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 do they 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 as in towns below this threshold, thus leading to a locally exogenous variation of entry barriers. We construct a novel comprehensive data set comprising the annual balance sheets of all national banks, and link it with the results of the decennial census. We show that initially, banks in markets with lower entry barriers extended more credit and chose a higher leverage, leading to a local credit boom that was associated with an expansion in the local manufacturing industry. However, banks in markets with lower entry barriers were also more likely to default or go out of business during or soon after a major financial crisis, the Panic of 1893. Our evidence suggests that banking competition supports 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 plausible for competition among banks to either increase or decrease, both, credit provision and risk taking.[1] Therefore, the nature of the questions asked becomes necessarily empirical. Identifying the causal effect of bank competition empirically, however, is generally challenging as competition and concentration are typically not exogenous. Existing empirical studies for the U.S. focus mostly on the deregulation of branching restrictions (see, e.g., Jayaratne and Strahan, 1996, 1998; Black and Strahan, 2002; Dick and Lehnert, 2010; Jiang et al., 2016). However, while the lifting of branching restrictions arguably increases local banking competition, it also changes the banking landscape through a number of other channels. The inference on the causal effects of competition is thus constrained by potential confounding factors such as the ability of banks to diversify (Goetz et al., 2016) and a complex interplay of bank mergers and political economic forces (Agarwal et al., 2012; Calomiris and Haber, 2014).

In this paper, we provide novel evidence on the causal effects of banking competition by studying the National Banking Era. There are three main reasons why the National Banking Era constitutes a close to ideal laboratory to study the 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, minimum capital requirements for national bank entrants give rise to local exogenous variation in the barriers to entry.

In particular, 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, banks faced a minimum dollar 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 more than 6,000 registered local

[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).

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population required the partners of the bank to invest twice the minimum capital that was required in towns with up to 6,000 inhabitants. Hence, fairly similar local markets above and below this threshold had quite different minimum capital requirements for national banks entering the market.

The regulatory requirement further determined that 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 barriers to entry can only derive from changes in the requirements for new entrants, but not from differential regulatory treatment of incumbents.[2] Hence, this allows us to isolate the change in bank behavior that stems from differences in entry barriers for competitors alone.

The legally relevant population was determined by the most recent decennial census, so the publication of the census induced a variation in the barriers to entry for all those towns that crossed the 6,000–person 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 with a population that stayed below 6,000.

Being subject to higher barriers to 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 barriers of entry. Third, we provide evidence that treated and non-treated cities are comparable among a number of observable characteristics, such as their population and manufacturing growth prior to the publication of the census and their degree of railroad access.

Our analysis starts out by constructing a novel data set that consists of all national bank balance sheets from 1871 throughout 1896. We then proceed 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, which indicates that the barriers to entry are economically meaningful and affect the degree of local

[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).

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competition. Our findings are in line with hypothesis developed by Sylla (1969) and James (1978) that capital requirements hindered bank entry during the National Banking Era. In particular, we show that towns with exactly one national bank in 1881 and higher entry costs thereafter have an around 36% lower 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 barriers to entry 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 markets with higher barriers to entry increase their loans and deposits portfolio at an around 20 percentage points lower rate than their peers in markets with lower barriers to entry. 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 immediately 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 banks' risk taking behavior, we find that incumbent banks in markets with higher entry barriers take less risk than their peers in more competitive markets. In particular, we show that the levels of equity relative to assets and relative to loans—the riskiest component of bank's assets—are higher in markets with higher entry barriers. If loan portfolio's had a similar risk profile across the different types of markets, the finding would imply that banks in the towns with higher entry barriers indeed follow a safer business model. Given the we cannot directly observe the risk characteristics of loan portfolios, we also consider ex-post measures of risk taking and show that incumbent banks in cities with lower barriers to entry tended to have more seized collateral on their balance sheets than

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banks in towns with higher barriers to entry.

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 followed 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 towns with higher barriers to entry were 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 existing 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 is consistent with the idea that competition affects bank behavior through its effects on charter value. Banks with higher charter value have less incentive to take risk and need not expand credit as rapidly—either because they are more cautious about their customers or less concerned about having to protect their market share. This is precisely the behavior we observe in areas with higher entry barriers. Our results hence suggest competition creates a tension between credit availability and financial stability. We find that banks in areas with more potential competition appear to have made credit more easily available which in turn appears associated with increased economic growth, but also to have taken more risk and been more likely to fail. This tension is consistent with findings in other recent work, such as Rancière et al. (2008); Rajan and Ramcharan (2015); Mian et al. (2017); Jaremski and Wheelock (2017).

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,

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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 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 reduce lending or prevent it 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 by reducing interest rates, moral hazard on behalf of bank borrowers is mitigated (see, e.g., Boyd and De Nicolo, 2005).[5]

Given the sensitivity of theoretical predictions, empirical evidence becomes even more important. There are 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. For example, classic empirical evidence by Petersen and Rajan (1994, 1995) shows that young firms can borrow at lower rates in more concentrated markets, which suggests a higher credit availability in less competitive markets. Further, 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). In general, these papers show that the deregulation of branching increases the threat of takeovers and thereby induces bank managers to make more efficient lending decisions. In particular, Dick and Lehnert (2010) show that even though bankruptcy rates increase, banks perform better due to decreasing loss rates on loans.

[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.

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However, the evidence also suggests that while the deregulation of branching restrictions leads to better bank management, it does not necessarily lead to more credit provision.[6]

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) find beneficial effects of increased competition on financial stability in the 1930s. In particular, they show that that banks that faced competition from a large, diversified bank either became more efficient—and thus more likely survive a large shock—or exited the market. By contrast, Berger and Hannan (1998) observe less failures in monopolistic markets, although they argue this is due to a lack of market discipline.

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, potentially masking the raw effects of competition. Second, while the lifting of branching restrictions arguably increased local banking competition, it also changed the banking landscape through a number of other channels. As argued above, it changes the ability of banks to diversify (Goetz et al., 2016) and thus potentially influences 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 explain the differences in findings to the existing

[6]Jayaratne and Strahan (1996) find some indications that credit supply may have increased, but argue that the finding is not robust. Dick and Lehnert (2010) and Mian et al. (2017) find an increase in credit provision to households in the context of the lifting of branching restrictions. Moreover, additional evidence by Gissler et al. (2018) find that competition by credit unions leads to an increase in credit provision to households by banks.

