891.*

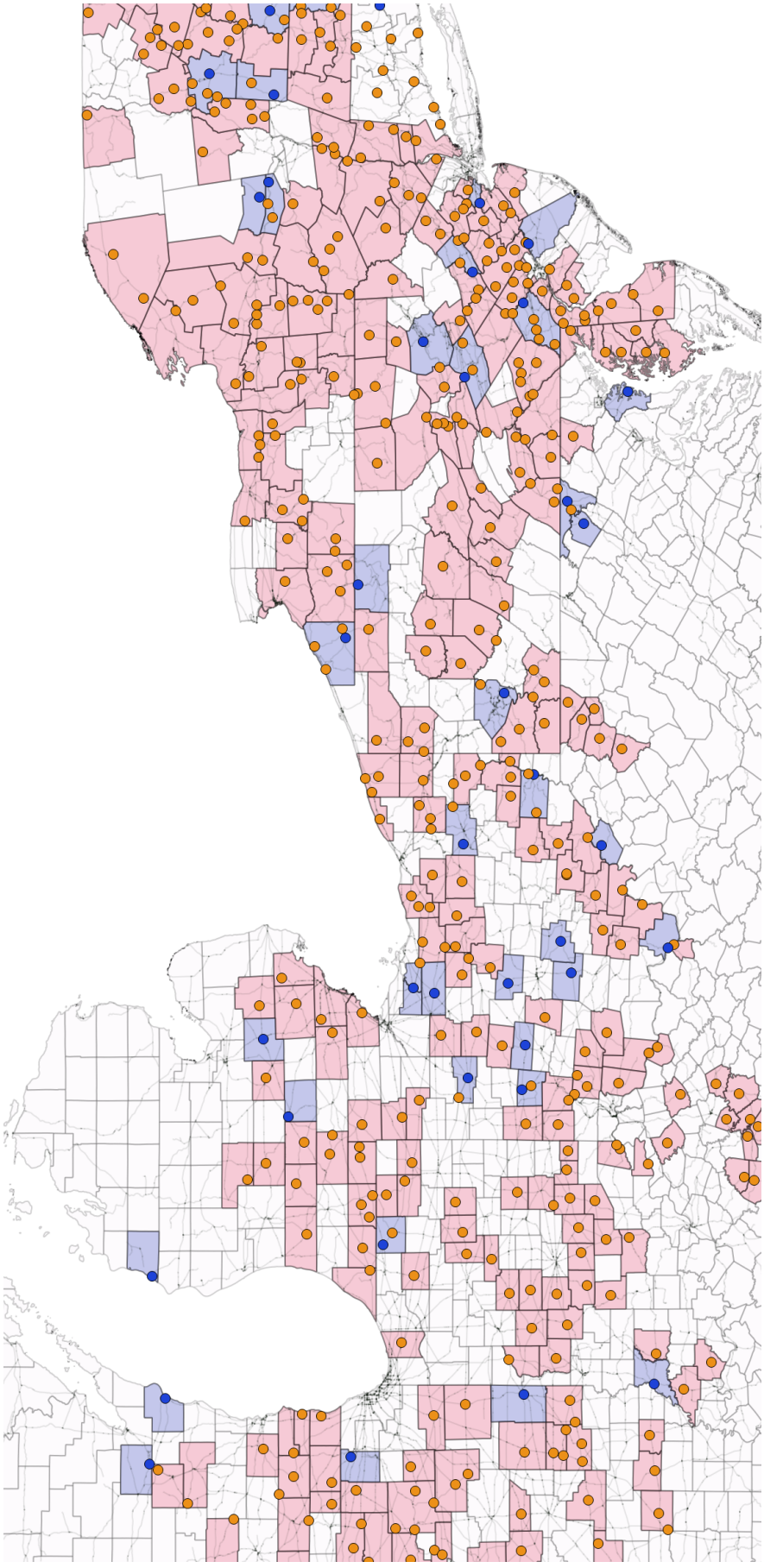


Figure 2: *Multiple cities in same county allows for county fixed effects.*

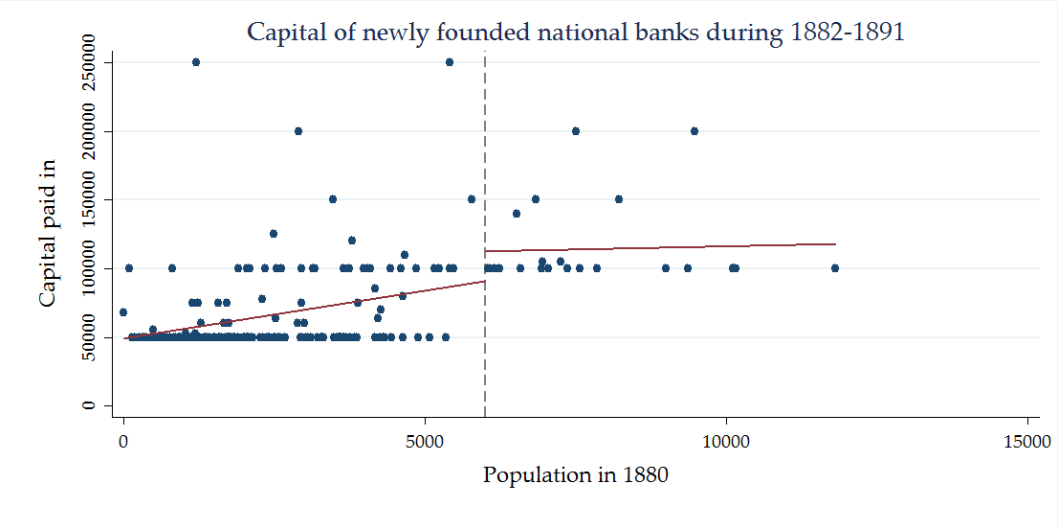


Figure 3: *Binned scatterplot of capital paid-in in the founding year all for banks founded between 1882 and 1891 by population of bank location. We generate the binned scatterplot using the "rdplot" command of the rdrobust package developed by* **?**.

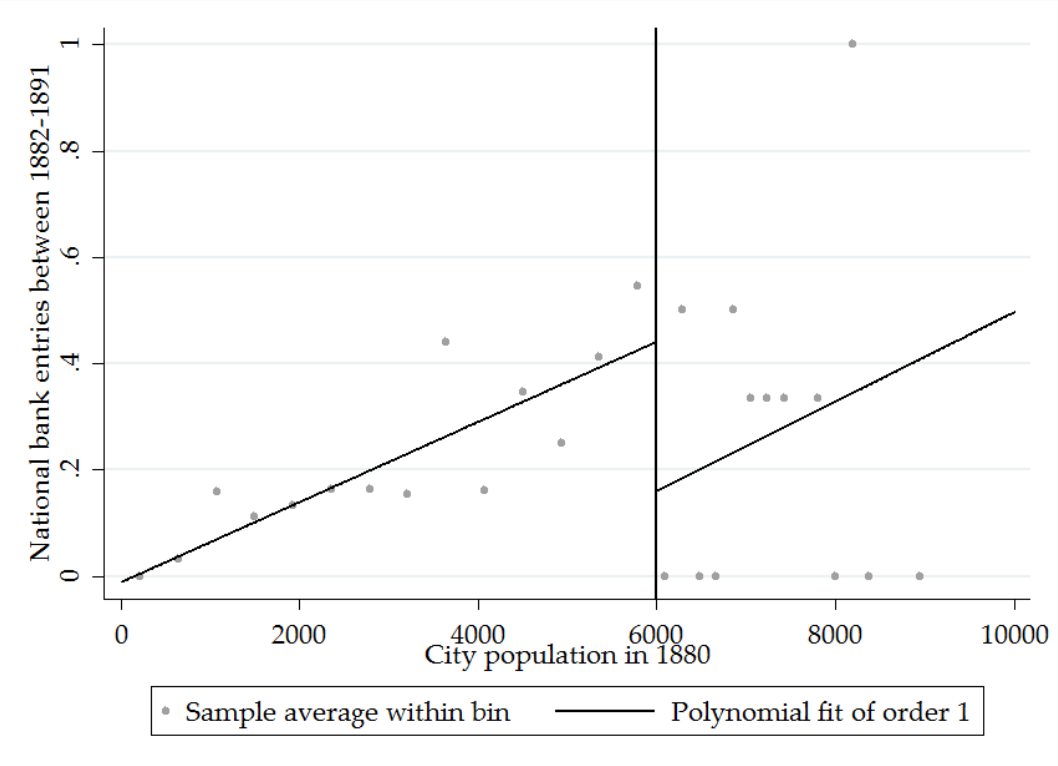


Figure 4: *Binned scatterplot of net entries of national banks between 1882 and 1891 by city population in 1880 in cities with exactly one bank in 1881.*

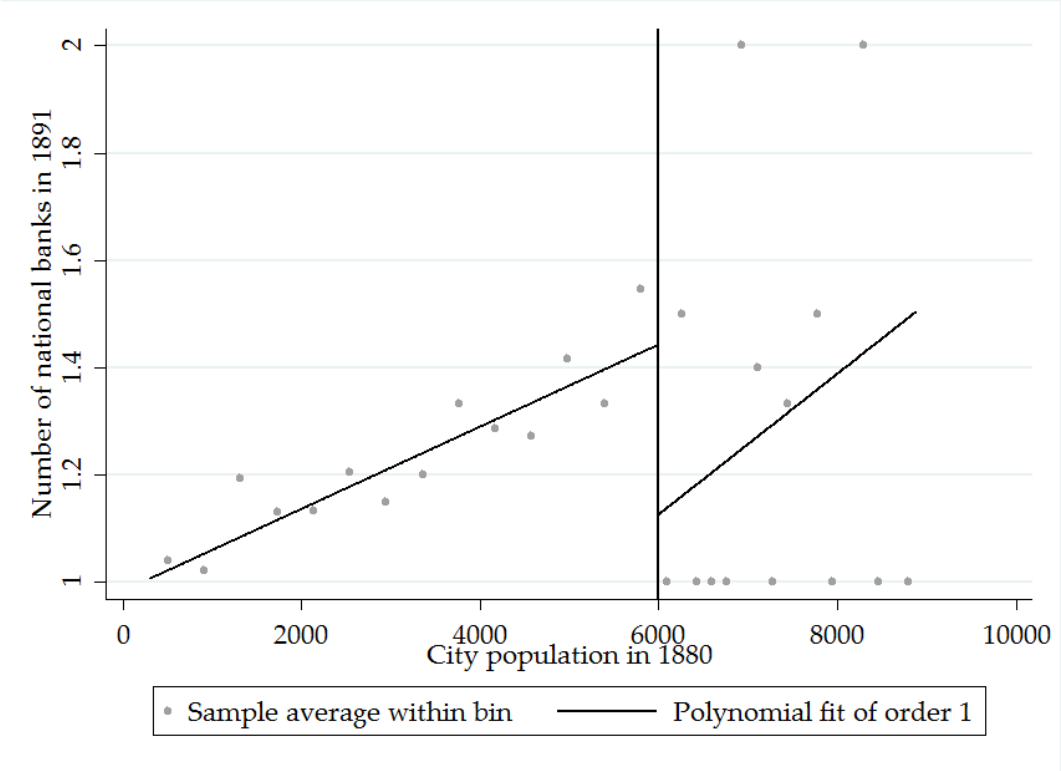


Figure 5: *Binned scatterplot of number of national banks in 1891 by city population in 1880 in cities with exactly one bank in 1881.*