Moreover, the real economic 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)

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literature. In contrast to the general leaning in the literature on the lifting of branching restrictions, we find strong indications that banks in more competitive areas tend to provide more credit availability. Moreover, we also find that banks in more competitive areas tend to choose riskier balance sheets, resulting in more bank failures. Our findings hence lend support to the notion that competition among banks rather increases bank risk taking (consistent with Jimenez et al., 2013; Braggion et al., 2017; Gissler et al., 2018)[7] rather than increasing the safety of the banking system (as found in Jayaratne and Strahan, 1998; Schaeck et al., 2009; Carlson and Mitchener, 2009).

However, we also find that more competitive areas tended to have greater credit availability, which in turn is associated with faster real economic growth. Hence, an additional contribution of our paper is to provide micro-evidence that causally connects the increased access of credit with credit booms, increased economic growth, and lower financial resilience. This in line with existing findings from, e.g., Rancière et al. (2008); Rajan and Ramcharan (2015); Mian et al. (2017); Jaremski and Wheelock (2017).

3 Data

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

First, we start out by constructing a comprehensive, novel dataset of annual balance sheets of all U.S. national banks between 1871 and 1896. To assemble this data set, we applied a combination of optical character recognition (OCR) and layout recognition techniques to the Comptroller of the Currency's Annual Report to the Congress.[8] 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 extracted the charter number, state, county, and city of each bank, geo-located the cities, and recorded the dates of all relevant events for each bank (entry, receivership, liquidation, rechartering, etc.).

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".

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

[8] See Figure 12 in the Appendix for an example of a bank balance sheet fromin the Annual Reports.

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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 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 *dollar amount* of equity investment (of "capital stock paid in") 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 barrier to entry rather than on leverage. [9]

Importantly, this minimum amount of capital required to open a bank depended on the population of the bank's location.[10] 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.[11]

[9] There were also other regulations related to capital. For instance, national banks were subject to a "double liability" rule: in case of a bank failure, shareholders were liable to lose not only their investments in the bank, but their own personal property up to the book value of their shares (see also Grossman, 2001)

[10] Branching regulations restricted banks to operate a single office in a single location or "place". The location could be a "city", "town", or "village".

Further note that branching restrictions together with the relatively high transportation cost at the time significantly mitigate concerns about what constitutes the appropriate locality of banking markets.

[11] In 1900, the capital regulation was refined such that banks founded in towns with less 3,000 inhabitants were required

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

There are two additional details regarding this capital requirement 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 applied to national banks that were entering the market, but not to incumbent banks, which did not have to increase their capital if the towns they operated in grew in population. These details are, for instance, described in the contemporary legal resource “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 means that, even if the population of every town is changing constantly, the minimum requirement for entrants only changes when the census is published. In line with the regulatory statutes, Figure 1 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 6,000 inhabitants have never less than $50,000, but potentially do have less than $100,000.[12]

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 (2007) for details.

[12]National banking regulation did allow banks to start operating when at least 50% of their stated capital was “paid in”, although the owners had to pay in the remainder within five months.

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[FIGURE 1 ABOUT HERE]

The fact that the capital requirement only applied to entrants, and not to incumbent national banks, means that regulatory requirements for incumbent banks are unaffected by the publication of the decennial census. I.e., if after a new census a town crossed the 6,000–person threshold, incumbent banks in the town were not required to adjust their regulatory capital. This is very attractive from the standpoint of identification as any observed changes in the behavior of incumbent banks are therefore driven by changes in the local market structure, rather than by changes in the banks' own capital structure. This is particularly important, as a change in the minimum amount of capital required may affect banks also in other ways than through competition.[13]

Finally, note that even though national banks are the predominant type of bank — for instance, in 1891, more than 75% of banking assets were held by national banks— competition can also arise form other types of financial institutions that provide similar services, such as state banks or savings banks. Therefore, it is important to emphasize that the regulatory requirements for national banks did not apply to other institutions that entered the market under a non-federal charter. As will be discussed below, higher barriers to entry for national banks provided an incentive for entry by institutions not subject to the strict regulatory requirements of national banks.

4.2 Identification

In order to study the effect of bank competition on bank behavior, we exploit that the publication changes entry barriers differentially across otherwise 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).

We focus our sample by restricting it to banks in towns with 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

[13]For instance, banks subject to the higher capital requirement may have a different ownership structure as they may need increase the number of partners to raise the capital required. In turn, differences in ownership structure are important for a bank's governance, see Calomiris and Carlson (2016).

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census.[14] We use 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. This data restriction implies that our paper focuses on the effect of adding additional banks to a town that already has at least one bank, rather than the margin of having a bank at all.

We focus on the northeastern "manufacturing belt"[15] 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 the predominant form of banking and 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 both the 1870 and the 1880 census. Formally, we define $\mathbb{1}_{\text{pop}>6,000}$ an indicator variable that takes the value one if city c passes the 6,000–person thresholdin the census of 1880 and zero otherwise, i.e.,

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

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–person thresholdaccording 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. A summary of balance sheets statistics of all banks in our sample can be found in Table 1.

[TABLE 1 ABOUT HERE]

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 6,000 inhabitants as of 1880 and hence being subject to higher entry costs is not entirely exogenous. Cities that cross the threshold might either already have a higher population in 1870 to begin with, might

[14] The OCC Annual Report for 1881 documented bank balance sheets as of October 1st.

[15] Bank in our sample are from the following twenty 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.

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have experienced a faster 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 larger towns tend to have lower economic growth rates—i.e. if growth flattens out over time—we may be simply picking 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 2 shows observable characteristics for treated and non-treated cities prior to the publication of the census.

[TABLE 2 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 for past and contemporaneous population growth. As long as our outcome variables—bank entry, loan growth, bank failure, etc.—are a continuous and approximately linear function of population, these controls will suffice. Note, however, that our results also hold when including richer population controls, such as the squares of both variables, and their interaction. These more complex population measures arguably control for the overall population trajectory of a city, and for nonlinear relationships between the outcome variables and population. Moreover our results are also robust when considering only towns closer to the 6,000–person threshold—i.e., in markets that as of 1880 had more than 3,000 but less than 9,000 inhabitants.