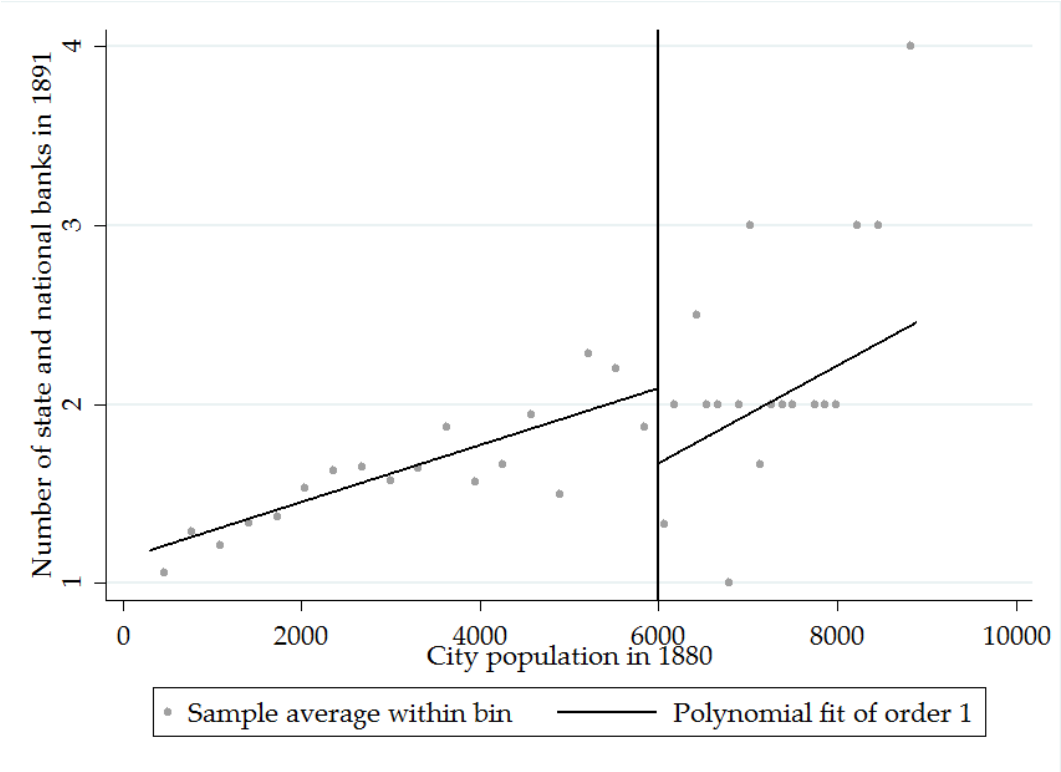


Figure 6: *Binscatter of number of national and state bank in 1891 by city population in 1880 in cities with exactly one bank in 1881.*

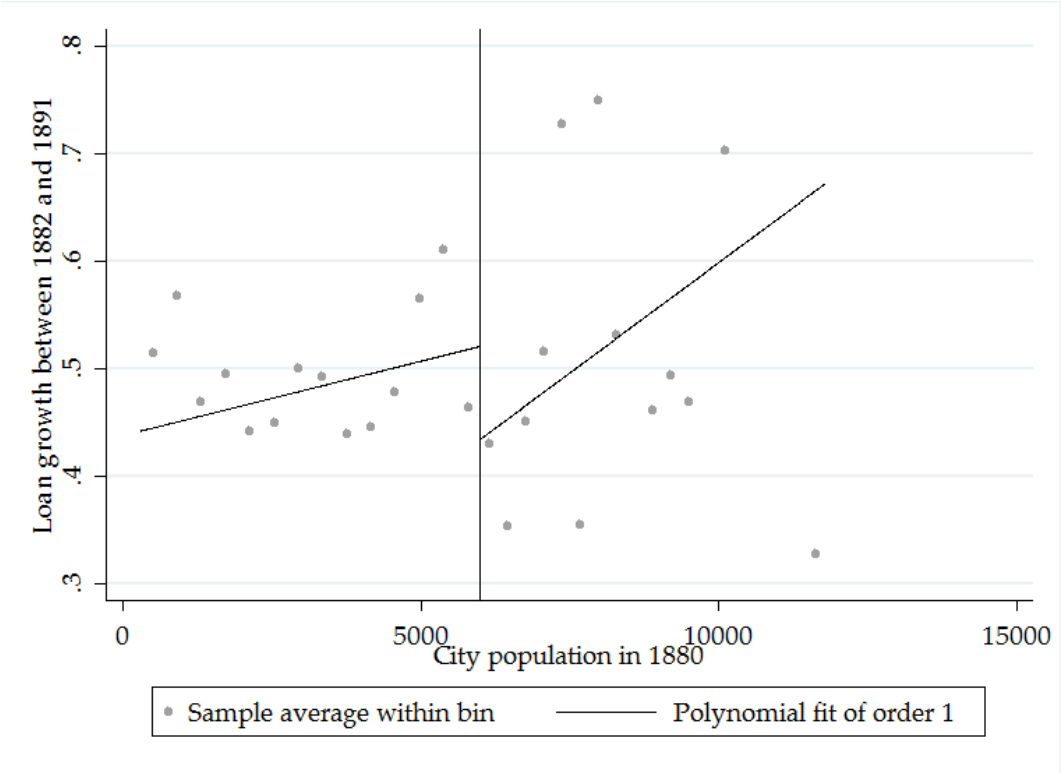
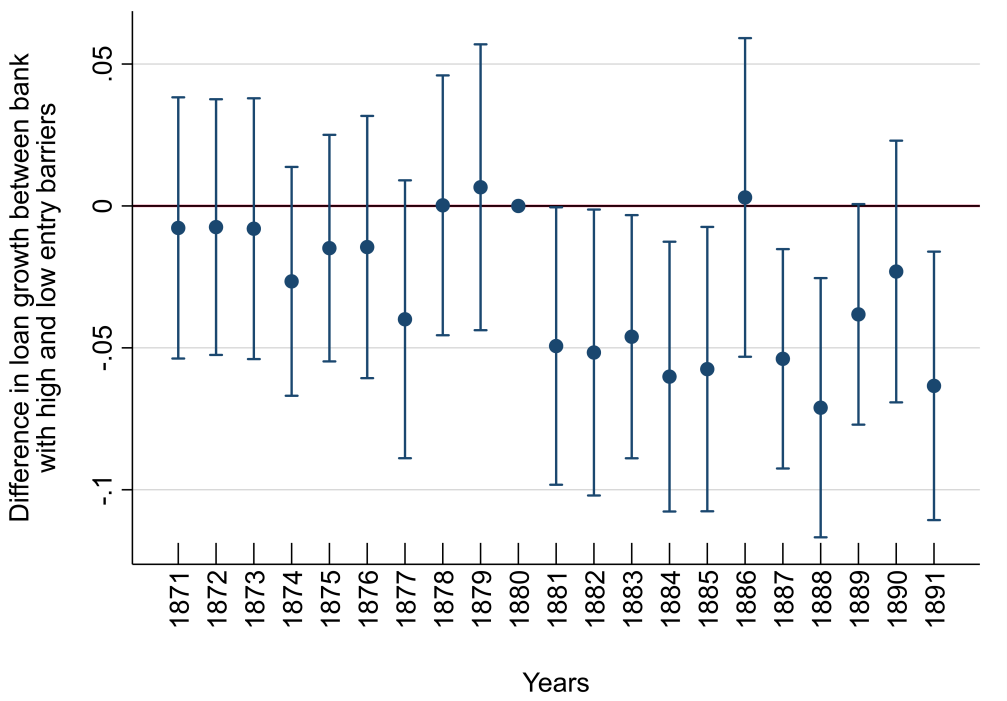


Figure 7: *Binned scatterplot of bank-level loan growth between 1882 and 1891 by city population in 1880.*



Note that we have only around 50% of all bank balance sheets of national banks for the year 1885 due to low quality of digital version of the OCC report.

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Figure 8: *The figure shows coefficient from estimating*

$$y_{bt} = \alpha + \sum_{t=1871}^{1891} \beta_t \mathbb{1}_c^{pop1880>6000} \times \tau_t + \delta X_{bt} + \tau_t + \gamma_{ct} + \epsilon_{bt}$$

where y_{bt} is the loan growth of bank b from t to $t+1$. We normalize coefficients to 0 in the year prior to the census publication, 1880.
Note that we have only around 50% of all bank balance sheets of national banks for the year 1885 due to low quality of digital version of the OCC report.

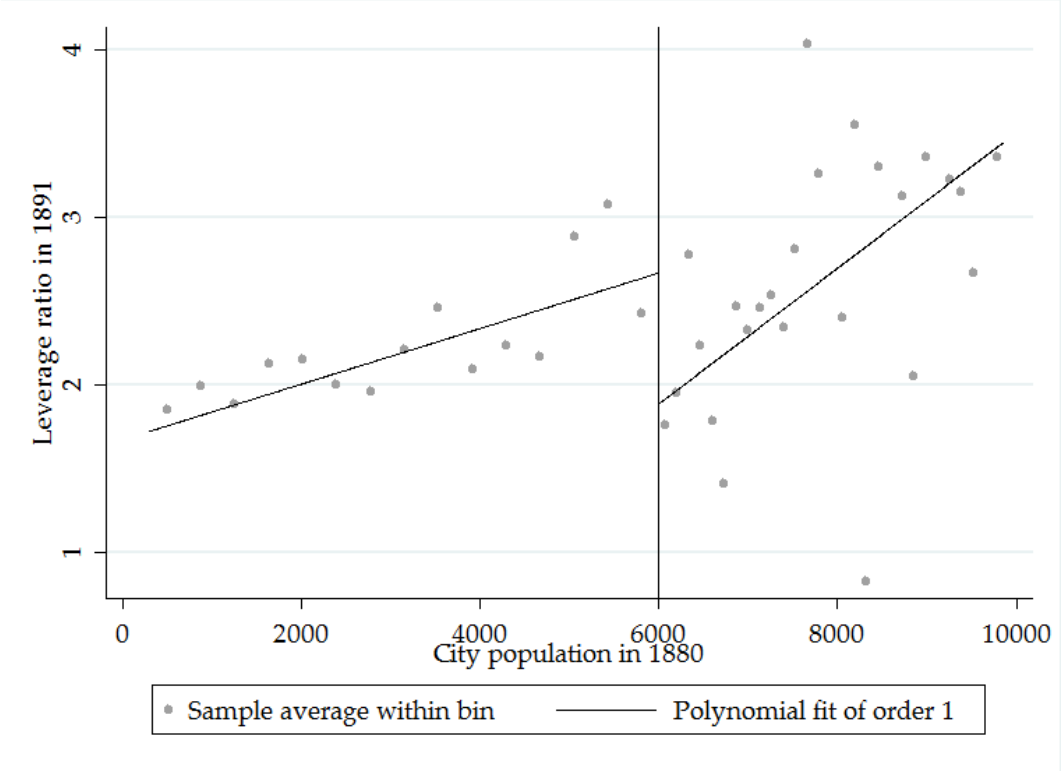


Figure 9: *Binned scatterplot of bank leverage in 1891 by city population in 1880.*

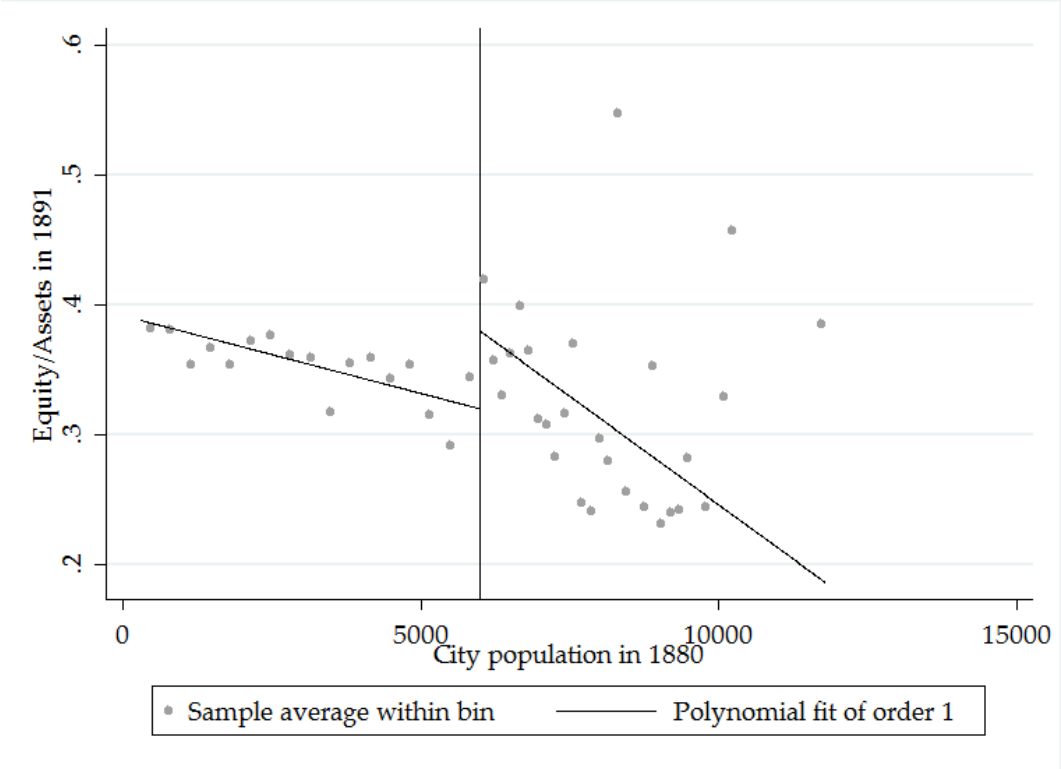


Figure 10: *Binned scatterplot of bank capital ratio in 1891 by city population in 1880.*

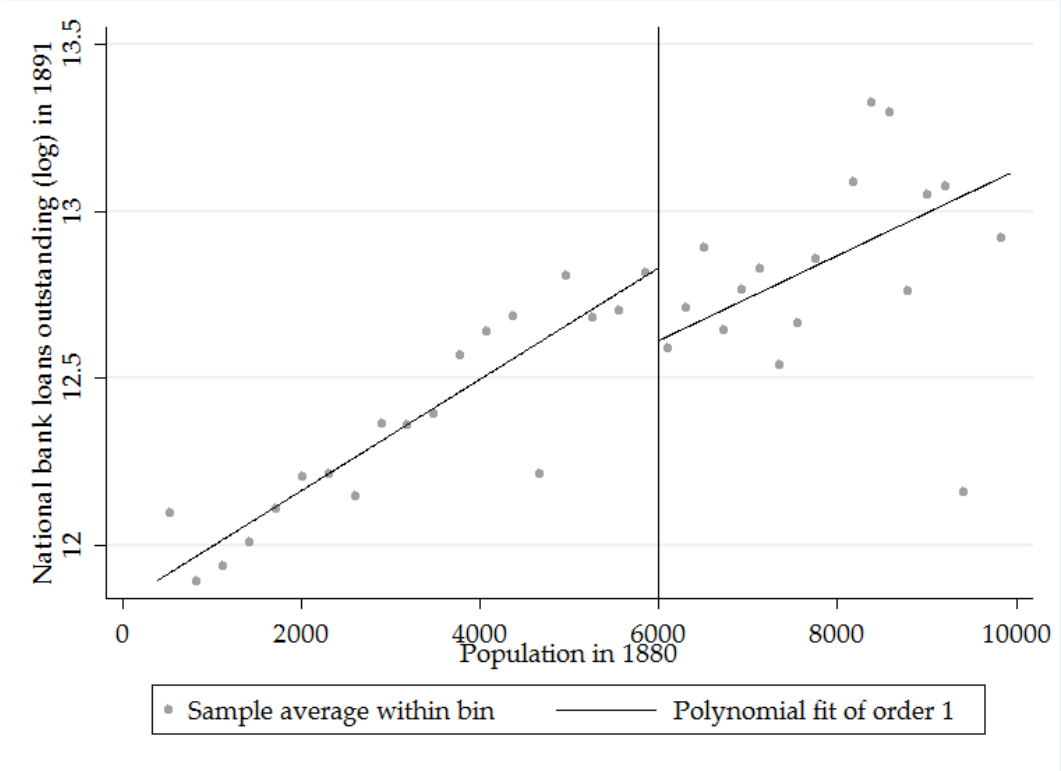


Figure 11: *Average amount of national bank loans outstanding (in log) by city population in 1880.*

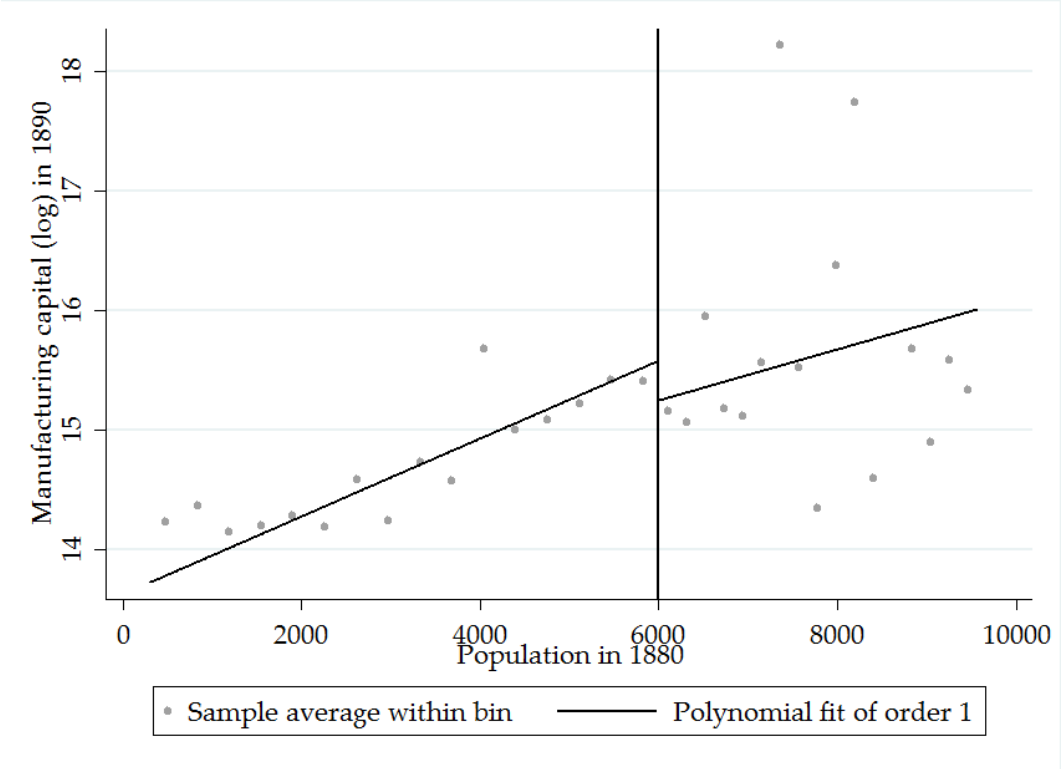


Figure 12: *Average manufacturing capital invested in 1890 by city population in 1880.*

9 Tables

Table 1: ***Descriptive statistics I***— *comparing city characteristics with less than 6000 inhabitants in 1870, at least one national bank in 1881, but different entry costs after the publication of the 1880 census.*

	Population 1880<6000		Population 1880>6000		Difference	
	Mean	Std	Mean	Std	Diff	t-stat
Capital (in thousands) in 1881	118.887	84.387	188.862	122.214	69.974	4.372
Loans (in thousands) 1881	200.033	150.780	416.078	255.315	216.045	6.498
Total assets (in thousands) in 1881	452.289	298.560	818.676	470.578	366.387	5.965
Population in 1870	2151.009	1360.108	4650.367	1550.042	2499.358	12.158
Population in 1880	2751.114	1361.173	7460.433	1187.618	4709.319	29.231
Population in 1890	3361.006	2091.379	10764.934	5036.178	7403.927	11.379
Manufacturing establishments in 1880	76.685	54.122	133.915	71.188	57.229	5.368
Manufacturing capital per capita (in th) in 1880	0.217	0.377	0.207	0.153	-0.010	-0.357
Manufacturing output per capita in 1880	0.364	0.688	0.340	0.214	-0.024	-0.561
Share with railroad by 1871	0.623	0.485	0.717	0.454	0.094	1.534
Share with railroad by 1881	0.879	0.327	0.917	0.279	0.038	1.001
Share with railroad by 1891	0.939	0.240	0.967	0.181	0.028	1.122
$\Delta \text{Population}_{1870:1880}$	0.452	0.871	0.668	1.074	0.215	1.520
$\Delta \text{Capital}_{1871:1881}$	-0.016	0.338	-0.011	0.461	0.005	0.072
$\Delta \text{Loans}_{1871:1881}$	0.133	0.461	0.213	0.504	0.080	1.101
$\Delta \text{TotalAssets}_{1871:1881}$	0.227	0.349	0.227	0.413	-0.000	-0.005
$\Delta \text{ManuCapital}_{1870:1880}$	0.173	0.607	0.203	0.369	0.030	0.456
$\Delta \text{ManuEstablishments}_{1870:1880}$	-0.087	0.635	-0.082	0.436	0.005	0.063
$\Delta \text{ManuOutput}_{1870:1880}$	0.081	0.615	0.107	0.464	0.026	0.329

Table 2: ***Descriptive statistics II***— *national banks founded before 1881 located in cities with less than 6000 inhabitants in 1870.*