Reassuringly for our purposes, other than differences in the level of 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. Second, trends in bank balance sheets prior to the 1881 census are also fairly similar for the two groups of cities, as growth rates for bank assets, loans, and capital between 1871 and 1881 are not statistically different. Third, other aspects of the cities are also similar—growth rates of manufacturing capital, establishments, and output from 1870 to 1880 are quite close and both types of cities have similar per capita levels of manufacturing capital and manufacturing output in 1880. Finally, railroad access, which would facilitate trade and possibly growth, was also comparable between the two groups of cities throughout 1870, 1880,

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and 1890.

Furthermore, Figure 2 reveals that the treated cities are fairly even spatially distributed and not clustered in one specific region. Importantly, observe 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 2 ABOUT HERE]

Finally, given the differences in city size, national banks also differ among a number of observables, see Table 3. In particular, cities across the different markets are on average the same age, but banks in treated cities are on average larger and hence have a higher leverage/lower capital to asset ratio in 1881. We control for these observable differences in all regressions at the bank level.

[TABLE 3 ABOUT HERE]

5 The effects of entry costs on entry and competition

In this section, we develop and test hypotheses on how the variation in barriers to entry affected bank entry.

As argued above, an increase in the minimum capital required to open a bank acted as a local entry barrier, possibly deterring bankers from chartering a national bank in a given town or city. Thus, if these requirements were indeed economically relevant constraints, we would expect to observe less national bank entry in markets that crossed the 6,000–person thresholdafter the 1880 census was published (this hypothesis follows Sylla, 1969; James, 1978).

At the same time, a larger minimum capital requirement made the founding of state-chartered banks comparatively cheaper.[16] Hence, we expect the lower number of national banks to be at least partially offset by the new state-chartered institutions. However, even though higher entry barriers only affected national banks, we still expect to observe a lower overall entry if state banks and national banks were not perfect substitutes. There are a number of reasons to believe that this was the case, as state banks

[16]State banks also faced start-up capital requirements based on the local population. However, these requirements varied widely by state and through time. 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. We find some evidence that having lower state requirements than national ones mattered for entry, but no evidence that how much lower mattered.

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had 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 and not as well reputed as national banks (Barnett, 1911; White, 1983).

We start out by providing visual evidence on the effect of the higher entry barriers on the degree of local competition. Figure 3 depicts a binned scatter plot of the number of new national banks in towns with exactly one national bank in 1881, grouped by city population as of the the 1880 census, and including linear fits left and right of the 6,000–person threshold. Focusing 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–person threshold. In particular, towns just above the threshold have a 20 percentage points lower probability of seeing an additional national bank entry between 1882 and 1891 than towns just left of the threshold.

In a similar spirit, Figure 4 depicts the number of national banks per town in 1891 by the population as of the 1880 census. The pattern observed confirms the visual evidence on new entrants. Figure 4 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 5 shows that the gap between cities just right and left of the threshold decreases when we consider the sum of both state and national banks: cities just below 6,000 inhabitants have on average two banks, while cities just right of the threshold have average 1.7 banks. This result is intuitive, as state banks receive a comparative advantage when regulatory requirements for national banks increase. However, the overall net effect on total bank entry remains negative, consistent with the idea that national banks and state bank are not perfect substitutes.

[FIGURE 3 AND 4 AND 5 ABOUT HERE]

Overall, the visual evidence suggests that whenever national banking entrants face a higher capital requirement, entry of national banks is lower. At the same time, state chartered institutions partly fill the gap, but a difference in the number of banks operating in the local market remains.

In order to formally test the effect of capital regulation on the degree of competition in a local market, we estimate the following Poisson model:[17]

[17]We estimate a Poisson regression because the outcome variables, such as entry and number of banks, are discrete and

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$$y_c = \exp\left(\alpha_s + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \gamma Z_c + \varepsilon_c\right), \tag{1}$$

where y_c is a measure of the number of bank entries between 1882 and 1891 in city c, and α_s is a set of state fixed effects to account for differences in the regulatory requirements of state-chartered banks. $\mathbb{1}_c^{\text{pop1880}>6{,}000}$ is as above, and Z_c is a set of city-level population and railroad-access controls: the logarithm of the city's population in 1880, the (absolute) growth in population between 1870 and 1880 as well as between 1880 and 1890, as well as the city's railroad access.[18]

We estimate the model for a set of different dependent variables, y_c. For each city c, we calculate the number of new entrants between 1882 and 1891, the net entries defined as the number of entries minus the number of exists between 1882 and 1891, and the absolute number of banks operating in 1891. We first estimate the model for national banks nb_{1891} and state banks sb_{1891} separately, and then for the sum of both national and state banks.

We start out by estimating Equation (1) for the exact sample used in Figures 3 to 5, i.e. for cities with exactly one bank in 1881. We then also estimate the same model with a larger sample of 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 3 and Figure 4, 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–person thresholdon 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 columns (1) - (6).

[TABLE 4 ABOUT HERE]

To address the concern that the our threshold dummy $\mathbb{1}_c^{\text{pop1880}>6{,}000}$ might be picking up an unobserved larger trend, we consider a placebo test in which we move the threshold to 4,000 instead of 6,000, and exclude all cities that had more than 4,000 inhabitants in 1870. Reassuringly, columns (7) and (8)

non-zero.

[18] We control for railroad access by controlling for the number of years since the city first had a railroad, as well as by using indicator variables that take the value one if the city had railroad access in 1881 and 1891, respectively.

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show that the coefficient on the threshold dummy, while still negative, becomes much smaller and loses statistical significance.

We also estimate Equation (1) using the number of national banks in 1891 as the dependent variable. Focusing on towns with 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 described above, since state banks are not subject to the same regulatory requirements as national banks, they might simply fill the gap left by national banks and thus leave the towns' competitive environment unchanged. To test this, in columns (3) and (4) of Table 5 we re-estimate Equation (1) using the total number of state banks as the dependent variable. We find that, indeed, cities that switched to higher entry costs in 1881 had, by 1891, 0.23 more state banks than those with lower entry costs—although the coefficient is not precisely estimated. However, in columns (5) and (6) of the same table we add up both state and national banks, and find that crossing the threshold leads to an average of 0.27 fewer total banks, confirming the visual evidence of Figure 5.

[TABLE 5 ABOUT HERE]

Finally, we test the effect of barriers to 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, but as the average number of additional entrants.

The results in Table 6 show that the effect of a higher barrier to entry on net entry and on the overall number of national banks in the city remains negative even when we include cities with more than one bank in 1881.

[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.