	Mean	Std	10th Perc	25th Perc	Median	75th Perc	90th Perc	N
Total assets (in th)	402.61	219.63	191.24	254.37	344.84	491.56	690.00	816
Equity	129.43	80.77	56.20	68.30	118.12	150.81	240.00	816
Capital paid in	103.96	62.95	50.00	50.00	100.00	110.00	200.00	816
Surplus fund	24.86	24.52	2.70	10.00	20.00	30.00	50.00	816
Deposits	171.23	123.64	50.50	89.16	138.96	217.31	327.96	816
National bank notes	86.01	56.65	43.80	45.00	81.97	90.00	164.10	816
Cash (specie and legal tender)	19.28	16.79	3.88	7.96	15.20	25.21	38.41	816
Liquid assets	55.87	48.45	12.79	24.05	43.51	74.11	109.59	816
Loans and discounts	182.25	117.17	74.22	105.21	151.60	218.33	328.19	816
Leverage	2.34	1.11	1.21	1.57	2.13	2.85	3.79	816
Equity/Assets	0.33	0.09	0.21	0.26	0.32	0.39	0.45	816
Loans/Assets	0.45	0.11	0.30	0.38	0.45	0.52	0.60	816
Deposits/Assets	0.41	0.16	0.19	0.30	0.42	0.53	0.62	816
Cash/Assets	0.05	0.03	0.01	0.03	0.04	0.07	0.09	816
Liquid/Assets	0.14	0.08	0.05	0.07	0.12	0.19	0.26	816
Reserves/(Required reserves)	2.35	1.36	1.00	1.38	2.01	2.98	4.08	816

Bank characteristics for banks in cities with at least one national bank in 1881. Data restricted to bank with entirely correct balance sheet and charter in operation in 1881 and 1891.

Table 3: ***Descriptive statistics III***— *comparing sample national banks in 1881 across markets with different entry costs after 1881.*

	Population 1880<6000		Population 1880>6000		Difference	
	Mean	Std	Mean	Std	Diff	t-stat
Total assets (in th)	384.176	205.261	567.588	271.039	183.412	5.398
Equity	125.849	78.724	161.453	91.682	35.604	3.073
Capital paid in	101.022	61.145	130.265	72.552	29.243	3.091
Surplus fund	24.254	24.289	30.256	26.071	6.002	1.990
Deposits	159.553	112.722	275.756	162.862	116.204	5.628
National bank notes	84.252	55.033	101.744	67.824	17.492	1.953
Cash (specie and legal tender)	17.974	15.743	30.949	20.986	12.975	4.485
Liquid assets	52.903	46.187	82.408	59.328	29.505	4.050
Loans and discounts	170.545	105.792	287.075	156.513	116.530	5.968
Leverage	2.294	1.089	2.748	1.175	0.454	2.945
Equity/Assets	0.331	0.092	0.291	0.082	-0.040	-3.607
Loans/Assets	0.441	0.112	0.502	0.124	0.061	3.748
Deposits/Assets	0.407	0.158	0.475	0.147	0.068	3.454
Cash/Assets	0.048	0.034	0.056	0.033	0.008	1.727
Liquid/Assets	0.138	0.083	0.147	0.079	0.008	0.884
Reserves/(Required reserves)	2.384	1.387	2.032	1.063	-0.352	-2.449

Bank characteristics for banks in cities with at least one national bank in 1881. Data restricted to bank with entirely correct balance sheet and charter in operation in 1881 and 1891.

Table 4: ***Entry I***— *city-level evidence on entries of national banks between 1882 and 1891 in cities with exactly one national bank in 1881. Poisson estimation with average marginal effect reported.*

Dependent variable	Entries$_{nb}$, 1882-1891							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\mathbb{1}_{\text{pop1880}>6000}$	-0.159***	-0.173***	-0.169***	-0.200***	-0.209***	-0.193***		
	(0.047)	(0.045)	(0.044)	(0.038)	(0.038)	(0.038)		
$\mathbb{1}_{\text{pop1880}>4000}$							-0.060	-0.047
							(0.067)	(0.062)
Population in 1880 (log)	0.063*	0.079**	0.043	0.137***	0.141***	0.105***	0.097**	0.061
	(0.037)	(0.037)	(0.036)	(0.036)	(0.036)	(0.035)	(0.049)	(0.046)
Population growth, 1880-1890	0.004***	0.004***	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Population growth, 1870-1880	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.002**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Years of railroad access		-0.003**	-0.002*		-0.000	0.000	-0.003*	-0.002
		(0.002)	(0.001)		(0.002)	(0.002)	(0.002)	(0.002)
Railroad access by 1891		0.261	0.208		0.124	0.106	0.316	0.265
		(0.175)	(0.173)		(0.158)	(0.148)	(0.227)	(0.225)
Railroad access by 1881		-0.001	-0.044		-0.115	-0.133	-0.001	-0.048
		(0.084)	(0.080)		(0.089)	(0.087)	(0.090)	(0.084)
National bank capital in 1881			-0.250***			-0.170***		-0.274***
			(0.047)			(0.059)		(0.053)
National bank assets in 1881			0.334***			0.220***		0.351***
			(0.052)			(0.063)		(0.054)
Mean	.21	.21	.21	.21	.21	.21	.21	.21
R^2	.071	.081	.12	.19	.19	.2	.08	.13
Number of Cities	569	569	569	569	569	569	498	498
Number of Counties	308	308	308	308	308	308	284	284
State FE	No	No	No	Yes	Yes	Yes	No	No

This tables shows coefficients from estimating

$$y_c = \alpha + \exp\left(\beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta X_c + \gamma_s + \epsilon_c\right),$$

where y_c is the number of national banks entering the market of city c between 1882 and 1891. We estimate the the equation with Poisson and report margins. The sample is reduced to cities with less than 4,000 inhabitants according to the 1870 census in columns (7) and (8). Data is restricted to cities with at least one national bank in 1881.
Standard errors clustered at the city level in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

Table 5: ***Entry II***— *city-level evidence on existence of national and state chartered institutions between in 1891 in cities with exactly one national bank in 1881. Poisson estimation and average marginal effect reported.*

Dependent variable	nb_{1891}		sb_{1891}		$sb_{1891} + nb_{1891}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}_{\text{pop1880}>6000}$	-0.373***	-0.364***	0.262*	0.256*	-0.247***	-0.234***
	(0.064)	(0.063)	(0.148)	(0.148)	(0.090)	(0.085)
Population growth, 1880-1890	0.007***	0.007***	0.003**	0.003*	0.009***	0.008***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
Population growth, 1870-1880	0.006***	0.006***	-0.001	-0.001	0.005***	0.005***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Years of railroad access	-0.002	-0.001	-0.002	-0.001	-0.003	-0.002
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Railroad access by 1891	0.174**	0.162**	-0.053	-0.041	0.069	0.057
	(0.076)	(0.073)	(0.131)	(0.129)	(0.097)	(0.092)
Railroad access by 1881	-0.108	-0.128	0.223*	0.190	0.051	0.011
	(0.085)	(0.084)	(0.124)	(0.121)	(0.099)	(0.095)
$nb_{1881} + sb_{1881}$	-0.006	0.009	0.389***	0.404***	0.500***	0.523***
	(0.042)	(0.042)	(0.059)	(0.060)	(0.051)	(0.053)
National bank capital in 1881		-0.187***		-0.100		-0.298***
		(0.061)		(0.131)		(0.086)
National bank assets in 1881		0.240***		0.214		0.439***
		(0.058)		(0.139)		(0.090)
Mean	1.2	1.2	.42	.42	1.6	1.6
R^2	.019	.02	.23	.24	.047	.05
Number of Cities	569	569	569	569	569	569
Number of Counties	308	308	308	308	308	308
State FE	Yes	Yes	Yes	Yes	Yes	Yes

$$y_c = \alpha + \exp\left(\beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta X_c + \gamma_s + \epsilon_c\right),$$

where y_c is city c's number of national banks in 1891 nb_{91}, or the number of state bank in 1891, sb_{91}, or the sum of the two. We estimate the the equation with Poisson and report margins. All estimations are restricted to cities with at least one national bank in 1881.
Standard errors clustered at the city level in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

Table 6: ***Entry III—*** *city-level evidence on existence of national banks and state bank in 1891 by number of national banks in 1881. Poisson estimation and average marginal effects reported.*

nb_{1881}	>0	$\in \{1,2\}$	=1	>0	$\in \{1,2\}$	=1
Dependent variable	$sb_{1891} + nb_{1891}$			nb_{1891}		
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}_{\text{pop1880}>6000}$	-0.223***	-0.174**	-0.234***	-0.161**	-0.178**	-0.364***
	(0.078)	(0.076)	(0.085)	(0.069)	(0.071)	(0.063)
Population in 1880 (log)	0.296***	0.264***	0.130***	0.083**	0.100***	0.125***
	(0.042)	(0.043)	(0.042)	(0.037)	(0.035)	(0.031)
Population growth, 1880-1890	0.002*	0.002	0.008***	0.006***	0.006***	0.007***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)
Population growth, 1870-1880	0.003	0.001	0.005***	0.003*	0.003**	0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Years of railroad access	-0.002	-0.001	-0.002	-0.001	-0.000	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Railroad access by 1891	0.094	0.085	0.057	0.092	0.103	0.162**
	(0.110)	(0.104)	(0.092)	(0.100)	(0.092)	(0.073)
Railroad access by 1881	-0.016	-0.022	0.011	0.029	-0.015	-0.128
	(0.099)	(0.096)	(0.095)	(0.103)	(0.096)	(0.084)
National bank capital in 1881	-0.275***	-0.273***	-0.298***	-0.142**	-0.131**	-0.187***
	(0.080)	(0.081)	(0.086)	(0.070)	(0.066)	(0.061)
National bank assets in 1881	0.409***	0.416***	0.439***	0.446***	0.387***	0.240***
	(0.081)	(0.081)	(0.090)	(0.068)	(0.064)	(0.058)
$nb_{1881} + sb_{1881}$	0.379***	0.452***	0.523***	0.260***	0.194***	0.009
	(0.035)	(0.036)	(0.053)	(0.027)	(0.030)	(0.042)
Mean	1.8	1.8	1.6	1.4	1.4	1.2
R^2	.062	.059	.05	.069	.051	.02
Number of Cities	749	722	569	749	722	569
Number of Counties	392	380	308	392	380	308
State FE	Yes	Yes	Yes	Yes	Yes	Yes

This tables shows coefficients from estimating

$$y_c = \alpha + \exp\left(\beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta X_c + \gamma_s + \epsilon_c\right),$$

where y_c is city c's number of national banks in 1891 nb_{91}, or the sum of national banks and state banks in 1891, $nb_{91} + sb_{91}$. We estimate the the equation with Poisson and report margins. All estimations are restricted to cities with at least one national bank in 1881. Moreover, column (2) and (4) restrict the sample to cities with one or two national banks in 1881 and column (3) and (6) restrict the sample to cities with exactly one national bank in 1881.
Standard errors clustered at the city level in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