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6 The effect of entry costs on incumbent banks' behavior

Having verified that capital regulation indeed predicts actual entry and hence competition, we now study the behavior of incumbent national banks. In particular, we contrast how incumbents behave in markets with low and high barriers to entry, in the ten years following the publication of the 1880 census.

Focusing on incumbents—banks founded before the publication of the 1880 census—has the key advantage of isolating the effects of changes in the degree of local competition, as opposed to changes in the banks' capital structure. This is because, as discussed earlier, minimum capital requirements only applied to newly founded banks, so incumbents were free to maintain their existing levels of capital.[19]

This section studies incumbents' behavior in three dimensions. First, we ask if higher barriers of entry affect their credit provision, and if other important balance sheet components are also affected. Second, we ask whether potential differences in credit provision can are driven by differences in actual entry, or whether they are a result of incumbents attempting to deter potential entry. Finally, we study the banks' risk appetite.

6.1 Credit provision

Figure 6 links the loan growth of incumbent national banks in 1882-1891 with the population in 1880 of the cities in which the banks are located. Eyeballing the difference around the 6,000 threshold, this figure suggests that incumbent banks in markets with higher entry barriers—at the right of the threshold—increased their loan portfolio by around 20 percentage points less than incumbent national banks in markets with lower entry barriers.

[FIGURE 6 ABOUT HERE]

To formally test this visual evidence, we estimate the following cross-sectional model:

$$y_b = \alpha_s + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \gamma X_b + \varepsilon_b, \tag{2}$$

where y_b, the outcome variable, is the growth rate of loans between 1881 and 1891, and $\mathbb{1}_c^{\text{pop1880}>6{,}000}$ is as defined above. Further, α_s is a set of state fixed effects, and X_b includes a battery of city and

[19] This is also seen empirically: Figure 14 in the Appendix shows that incumbent banks did not see a shift in their regulatory capital following the publication of the 1880 census.

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bank-level controls: number of national and state banks in 1881, population in 1880, population growth between 1880 and 1890, railroad access indicators for 1881 and 1891, years since first railroad access; as well as bank size in 1881, bank capital ratio in 1881, and the age of the bank as of 1881.

[TABLE 7 ABOUT HERE]

Table 7 reports the regression results through four alternative sets of controls, with column (1) containing the simplest specification and column (4)—our preferred specification—containing the full battery of controls. We verify our earlier visual results, with column (4) finding that crossing the threshold lead to a 22 percentage point lower loan growth in the ten years that followed the census publication. Hence, incumbent banks in markets with higher entry costs provided less credit than their peers in more competitive markets.

Moreover, we investigate whether the additional loan growth in markets with lower barriers to entry is financed by an expansion of the banks' balance sheet or a substitutions of liquid funds into illiquid loans. Moreover, to the extend it is driven by an expansion of the balance sheet, we can study whether additional loans are financed by raising additional equity or by expanding the deposit base. To understand this, we repeat eq. (2) with the 1881-1891 growth of equity, deposits, reserves, cash, bank notes, and total assets as our outcome variables.[20]

[TABLE 8 ABOUT HERE]

In line with the lower credit provision in markets with higher barriers to entry, 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.[21] There is no statistically significant difference in the growth of reserves, cash and bank notes, or equity.[22] Hence, the additional credit provision in market with lower barriers to entry coincides with an expansion of the banks' deposit base rather than additional equity finance.

To address concerns that results might be driven by either unobservable local economic conditions impacting credit demand across the two types of markets, we now exploit the richness of our data and

[20]Bank equity is defined as the sum of paid-in capital (regulatory capital), surplus fund, and undivided dividends. Reserves are defined as the sum of cash and due from reserve agents. Cash is the sum of specie, fractional currency and coins, and legal-tender notes.

[21]Returning briefly to identification and bias, all else equal, one might have expected more lending opportunities and faster loan growth in towns that crossed the 6,000 inhabitant threshold. Any potential such bias goes against our results.

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

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estimate a panel regression for all years between 1872 and 1891:[23]

$$y_{bt} = \alpha_{ct} + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} \times \text{Census-publication} + \gamma X_{bt} + \varepsilon_{bt}, \tag{3}$$

where y_{bt} is the annual growth rate of the bank-level variables described above, α_{ct} are county-time fixed effects, $\mathbb{1}_c^{\text{pop1880}>6{,}000}$ is as above and is interacted with a dummy variable that takes the value one after the publication of the census, and X_{bt} is a set of time-varying city and bank-level controls.

The particular advantage of this approach is that it allows us to include county-time fixed effects α_{ct}, which absorbs time-varying 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.[24] This is less a concern in a larger panel regression with many years of observations.

[TABLE 9 ABOUT HERE]

Table 9 columns (1), (3), and (5) show that banks in markets with higher entry barriers expanded their loan portfolio less than their peers in untreated markets, with annual growth of each category falling behind by roughly 2.5, 1.7, and 1.2 percentage points, respectively. These results are 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 columns (2), (4), and (6). Hence, the expansion of credit and deposits in market with lower barriers to entry is hence arguably driven by differences in credit supply rather than credit demand.

Our evidence hence suggests that incumbent banks operating in markets with lower entry barriers made credit more readily available. Naturally, it is of interest to learn more about the mechanism giving rise to this differential behavior. In particular, it could be that incumbent banks expanded their lending only in those markets that experienced actual entry as banks competed over market share. Alternatively, the additional credit provision could also have resulted 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 estimate Equation (2) with a reduced sample consisting

[23] We start our panel in 1872 as that is the year where the 1870 census was published.
[24] Note that our cross-sectional regression are nonetheless robust to using county fixed effects.

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only of cities in which no additional bank entered between 1881 and 1891. The result are shown in the Table 10. We find about the same effect as Table 7 of the entry restriction on loan growth between 1881 and 1891 when we focus on this specific subset of cities, even though the estimates are slightly less precise. This indicates that there was a meaningful expansion of credit by incumbent banks even when there had not been no additional entry. We interpret this as evidence that is consistent with the idea that incumbent banks expanded credit provision to prevent entry, i.e., to deter potential entrants.

[TABLE 10 ABOUT HERE]

Further information on the mechanism through which barriers of entry shaped bank outcomes can be attained by studying the timing of the effect in more detail. To this end we extend our previous panel data equation, by interacting the treatment indicator with with time dummies:

$$y_{bt} = \alpha_{ct} + \sum_{t=1871}^{1891} \beta_t \mathbb{1}_c^{\text{pop1880}>6{,}000} \times \tau_t + \gamma X_{bt} + \varepsilon_{bt}, \tag{4}$$

where y_{bt} is the loan growth of bank b from t to $t+1$, and coefficient are normalized to 1880.

Figure 7 show the coefficients across time. The effect of entry barriers on loan growth appears immediately after the publication of the census. Given that actual entry takes much more time, fig. 7 provides further indication that the effect results from attempts to deter entry. Hence, credit expands slower in markets in which the threat of entry is lower.

[FIGURE 7 ABOUT HERE]

6.2 Risk taking

To study the effect of competition on risk taking and financial stability, we start by exploring two balance sheet ratios correlated to ex-ante risk taking: the equity-assets ratio, and the equity-loans ratio, selected because loans tend to be bank's riskiest asset component. Assuming equally risky loan portfolio's and cash holdings, larger equity buffers indicate that the bank was pursuing a more conservative investment strategy.

[FIGURE 8 AND 9 ABOUT HERE]

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Figure 8 and Figure 9 suggest that incumbent banks in markets with higher entry barriers had more conservative business models. This is in line with the fact that the credit expansion in markets with lower entry barriers was financed by issuing deposits rather than raising equity.

Estimating eq. (2) using the leverage and the capital ratio as dependent variables, Table 11 confirms these results when controlling for other observable characteristics. It shows that incumbent national banks in markets with lower barriers to entry 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. In particular, incumbents in markets with high entry barriers had a 27 percentage point lower leverage ratio, and a 2 percentage points higher capital ratio. As mentioned above, these results are not driven by the regulatory capital requirement, as the 1881 change in regulation did not apply to incumbent banks.

[TABLE 11 ABOUT HERE]

Clearly, to conclude that more leveraged institutions are behaving in a riskier manner 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 that can be seen as an ex-post measure of risk-taking. On the asset side, we measure ex-post asset quality through banks' holdings of seized real estate, 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. This ratio has a quite skewed distribution, so we focus on whether or not it is greater than zero.

On the liability side, we study differences in the use of bills payable and rediscounts. These funding instruments are indicative of risk taking as they tended to short-term, high interest rate, secured transactions to which banks turned 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]

[TABLE 12 ABOUT HERE]

The results are in Table 12. With respect to OREO, column (1) shows that in 1891, a bank that had

[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.

[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).

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been operating in a less competitive market was half as likely to hold seized collateral, compared to untreated banks. Moreover, column (2) shows that this effect persists through the Panic of 1893, with a slightly larger coefficient of -0.16. Altogether, these results are consistent with the idea that banks with larger market power chose safer borrowers. We also find that banks in less competitive markets were 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.

Thus far, our results indicate that banks in areas with higher barriers to entry took less risk. These findings are consistent with the idea that banks in these areas had a higher charter value and that they acted in ways to preserve that value such as by making safer loans and being more cautious when making credit available. As a final test of risk-taking, 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 to, among other things, concerns about the US commitment to the gold standard and 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 borrower default and depositor flight during the panic and the downturn that followed.

Thus, whether the banks in the sample survived until 1898 or whether they failed or were 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 were still solvent. We provide a complete 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, respectively, whether a receiver was appointed between 1892 and 1896, or whether the bank decided 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.

[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.

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[TABLE 13 ABOUT HERE]

The coefficients in the first line of columns (1), (2) and (3) indicate 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—which is considerable given an unconditional default probability of 1.7 percentage points.

We also find that banks in less competitive markets were less likely to voluntarily liquidate during and after the crisis. While the unconditional probability of a voluntarily liquidation is calculated as 2.7 percentage points, incumbent bank in less competitive market are estimated to have been 1.4 percentage points less likely to have given up their business during the crisis. These results also point to less risk-taking; it can also be interpreted as an indication that charter values were higher in the less competitive markets, so that banks in these markets had a greater incentive to remain open, even in times of distress.

7 Evidence on manufacturing growth

After studying how competition affects credit availability and risk-taking, we now 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 1880 and 1890 decennial census, on capital establishments and output value in the manufacturing industry. This data is only available at the county level. Given that changes in county border over time make estimates of manufacturing growth potentially inaccurate, we instead construct estimates of manufacturing at the city-level. A meaningful link between county level and city-level data can be established if manufacturing outcomes are closely correlated

[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.

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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:

$$y_c = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6,000} + \delta Z_c + \gamma_s + \varepsilon_c, \tag{5}$$

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.

We estimate Equation (5) using our city-level data 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 experienced a lower growth in manufacturing capital as well as in manufacturing output. The growth in 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.

[TABLE 14 ABOUT HERE]

Our findings support 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.

[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 manufacturing outcomes. Note that our method of dis-aggregating results to the city level does not require us to account for changes in county borders.

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8 Conclusion

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 capital requirements 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 results indicate that incumbent banks in cities where entry barriers increased were less exposed to potential entry, grew their lending more slowly, and took less risk. Interestingly, we find evidence that more competitive environments may be areas of both greater credit availability that supports economic growth as well as areas of greater risk-taking that creates financial instability. More research will be needed to more fully understand this trade-off.

Our evidence also suggests that charter values played an important role in determining bank behavior. Charter values may have been particularly important and influential in this period as there was no deposit insurance, no lender of last resort, and a relatively light regulatory environment generally. Nevertheless, understanding that charter values can be important in shaping behavior can be useful for providing a sense of how financial institutions behave in less regulated environments such as the less regulated shadow banking system.

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.

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9 Figures

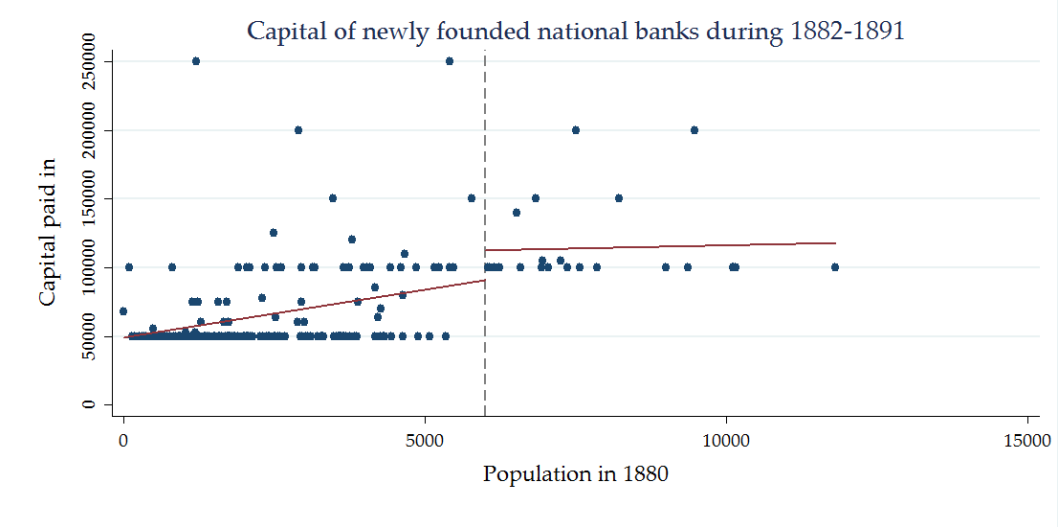


Figure 1: *Scatterplot of capital paid-in in the founding year all for banks founded between 1882 and 1891 by population of bank location.*