Table 7: ***Bank credit I—*** *bank-level evidence on growth of bank loans between 1881 and 1891 for incumbent national banks (founded before 1882).*

Dependent variable	$\%\Delta_{\text{Loans}}$			
	(1)	(2)	(3)	(4)
$1_{\text{pop1880}>6000}$	-0.206**	-0.209**	-0.204**	-0.223**
	(0.073)	(0.075)	(0.104)	(0.080)
Population in 1880 (log)	-0.059	-0.061	-0.126*	-0.083
	(0.052)	(0.051)	(0.072)	(0.049)
Population growth, 1880-1890	0.106***	0.106***	0.097***	0.082***
	(0.015)	(0.015)	(0.017)	(0.013)
Years of railroad access		0.001	0.001	0.003
		(0.002)	(0.002)	(0.002)
Railroad access by 1891		-0.048	-0.046	-0.054
		(0.178)	(0.191)	(0.159)
Railroad access by 1881		-0.036	-0.054	-0.067
		(0.087)	(0.151)	(0.107)
Total assets in 1881 (log)			0.187***	0.361***
			(0.062)	(0.094)
Capital/Assets in 1881				0.727*
				(0.368)
Age				-0.065***
				(0.010)
$nb_{81} + sb_{81}$	-0.082	-0.081*	-0.081**	-0.104**
	(0.047)	(0.047)	(0.035)	(0.041)
Mean	.57	.57	.57	.57
R^2	.17	.17	.18	.3
No of Banks	816	816	816	816
No of Cities	697	697	697	697
No of Counties	415	415	415	415
State FE	Yes	Yes	Yes	Yes

This table shows coefficients from estimating:

$$y_b = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta X_b + \gamma_s + \epsilon_b,$$

where y_b is bank b's change in loans and discounts between 1881 to 1891. The sample is restricted to national banks that had been founded by 1881.
Standard errors clustered at the bank level in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

Table 8: ***Bank credit II—*** *bank-level evidence on growth of equity, deposits, reserves and liquid assets, and total bank assets between 1881 and 1891 for incumbent national banks (founded before 1882).*

Dependent variable	$\%\Delta_{\text{Equity}}$	$\%\Delta_{\text{Deposits}}$	$\%\Delta_{\text{Reserves}}$	$\%\Delta_{\text{Cash}}$	$\%\Delta_{\text{Notes}}$	$\%\Delta_{\text{Total}}$
	(1)	(2)	(3)	(4)	(5)	(6)
$1_{\text{pop1880}>6000}$	-0.052	-0.174*	0.077	0.039	-0.006	-0.103**
	(0.053)	(0.090)	(0.186)	(0.190)	(0.043)	(0.045)
Population in 1880 (log)	-0.032	0.037	0.130	0.151	-0.048*	-0.009
	(0.021)	(0.052)	(0.103)	(0.110)	(0.025)	(0.025)
Population growth, 1880-1890	0.033***	0.060***	0.048	0.048	0.011*	0.035***
	(0.008)	(0.015)	(0.036)	(0.036)	(0.007)	(0.010)
Years of railroad access	-0.000	-0.001	-0.002	-0.002	0.000	0.001
	(0.001)	(0.002)	(0.004)	(0.004)	(0.001)	(0.001)
Railroad access by 1891	-0.024	0.073	-0.433	-0.367	0.066	0.010
	(0.051)	(0.150)	(0.317)	(0.325)	(0.068)	(0.063)
Railroad access by 1881	0.022	0.037	0.182	0.119	-0.092	-0.028
	(0.048)	(0.122)	(0.193)	(0.207)	(0.058)	(0.053)
Total assets in 1881 (log)	0.181***	0.370***	0.390***	0.423***	0.146***	0.321***
	(0.037)	(0.060)	(0.117)	(0.121)	(0.029)	(0.036)
Capital/Assets in 1881	-0.822***	3.638***	3.941***	4.267***	0.201	0.604***
	(0.174)	(0.403)	(0.728)	(0.787)	(0.165)	(0.147)
Age	-0.029***	-0.062***	-0.059***	-0.063***	-0.006**	-0.036***
	(0.003)	(0.006)	(0.012)	(0.012)	(0.003)	(0.003)
$nb_{81} + sb_{81}$	-0.028*	-0.101***	-0.089	-0.095	-0.017	-0.042**
	(0.017)	(0.038)	(0.066)	(0.068)	(0.017)	(0.017)
Mean	.14	.43	.49	.55	-.54	.09
R^2	.39	.31	.16	.16	.1	.44
No of Banks	816	816	816	816	816	816
No of Cities	697	697	697	697	697	697
No of Counties	415	415	415	415	415	415
State FE	Yes	Yes	Yes	Yes	Yes	Yes

This table shows coefficients from estimating:

$$y_b = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta X_b + \gamma_s + \epsilon_b,$$

where y_b is bank b's change in equity, deposits, reserves, liquid assets, national bank notes, and total assets between 1881 to 1891. The sample is restricted to national banks that had been founded by 1881.
Standard errors clustered at the bank level in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

Table 9: ***Bank credit III—*** *bank-year-level evidence on behavior of incumbent national banks (founded before 1882) from 1871 to 1891.*

Dependent variable	$\%\Delta_{\text{Loans}}$		$\%\Delta_{\text{Deposits}}$		$\%\Delta_{\text{Total}}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$1_{\text{pop1880}>6000} \times$ Census	-0.031***	-0.054***	-0.025**	-0.051**	-0.019***	-0.035***
	(0.007)	(0.014)	(0.012)	(0.022)	(0.005)	(0.009)
Total Assets (log)	0.005	-0.014	-0.080***	-0.071**	0.042***	0.042***
	(0.011)	(0.019)	(0.018)	(0.030)	(0.008)	(0.012)
Total capital (log)	0.018	0.031	0.171***	0.142***	0.036***	0.027**
	(0.012)	(0.020)	(0.019)	(0.032)	(0.008)	(0.013)
Equity/Assets	-0.643***	-0.581***	-0.376***	-0.421***	-0.457***	-0.476***
	(0.040)	(0.061)	(0.064)	(0.098)	(0.026)	(0.038)
Loans/Assets	0.501***	0.545***	-0.171***	-0.118**	-0.019	0.011
	(0.019)	(0.028)	(0.030)	(0.046)	(0.013)	(0.018)
Liquid Assets/Assets	-0.293***	-0.416***	0.447***	0.455***	0.232***	0.192***
	(0.029)	(0.043)	(0.047)	(0.070)	(0.019)	(0.027)
Deposits/Assets	0.039	0.077*	1.023***	1.088***	0.048***	0.029
	(0.028)	(0.043)	(0.045)	(0.069)	(0.019)	(0.027)
Railroad Dummy	-0.002	0.005	0.023**	0.021	0.001	0.009
	(0.007)	(0.011)	(0.011)	(0.017)	(0.005)	(0.007)
Mean	.037	.035	.054	.05	.021	.017
R^2	.3	.59	.3	.6	.33	.63
N	14001	9703	14001	9703	14001	9703
No of Banks	816	597	816	597	816	597
No of Cities	707	487	707	487	707	487
No of Counties	416	197	416	197	416	197
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
County-time FE	No	Yes	No	Yes	No	Yes

This table reports coefficients from estimating

$$y_{bt} = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} \times \text{Census} + \delta X_{bt} + \tau_t + \gamma_{ct} + \epsilon_{bt},$$

where y_{bt} is either the annual change in loans, deposits, or total assets. Census is a dummy that takes the value one in 1882, i.e., after the census of 1880 is published. γ_{ct} is a county-time fixed effect. We estimate the equation using data from 1872 to 1891.
Standard errors clustered at the bank level in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

Table 10: ***Threat of entry—*** *bank-level evidence on growth of loans between 1881 and 1891 for incumbent national banks (founded before 1882) for banks in towns that do not see a new bank enter.*

Dependent variable	$\%\Delta_{\text{Loans}}$	$\%\Delta_{\text{Deposits}}$	$\%\Delta_{\text{Total}}$	$\frac{\text{Assets-Equity}}{\text{Equity}}$	$\frac{\text{Equity}}{\text{Assets}}$	$\frac{\text{Loans}}{\text{Equity}}$	$\frac{\text{Deposits}}{\text{Assets}}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$1_{\text{pop1880}>6000}$	-0.227*	-0.241	-0.129	-0.383	0.037***	-0.424***	-0.038***
	(0.109)	(0.165)	(0.086)	(0.245)	(0.011)	(0.147)	(0.013)
Population in 1880 (log)	-0.023	0.101	0.021	0.170**	-0.021***	0.082	0.034***
	(0.059)	(0.064)	(0.025)	(0.072)	(0.006)	(0.051)	(0.008)
Population growth, 1880-1890	0.097***	0.117**	0.045***	0.067	-0.008	0.101	0.016**
	(0.029)	(0.044)	(0.014)	(0.058)	(0.007)	(0.116)	(0.008)
Years of railroad access	0.003	-0.001	0.000	-0.004	0.000	-0.003	-0.000
	(0.003)	(0.002)	(0.001)	(0.003)	(0.000)	(0.004)	(0.001)
Railroad access by 1891	-0.086	0.064	-0.033	-0.222	0.011	-0.123	-0.013
	(0.152)	(0.190)	(0.065)	(0.140)	(0.014)	(0.208)	(0.015)
Railroad access by 1881	-0.036	0.065	0.017	0.315**	-0.021	0.239	0.032
	(0.142)	(0.160)	(0.047)	(0.143)	(0.016)	(0.185)	(0.022)
Total assets in 1881 (log)	0.313***	0.323**	0.315***	0.489***	-0.032***	0.629***	0.010
	(0.092)	(0.127)	(0.048)	(0.108)	(0.010)	(0.155)	(0.017)
Age	-0.085***	-0.075***	-0.041***	-0.036***	0.004***	-0.031***	-0.005***
	(0.014)	(0.008)	(0.004)	(0.010)	(0.001)	(0.009)	(0.002)
$nb_{81} + sb_{81}$	-0.060	-0.073	-0.024	-0.021	0.000	-0.037	0.007
	(0.064)	(0.092)	(0.034)	(0.081)	(0.009)	(0.071)	(0.010)
Mean	.54	.48	.063	2.1	.37	2.4	.48
R^2	.3	.33	.43	.59	.65	.47	.7
No of Banks	467	467	467	467	467	467	467
No of Cities	467	467	467	467	467	467	467
No of Counties	289	289	289	289	289	289	289
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table shows coefficients from estimating:

$$y_b = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta X_b + \gamma_s + \epsilon_b,$$

where y_b can either bank b's change in loans, deposits, or and total assets between 1881 to 1891, or bank b's leverage, capital ratio or loan ratio in 1891. The sample is restricted to national banks that had been founded by 1881 and are located in cities that do not see any additional national bank entering between 1881 and 1891.
Standard errors clustered at the bank level in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

Table 11: ***Bank risk taking I—*** *bank-level evidence on bank balance sheet characteristics in 1891 for incumbent national banks (founded before 1882).*

Dependent variable	$\frac{\text{Assets-Equity}}{\text{Equity}}$	$\frac{\text{Equity}}{\text{Assets}}$	$\frac{\text{Loans}}{\text{Equity}}$	$\frac{\text{Deposits}}{\text{Assets}}$	$\frac{\text{Cash}}{\text{Assets}}$	$\frac{\text{Reserves}}{\text{Assets}}$
	(1)	(2)	(3)	(4)	(5)	(6)
$1_{\text{pop1880}>6000}$	-0.272**	0.019**	-0.466***	-0.024**	0.007	-0.012
	(0.129)	(0.008)	(0.159)	(0.009)	(0.004)	(0.113)
Population in 1880 (log)	0.096	-0.007	0.044	0.024***	0.004	0.072
	(0.062)	(0.005)	(0.050)	(0.006)	(0.003)	(0.075)
Population growth, 1880-1890	-0.001	0.000	0.040	-0.002	-0.000	0.003
	(0.021)	(0.001)	(0.027)	(0.004)	(0.000)	(0.014)
Years of railroad access	-0.004	-0.000	-0.002	-0.000	0.000	-0.003
	(0.003)	(0.000)	(0.004)	(0.000)	(0.000)	(0.005)
Railroad access by 1891	0.055	-0.009	0.019	0.005	0.005	-0.121
	(0.158)	(0.014)	(0.148)	(0.014)	(0.007)	(0.322)
Railroad access by 1881	0.001	0.008	0.010	0.004	-0.005	0.053
	(0.155)	(0.015)	(0.104)	(0.018)	(0.007)	(0.275)
Total assets in 1881 (log)	0.569***	-0.042***	0.795***	0.029**	-0.007**	-0.461***
	(0.078)	(0.007)	(0.107)	(0.011)	(0.003)	(0.072)
Age	-0.021***	0.003***	-0.026***	-0.004***	0.000	0.022**
	(0.008)	(0.000)	(0.009)	(0.001)	(0.000)	(0.008)
$nb_{81} + sb_{81}$	-0.077*	0.004	-0.035	-0.008*	0.001	-0.030
	(0.045)	(0.003)	(0.061)	(0.004)	(0.001)	(0.063)
Mean	2.2	.35	2.7	.5	.054	2.1
R^2	.57	.62	.49	.65	.31	.16
No of Banks	816	816	816	816	816	816
No of Cities	697	697	697	697	697	697
No of Counties	415	415	415	415	415	415
State FE	Yes	Yes	Yes	Yes	Yes	Yes

This table shows coefficients from estimating:

$$y_b = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta X_b + \gamma_s + \epsilon_b,$$

where y_b is bank b's leverage, capital ratio, deposit ratio, loansratio, or reservesratio in 1891. The sample is restricted to national banks that had been founded by 1881.
Standard errors clustered at the bank level in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

Table 12: ***Bank risk taking II—*** *bank-level evidence on risk taking: OREO and Rediscounts. Probit estimation and average marginal effect reported.*

Dependent variable	OREO		Rediscounts	
	1891	1892-1896	1891	1892-1896
	(1)	(2)	(3)	(4)
$1_{\text{pop1880}>6000}$	-0.123***	-0.159**	0.046	-0.052
	(0.047)	(0.068)	(0.036)	(0.049)
Population in 1890 (log)	-0.074**	-0.072*	-0.003	-0.013
	(0.033)	(0.040)	(0.018)	(0.031)
Population growth, 1880-1890	0.005	0.002	-0.001	0.029***
	(0.008)	(0.009)	(0.003)	(0.009)
Population growth, 1870-1880	0.034***	0.040***	-0.002	0.014
	(0.012)	(0.014)	(0.005)	(0.011)
Years of railroad access	-0.001	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Total Assets (log) in 1891	0.076**	0.162***	0.010	-0.079**
	(0.036)	(0.043)	(0.018)	(0.032)
Capital/Assets in 1891	-0.215	-0.237	0.057	-0.430***
	(0.147)	(0.180)	(0.069)	(0.141)
Loans/Assets in 1891	-0.103	0.401***	0.317***	0.717***
	(0.120)	(0.151)	(0.068)	(0.130)
Age	0.006	-0.001	-0.003	-0.003
	(0.004)	(0.005)	(0.002)	(0.003)
Mean	0.240	0.477	0.066	0.206
R^2	.031	.042	.11	.18
No of Banks	814	814	814	814
No of Cities	695	695	695	695
State FE	No	No	No	No

This table shows coefficients from estimating:

$$y_b = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta X_b + \gamma_s + \epsilon_b,$$

where y_b is a dummy variable that takes the value one if bank b has hold more than 2,500$ of "other real estate and mortgages owned" (OREO) or is using rediscounts or bills payable as a source of funding in either 1891 or anytime throughout 1892-1896. OREO typically is seized collateral from defaulting borrowers. Rediscounts and bill payable are a very expensive source of funding, often used in times of distress. The sample is restricted to national banks that had been founded by 1881. We estimate the equation by using a probit model and report margins.
Robust standard errors in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

Table 13: ***Bank risk taking III—*** *bank-level evidence on bank defaults and voluntary liquidations. Probit estimation and average marginal effect reported.*

Dependent variable	Receiver Appointed			Voluntary Liquidation		
	(1)	(2)	(3)	(4)	(5)	(6)
$1_{\text{pop1880}>6000}$	-0.010*	-0.010*	-0.010**	-0.014	-0.015**	-0.014**
	(0.006)	(0.005)	(0.004)	(0.013)	(0.007)	(0.006)
Population in 1890 (log)	0.010*	0.013**	0.010**	-0.009	0.002	0.000
	(0.005)	(0.006)	(0.005)	(0.009)	(0.006)	(0.007)
Population growth, 1880-1890	0.002	0.001	0.002*	0.004**	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Population growth, 1870-1880	0.003	0.003	0.003*	-0.006	-0.001	-0.002
	(0.002)	(0.002)	(0.002)	(0.008)	(0.006)	(0.006)
Years of railroad access	-0.000	-0.000	0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Total Assets (log) in 1891		-0.007	-0.008		-0.030***	-0.031***
		(0.009)	(0.008)		(0.010)	(0.010)
Capital/Assets in 1891		-0.003	-0.007		0.037	0.022
		(0.032)	(0.026)		(0.040)	(0.035)
Loans/Assets in 1891		0.003	-0.011		0.051	0.039
		(0.028)	(0.024)		(0.031)	(0.025)
Age		-0.001	-0.000		0.002**	0.002**
		(0.001)	(0.001)		(0.001)	(0.001)
Discountdummy			0.047			-0.004
			(0.029)			(0.008)
Clearinghouse			-0.009**			-0.001
			(0.004)			(0.014)
Mean	0.017	0.017	0.017	0.027	0.027	0.027
R^2	.088	.1	.15	.032	.12	.13
No of Banks	814	814	814	814	814	814
No of Cities	695	695	695	695	695	695
State FE	No	No	No	No	No	No

This table shows coefficients from estimating:

$$y_b = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta X_b + \gamma_s + \epsilon_b,$$

where y_b is a dummy variable that takes the value one only if bank b default between 1892 and 1896, or voluntarily liquidates between 1892 and 1898 The sample is restricted to national banks that had been founded by 1881. We estimate the equation by using a probit model and report margins. Robust standard errors in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

Table 14: ***Real economic outcomes*** *— city-level evidence on growth of value of manufactured products, capital invested in manufacturing and manufacturing establishments, between 1880 and 1890.*

Dependent variable	$\%\Delta_{\text{Capital}}$		$\%\Delta_{\text{Value}}$		$\%\Delta_{\text{Establishments}}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}_{\text{pop1880}>6000}$	-0.186**	-0.190***	-0.166**	-0.166**	-0.021	-0.017
	(0.074)	(0.071)	(0.072)	(0.068)	(0.084)	(0.080)
Population in 1880 (log)	0.167***	0.169***	0.145**	0.144**	0.133***	0.129***
	(0.053)	(0.053)	(0.065)	(0.066)	(0.040)	(0.042)
Population growth, 1880-1890	0.003	0.003	0.000	0.000	0.001	0.000
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Population growth, 1870-1880	0.009***	0.009***	0.010***	0.010***	0.006**	0.006**
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Years of railroad access		-0.001		0.001		0.002
		(0.002)		(0.002)		(0.002)
Railroad access by 1891		0.225*		0.143*		0.179
		(0.131)		(0.080)		(0.140)
Railroad access by 1881		-0.123		-0.083		-0.066
		(0.119)		(0.116)		(0.155)
Mean	.43	.43	.2	.2	-.084	-.084
R^2	.26	.27	.26	.26	.27	.28
Number of Cities	561	561	561	561	561	561
Number of Counties	373	373	373	373	373	373
State FE	Yes	Yes	Yes	Yes	Yes	Yes

Data on manufacturing growth is only available at the county level. We disaggregate to the city level by urban population. In particular, we calculate for each city c in a given *county*:

$$y_{ct} = \frac{pop_{ct}}{\sum_{c=1}^{n} pop_{ct}} y_{county},$$

The table then reports coefficients from estimating:

$$y_c = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} + \delta Z_c + \gamma_s + \epsilon_c.$$

where y_c is city c's growth of manufacturing capital, manufacturing output, or manufacturing establishments between 1880 and 1890.
Standard errors clustered at the city level in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

References

Agarwal, S., E. Benmelech, N. Bergman, and A. Seru (2012). Did the community reinvestment act (cra) lead to risky lending? Working Paper 18609, National Bureau of Economic Research.

Allen, F. and D. Gale (2004). Competition and financial stability. *Journal of Money, Credit and Banking 36*(3), 453–80.

Atack, J. (2013). On the use of geographic information systems in economic history: The american transportation revolution revisited. *Journal of Economic History 73*(2), 313–338.

Beck, T., A. Demirgüç-Kunt, and R. Levine (2006). Bank concentration, competition, and crises: First results. *Journal of Banking & Finance 30*(5), 1581 – 1603.

Benmelech, E., C. Frydman, and D. Papanikolaou (2017). Financial frictions and employment during the great depression. Working Paper 23216, National Bureau of Economic Research.

Berger, A. N. and T. H. Hannan (1998). The efficiency cost of market power in the banking industry: A test of the "quiet life" and related hypotheses. *Review of Economics and Statistics 80*(3), 454–465.

Bertrand, M., A. Schoar, and D. Thesmar (2007). Banking deregulation and industry structure: Evidence from the french banking reforms of 1985. *Journal of Finance 62*(2), 597–628.

Black, S. E. and P. E. Strahan (2002). Entrepreneurship and bank credit availability. *Journal of Finance 57*(6), 2807–2833.

Boyd, J. H. and G. De Nicolo (2005). The theory of bank risk taking and competition revisited. *Journal of Finance 60*(3), 1329–1343.

Braggion, F., N. Dwarkasing, and L. Moore (2017). Nothing special about banks: Competition and bank lending in britain, 1885–1925. *The Review of Financial Studies 30*(10), 3502–3537.

Calomiris, C. W. and M. Carlson (2016). Corporate governance and risk management at unprotected banks: National banks in the 1890s. *Journal of Financial Economics 119*(3), 512 – 532.