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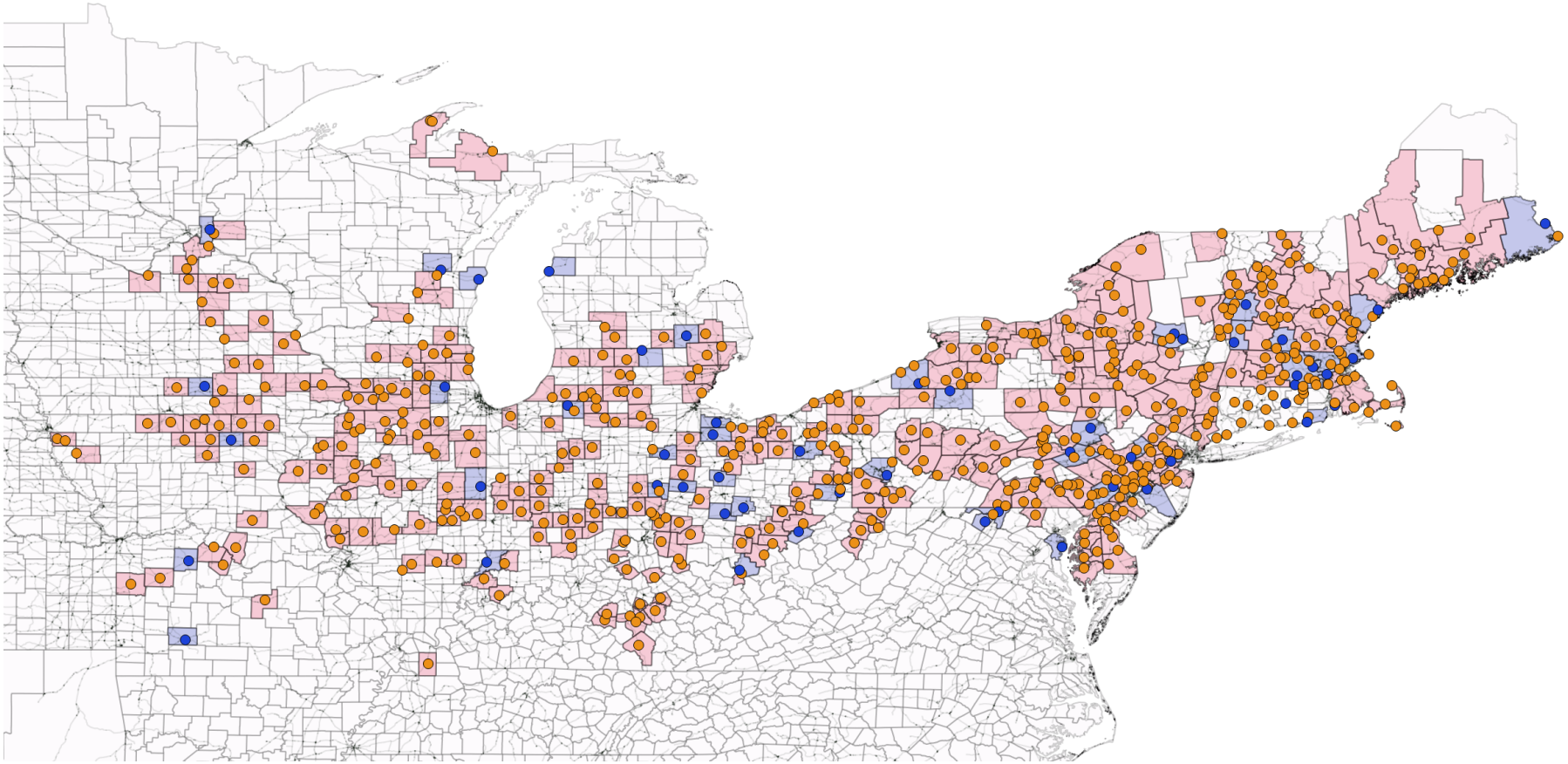


Figure 2: *Spatial distribution of cities with at least one bank in 1881 and less than 6,000 inhabitants prior to 1880. Cities are blue/non-transparent if* $\mathbb{1}_c^{pop>6,000} = 1$ *and orange/transparent if* $\mathbb{1}_c^{pop>6,000} = 0$*. County borders are from 1890 and railroads that are in operation by 1891.*