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. *NBER Working Paper No 24460*.

Calomiris, C. W. and S. H. Haber (2014). *Fragile by Design: The Political Origins of Banking Crises and Scarce Credit*. Princeton University Press.

Calomiris, C. W. and J. Mason (1997). Contagion and bank failures during the great depression: the june 1932 chicago banking panic. *American Economic Review 87*, 327 – 355.

Carlson, M. (2013). *Routledge Handbook of Major Events in Economic History*, Chapter The Panic of 1893, pp. 40–49. Routledge.

Carlson, M. and K. Mitchener (2009). Branch banking as a device for discipline: Competition and bank survivorship during the great depression. *Journal of Political Economy 117*(2), 165–210.

Cetorelli, N. (2014). Surviving credit market competition. *Economic Inquiry 52*(1), 320–340.

Cetorelli, N. and P. E. Strahan (2006). Finance as a barrier to entry: Bank competition and industry structure in local u.s. markets. *Journal of Finance 61*(1), 437–461.

Champ, B. (2008). The national banking system: A brief history. *Working Paper*.

Chodorow-Reich, G. (2014). The employment effects of credit market disruptions: Firm-level evidence from the 2008–9 financial crisis. *Quarterly Journal of Economics 129*(1), 1–59.

Davis, J. H. (2004). An annual index of u.s. industrial production. *Quarterly Journal of Economics 119*, 1177 – 1215.

Dick, A. and A. Lehnert (2010). Personal bankruptcy and credit market competition. *The Journal of Finance 65*(2), 655–686.

Friedman, M. and A. J. Schwartz (1963). *A Monetary History of the United States, 1867-1960*. Princeton University Press.

Fulford, S. L. (2015). How important are banks for development? national banks in the united states, 1870–1900. *Review of Economics and Statistics 97*(5), 921–938.

Goetz, M. R., L. Laeven, and R. Levine (2016). Does the geographic expansion of banks reduce risk? *Journal of Financial Economics 120*(2), 346 – 362.

Gou, M. (2016). Did capital requirements promote bank stability in the early 20th century united states? *Working Paper*.

Haines, M. R. (2004). Historical, demographic, economic, and social data: the united states, 1790-2000.

Hornbeck, R. (2010). Barbed wire: Property rights and agricultural development*. *Quarterly Journal of Economics 125*(2), 767–810.

James, J. A. (1978). *Money and Capital Markets in Postbellum America*. Princeton University Press.

Jaremski, M. (2013). State banks and the national banking acts: Measuring the response to increased financial regulation, 1860–1870. *Journal of Money, Credit and Banking 45*(2-3), 379–399.

Jaremski, M. (2014). National banking's role in u.s. industrialization, 1850–1900. *The Journal of Economic History 74*(1), 109–140.

Jaremski, M. and P. V. Fishback (2018). Did inequality in farm sizes lead to suppression of banking and credit in the late nineteenth century? *The Journal of Economic History 78*(1), 155–195.

Jayaratne, J. and P. E. Strahan (1996). The finance-growth nexus: Evidence from bank branch deregulation. *Quarterly Journal of Economics 111*(3), 639–670.

Jayaratne, J. and P. E. Strahan (1998). Entry Restrictions, Industry Evolution, and Dynamic Efficiency: Evidence from Commercial Banking. *Journal of Law and Economics 41*(1), 239–273.

Jiang, L., R. Levine, and C. Lin (2016). Competition and bank opacity. *The Review of Financial Studies 29*(7), 1911–1942.

Jimenez, G., J. A. Lopez, and J. Saurina (2013, June). How does competition affect bank risk-taking? *Journal of Financial Stability 9*(2), 185–195.

Keeley, M. C. (1990). Deposit insurance, risk, and market power in banking. *American Economic Review 80*(5), 1183–1200.

Khwaja, A. I. and A. Mian (2008). Tracing the impact of bank liquidity shocks: Evidence from an emerging market. *American Economic Review 98*(4), 1413–42.

Klaus, S., C. Martin, and W. Simon. Are competitive banking systems more stable? *Journal of Money, Credit and Banking 41*(4), 711–734.

Klein, M. A. (1971). A theory of the banking firm. *Journal of Money, Credit and Banking 3*(2), 205–218.

Koskela, E. and R. Stenbacka (2000). Is there a tradeoff between bank competition and financial fragility? *Journal of Banking and Finance 24*, 1853–1873.

Liebersohn, J. (2017). How does competition affect bank lending? quasi-experimental evidence from bank mergers. *working paper*.

Marquez, R. (2002). Competition, adverse selection, and information dispersion in the banking industry. *The Review of Financial Studies 15*(3), 901–926.

Martinez-Miera, D. and R. Repullo (2010). Does competition reduce the risk of bank failure? *The Review of Financial Studies 23*(10), 3638–3664.

Matutes, C. and X. Vives (1996). Competition for deposits, fragility, and insurance. *Journal of Financial Intermediation 5*(2), 184 – 216.

Mian, A., A. Sufi, and E. Verner (2018). How do credit supply shocks affect the real economy? evidence from the united states in the 1980s. *Working paper*.

Milgrom, P. and J. Roberts (1982a). Limit pricing and entry under incomplete information: An equilibrium analysis. *Econometrica 50*(2), 443–459.

Milgrom, P. and J. Roberts (1982b). Predation, reputation, and entry deterrence. *Journal of Economic Theory 27*(2), 280 – 312.

Peek, J. and E. S. Rosengren (2000). Collateral damage: Effects of the japanese bank crisis on real activity in the united states. *American Economic Review*, 30–45.

Petersen, M. A. and R. G. Rajan (1994). The benefits of lending relationships: Evidence from small business data. *Journal of Finance 49*(1), 3–37.

Petersen, M. A. and R. G. Rajan (1995). The effect of credit market competition on lending relationships*. *Quarterly Journal of Economics 110*(2), 407–443.

Pratt, A. (1886). *Pratt's digest of the national banking act and other laws realting to national banks from the from the revised statutes of the united states with amendmendts*. A.S. Pratt & Sons.

Rajan, R. and R. Ramcharan (2015, April). The anatomy of a credit crisis: The boom and bust in farm land prices in the united states in the 1920s. *American Economic Review 105*(4), 1439–77.

Rancière, R., A. Tornell, and F. Westermann (2008). Systemic crises and growth*. *The Quarterly Journal of Economics 123*(1), 359–406.

Repullo, R. (2004). Capital requirements, market power, and risk-taking in banking. *Journal of Financial Intermediation 13*(2), 156 – 182. Bank Capital Adequacy Regulation under the New Basel Accord.

Rice, T. and P. E. Strahan (2010). Does credit competition affect small-firm finance? *Journal of Finance 65*(3), 861–889.

Scharfstein, D. S. and A. Sunderam (2013, June). Concentration in mortgage lending, refinancing activity and mortgage rates. Working Paper 19156, National Bureau of Economic Research.

Schmidt, B. (2017). Creating data: The invention of information in the nineteenth century american state.

Stiroh, K. and P. E. Strahan (2003). Competitive dynamics of deregulation: Evidence from u.s. banking. *Journal of Money, Credit and Banking 35*(5), 801–28.

Sylla, R. (1969). Federal policy, banking market structure, and capital mobilization in the united states, 1863–1913. *The Journal of Economic History 29*(4), 657–686.

U.S. Census Bureau and E. Steiner (2017). *Spatial History Project*.

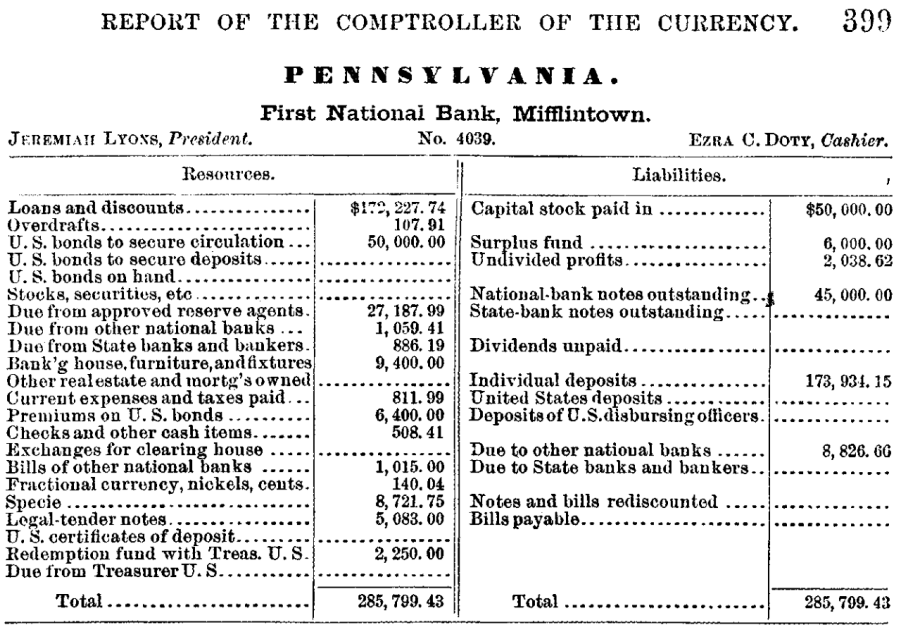
White, E. (1983). *The Regulation and Reform of the American Banking System*. Princeton University Press.

Zarutskie, R. (2006). Evidence on the effects of bank competition on firm borrowing and investment. *Journal of Financial Economics 81*(3), 503 – 537.

A Important National Banking Laws

Act of June 3, 1864 (The National Bank Act). Section 7. No association shall be organized under this act, with a less capital than one hundred thousand dollars, nor in a city whose population exceeds fifty thousand persons, with a less capital than two hundred thousand dollars: Provided, that banks with a capital of not less than fifty thousand dollars may, with the approval of the Secretary of the Treasury, be organized in any place the population of which does not exceed six thousand inhabitants.

B Supplementary Figures and Tables



REPORT OF THE COMPTROLLER OF THE CURRENCY. 399

PENNSYLVANIA.

First National Bank, Mifflintown.

JEREMIAH LYONS, *President.* No. 4039. EZRA C. DOTY, *Cashier.*

Resources.		Liabilities.	
Loans and discounts	$172, 227. 74	Capital stock paid in	$50, 000. 00
Overdrafts	107. 91		
U. S. bonds to secure circulation	50, 000. 00	Surplus fund	6, 000. 00
U. S. bonds to secure deposits		Undivided profits	2, 038. 62
U. S. bonds on hand			
Stocks, securities, etc		National-bank notes outstanding	45, 000. 00
Due from approved reserve agents	27, 187. 99	State-bank notes outstanding	
Due from other national banks	1, 059. 41		
Due from State banks and bankers	886. 19	Dividends unpaid	
Bank'g house, furniture, and fixtures	9, 400. 00		
Other real estate and mortg's owned		Individual deposits	173, 934. 15
Current expenses and taxes paid	811. 99	United States deposits	
Premiums on U. S. bonds	6, 400. 00	Deposits of U.S. disbursing officers	
Checks and other cash items	508. 41		
Exchanges for clearing house		Due to other national banks	8, 826. 66
Bills of other national banks	1, 015. 00	Due to State banks and bankers	
Fractional currency, nickels, cents	140. 04		
Specie	8, 721. 75	Notes and bills rediscounted	
Legal-tender notes	5, 083. 00	Bills payable	
U. S. certificates of deposit			
Redemption fund with Treas. U. S.	2, 250. 00		
Due from Treasurer U. S.			
Total	285, 799. 43	Total	285, 799. 43

Figure 13: *Excerpt from the 1891 OCC annual report.*

AN IMPORTANT PUBLICATION.: The First Volume of the Result of the Tenth Censtis.
The Washington Post (1877-1922); Mar 4, 1882; ProQuest Historical Newspapers: The Washington Post
pg. 1

AN IMPORTANT PUBLICATION.

The First Volume of the Result of the Tenth Census.

The first and most important publication embodying the results of the tenth census, appeared yesterday in a handsome quarto volume of nearly four hundred pages, containing the final tables of population, with introductory remarks, colored maps, diagrams, computations and copious notes, designed to assist the student of the tables. The first of these tables shows the population of the United States in the aggregate, by sexes, nativity and race; the aggregate population at each census of each State and Territory as constituted at the date of that census; the percentage of increase, the density of population, the aggregate population and the colored and foreign population, in relation to topographical features, to elevation above the sea level, to the mean annual temperature, to the mean temperature of July and of January and to the maximum and minimum temperature, and to the annual and the spring and summer rainfall.

Table two shows the population of each State and Territory by counties, in the aggregate and all censuses, and presents a record of changes in county organizations since the last census.

Table three shows the population of civil divisions less than counties, including cities in the aggregate at the census of 1880 and 1870, and presents a record of changes in these divisions since the last census.

Figure 14: *Washington Post article on the publication of city-level census data.*

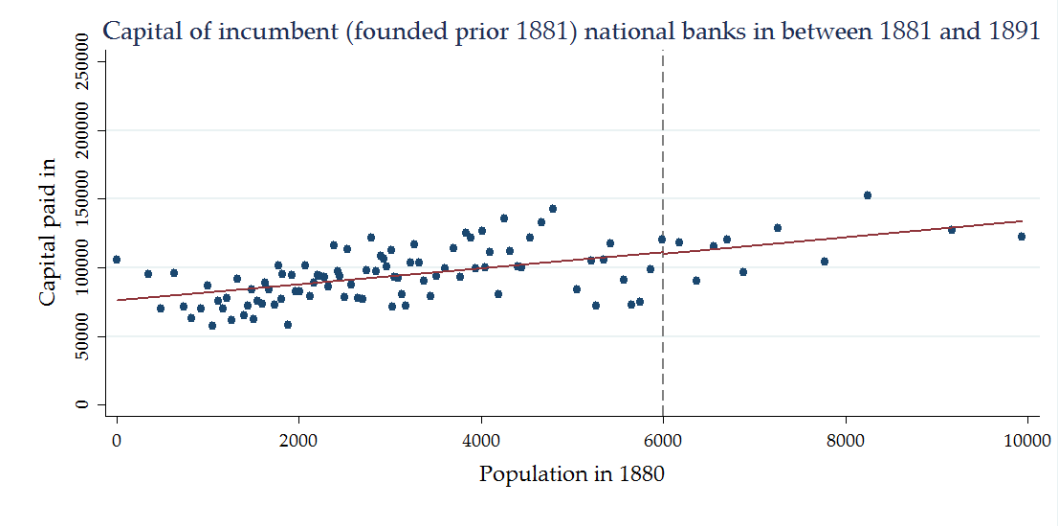


Figure 15: *Scatterplot of capital paid-in for all for banks that were founded prior to 1882 between 1881 and 1891, by population of bank location.*

Table 15: ***Bank risk taking IV—*** *bank-year-level evidence on behavior of incumbent national banks (founded before 1882) from 1871 to 1891.*

Dependent variable	$\%\Delta_{\text{Leverage}}$		$\%\Delta_{\text{Equity/Assets}}$		$\%\Delta_{\text{Liquid/Assets}}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$1_{\text{pop1880}>6000} \times$ Census	-0.018*	-0.042***	0.012**	0.026***	-0.009	-0.023
	(0.009)	(0.014)	(0.005)	(0.008)	(0.021)	(0.042)
Total Assets (log)	-0.048***	-0.043**	0.023***	0.016	-0.076**	-0.028
	(0.016)	(0.019)	(0.007)	(0.011)	(0.032)	(0.057)
Total capital (log)	0.078***	0.072***	-0.042***	-0.032***	0.137***	0.141**
	(0.018)	(0.021)	(0.008)	(0.012)	(0.035)	(0.061)
Equity/Assets	-1.048***	-1.195***	0.614***	0.684***	-0.023	-0.019
	(0.056)	(0.063)	(0.026)	(0.037)	(0.113)	(0.186)
Loans/Assets	-0.053**	0.002	0.042***	0.011	0.054	-0.011
	(0.024)	(0.030)	(0.013)	(0.018)	(0.054)	(0.087)
Liquid Assets/Assets	0.364***	0.309***	-0.225***	-0.181***	4.564***	5.204***
	(0.040)	(0.045)	(0.019)	(0.027)	(0.083)	(0.132)
Deposits/Assets	0.092***	0.006	-0.068***	-0.009	-0.382***	-0.346***
	(0.034)	(0.044)	(0.019)	(0.026)	(0.080)	(0.131)
Railroad Dummy	-0.001	0.004	0.002	-0.001	0.028	-0.013
	(0.009)	(0.011)	(0.005)	(0.007)	(0.019)	(0.032)
Mean	.011	.0082	-.0071	-.0051	.0058	.0048
R^2	.3	.62	.31	.63	.32	.58
N	14001	9703	14001	9703	14001	9703
No of Banks	816	597	816	597	816	597
No of Cities	707	487	707	487	707	487
No of Counties	416	197	416	197	416	197
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
County-time FE	No	Yes	No	Yes	No	Yes

This table reports coefficients from estimating

$$y_{bt} = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6000} \times \text{Census} + \delta X_{bt} + \tau_t + \gamma_{ct} + \epsilon_{bt},$$

where y_{bt} is either the annual change in leverage, capital ratios, or liquid assets ratios. Census is a dummy that takes the value one in 1882, i.e., after the census of 1880 is published. γ_{ct} is a county-time fixed effect. We estimate the equation using data from 1872 to 1891.
Standard errors clustered at the bank level in parentheses and stars indicate significance at the 10%, 5%, and 1% level, respectively.

Table 16: *List of Banks with a receiver appointed during 1891 and 1896*

Bank Name	City	State	Year Receiver Appointed
Population in 1880<6000			
FIRST NATIONAL BANK	CEDARFALLS	Iowa	1892
NATIONAL GRANITE STATE BANK	EXETER	New Hampshire	1892
CITIZENS NATIONAL BANK	HILLSBORO	Ohio	1892
CITY NATIONAL BANK	GREENVILLE	Michigan	1892
FIRST NATIONAL BANK	KANKAKEE	Illinois	1892
NORTHERN NATIONAL BANK	BIGRAPIDS	Michigan	1892
CITIZENS NATIONAL BANK	MUNCIE	Indiana	1892
NATIONAL BANK OF MIDDLETOWN	MIDDLETOWN	Pennsylvania	1893
BIG RAPIDS NATIONAL BANK	BIGRAPIDS	Michigan	1894
FIRST NATIONAL BANK	PELLA	Iowa	1894
YATES COUNTY NATIONAL BANK	PENNYAN	New York	1895
FIRST NATIONAL BANK	HILLSBORO	Ohio	1895
FIRST NATIONAL BANK	FRANKLIN	Ohio	1896
NATIONAL BANK OF POTSDAM	POTSDAM	New York	1896
FIRST NATIONAL BANK	DECORAH	Iowa	1896
Population in 1880>6000			
FIRST NATIONAL BANK	SEDALIA	Missouri	1893
AMERICAN NATIONAL BANK	SPRINGFIELD	Missouri	1893
FIRST NATIONAL BANK	WILLIMANTIC	Connecticut	1894
SIOUX NATIONAL BANK	SIOUXCITY	Iowa	1895

The table shows all defaults between 1891 and 1896 of banks that are located in cities that had exactly one bank in 1881 and less than 6000 inhabitants according to the census of 1870.

Table 17: *List of Banks with that are voluntarily liquidated during 1891 and 1896*

Bank Name	City	State	Year of Liquidation
Population in 1880<6000			
FARMERS NATIONAL BANK	CONSTANTINE	Michigan	1892
FIRST NATIONAL BANK	PONTIAC	Michigan	1892
ORONO NATIONAL BANK	ORONO	Maine	1892
LAKE NATIONAL BANK	WOLFEBORO	New Hampshire	1892
FIRST NATIONAL BANK	KENDALLVILLE	Indiana	1893
FIRST NATIONAL BANK	CENTREVILLE	Michigan	1893
FIRST NATIONAL BANK	CONSTANTINE	Michigan	1893
RANDOLPH NATIONAL BANK	RANDOLPH	Massachusetts	1893
BATES COUNTY NATIONAL BANK	BUTLER	Missouri	1893
CITIZENS NATIONAL BANK	WHITEWATER	Wisconsin	1893
FIRST NATIONAL BANK	CLINTON	Missouri	1893
FIRST NATIONAL BANK	JERSEYVILLE	Illinois	1893
FIRST NATIONAL BANK	WAYNESBORO	Pennsylvania	1894
FARMERS AND DROVERS NATIONAL BANK	SOMERS	New York	1895
FIRST NATIONAL BANK	ANDES	New York	1895
WELLSBOROUGH NATIONAL BANK	WELLSBORO	Pennsylvania	1896
FIRST NATIONAL BANK	IONIA	Michigan	1896
THREE RIVERS NATIONAL BANK	THREERIVERS	Michigan	1896
FIRST NATIONAL BANK	ROMEO	Michigan	1896
CITIZENS NATIONAL BANK	FERGUSFALLS	Minnesota	1896
FIRST NATIONAL BANK	ATHENS	Pennsylvania	1897
FIRST NATIONAL BANK	GREENSBURG	Indiana	1897
NATIONAL BANK OF WINTHROP	WINTHROP	Maine	1897
THOMPSON NATIONAL BANK	THOMPSON	Connecticut	1898
PONTIAC NATIONAL BANK	PONTIAC	Michigan	1898
Population in 1880>6000			
FIRST NATIONAL BANK	SPRINGFIELD	Missouri	1892
NATIONAL BANK OF SIOUX CITY	SIOUXCITY	Iowa	1893
CORN EXCHANGE NATIONAL BANK	SIOUXCITY	Iowa	1894
MERCHANTS NATIONAL BANK	BATTLECREEK	Michigan	1894

The table shows all voluntary liquidations between 1891 and 1896 of banks that are located in cities that had exactly one bank in 1881 and less than 6000 inhabitants according to the census of 1870.