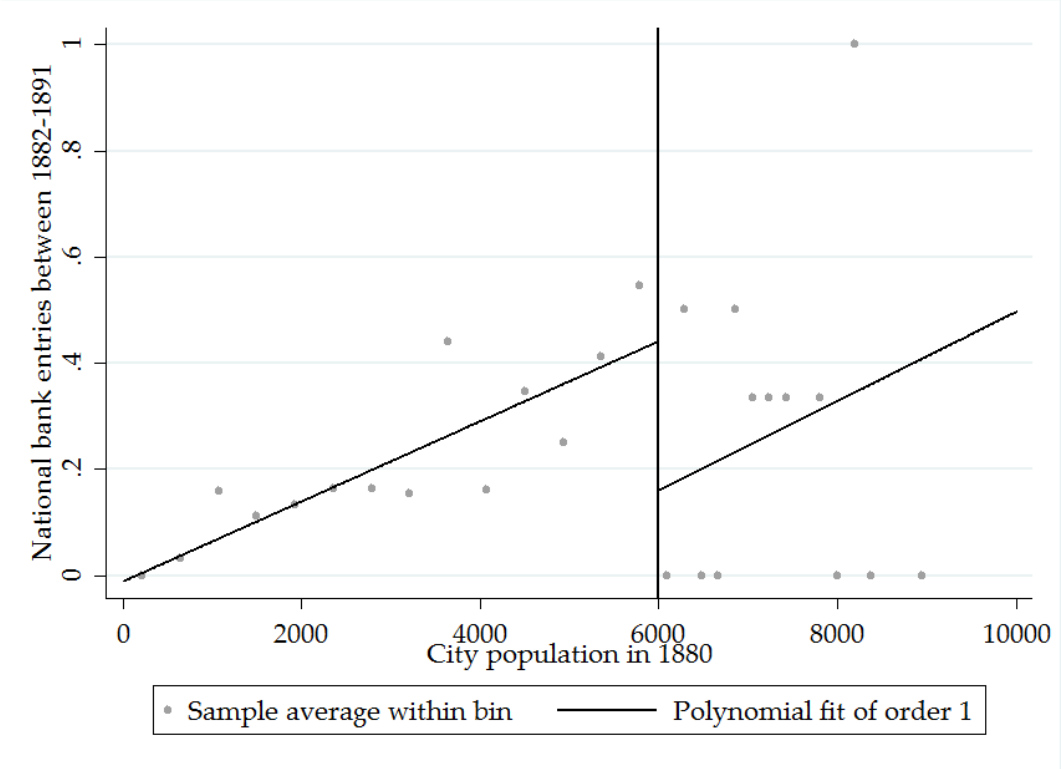


Figure 3: *Binned scatterplot of net entries of national banks between 1882 and 1891 by city population in 1880 in cities with exactly one bank in 1881. We generate the binned scatterplot using the "rdplot" command of the rdrobust package developed by Calonico et al. (2017).*

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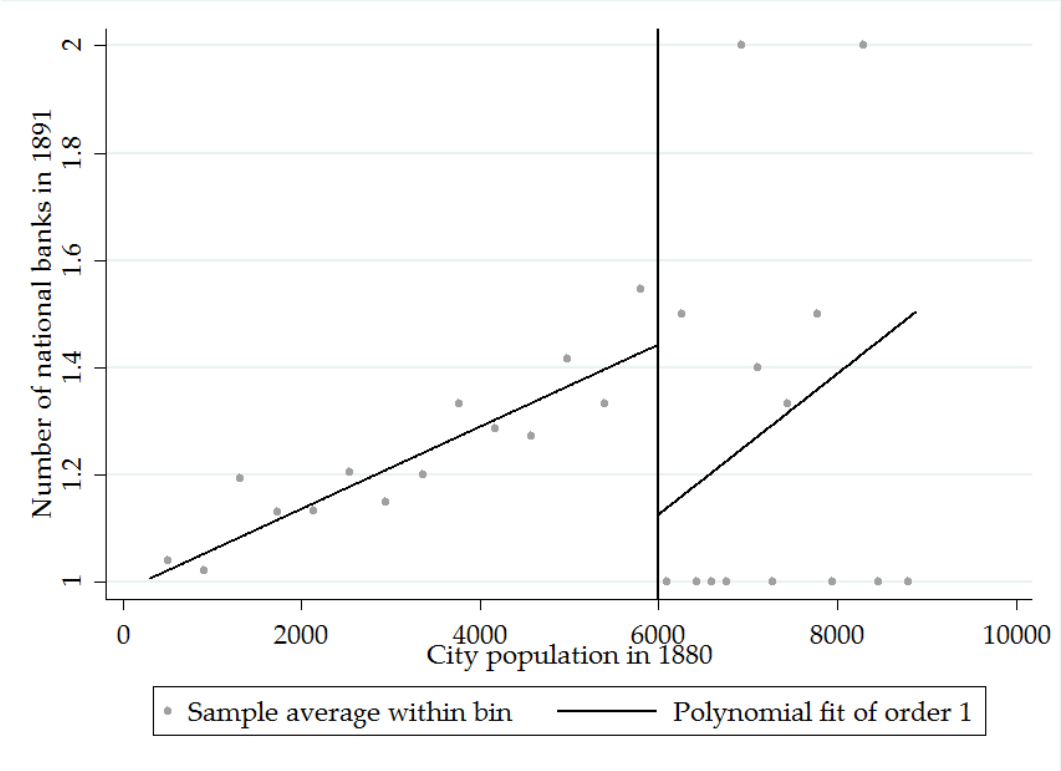


Figure 4: *Binned scatterplot of number of national banks in 1891 by city population in 1880 in cities with exactly one bank in 1881.*

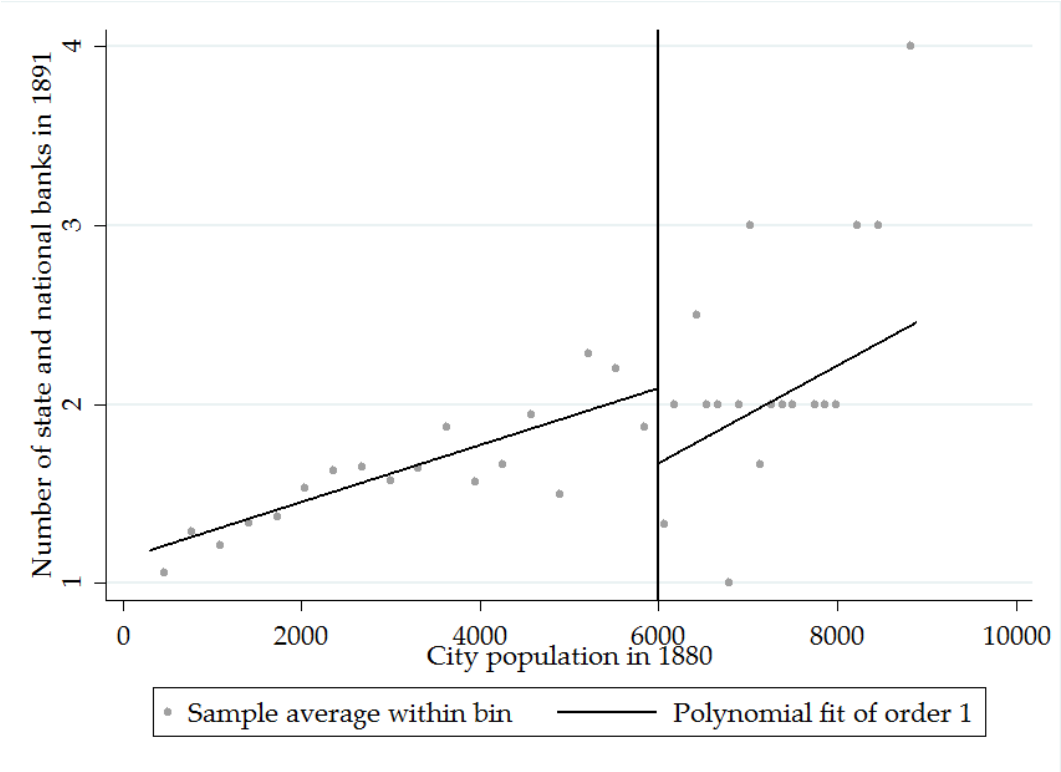


Figure 5: *Binscatter of number of national and state bank in 1891 by city population in 1880 in cities with exactly one bank in 1881.*

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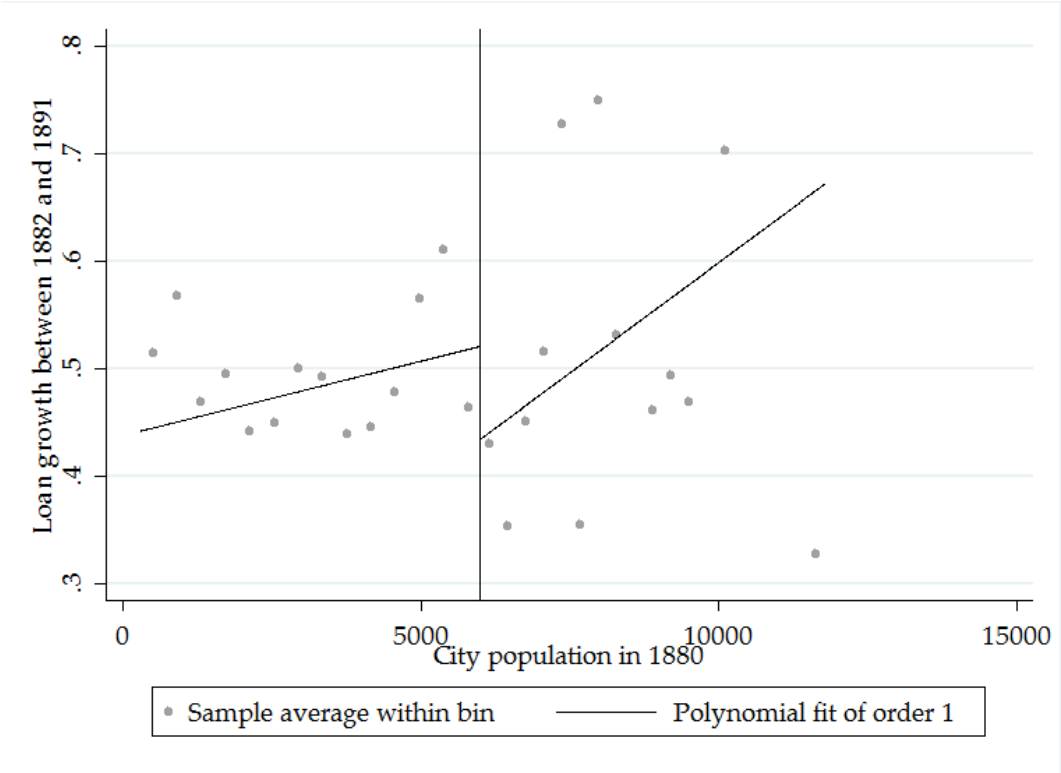


Figure 6: *Binned scatterplot of bank-level loan growth between 1882 and 1891 by city population in 1880.*

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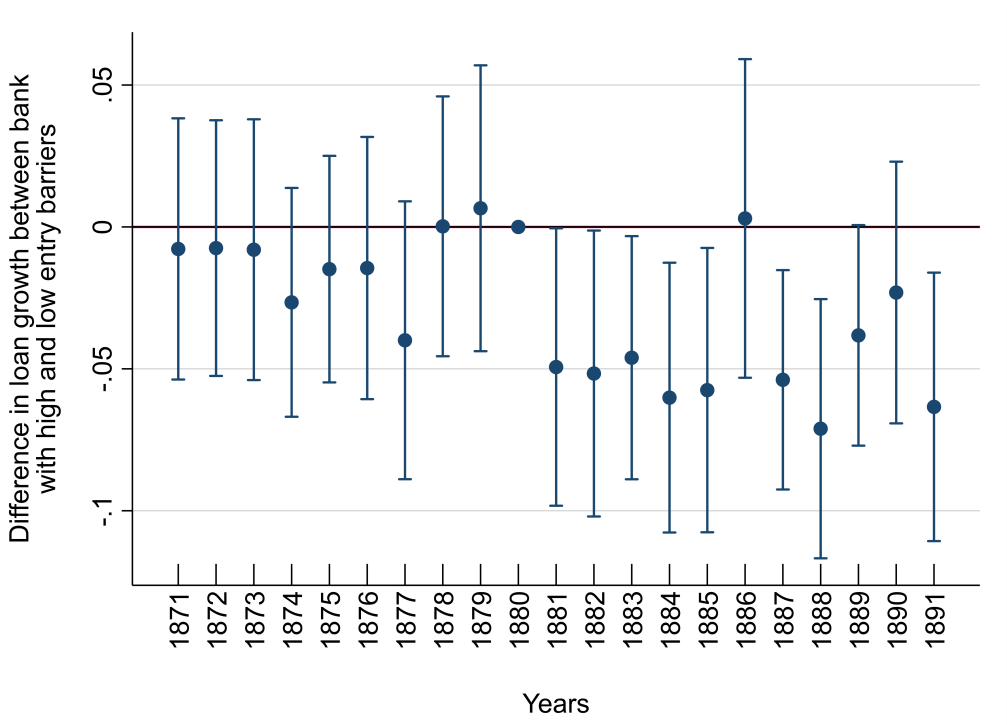


Figure 7: *The figure shows coefficient from estimating* $y_{bt} = \alpha + \sum_{t=1871}^{1891} \beta_t \mathbb{1}_c^{pop1880>6{,}000} \times \tau_t + \delta X_{bt} + \tau_t + \gamma_{ct} + \varepsilon_{bt}$ *where* y_{bt} *is the loan growth of bank* b *from* t *to* $t+1$*. We normalize coefficients 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.*

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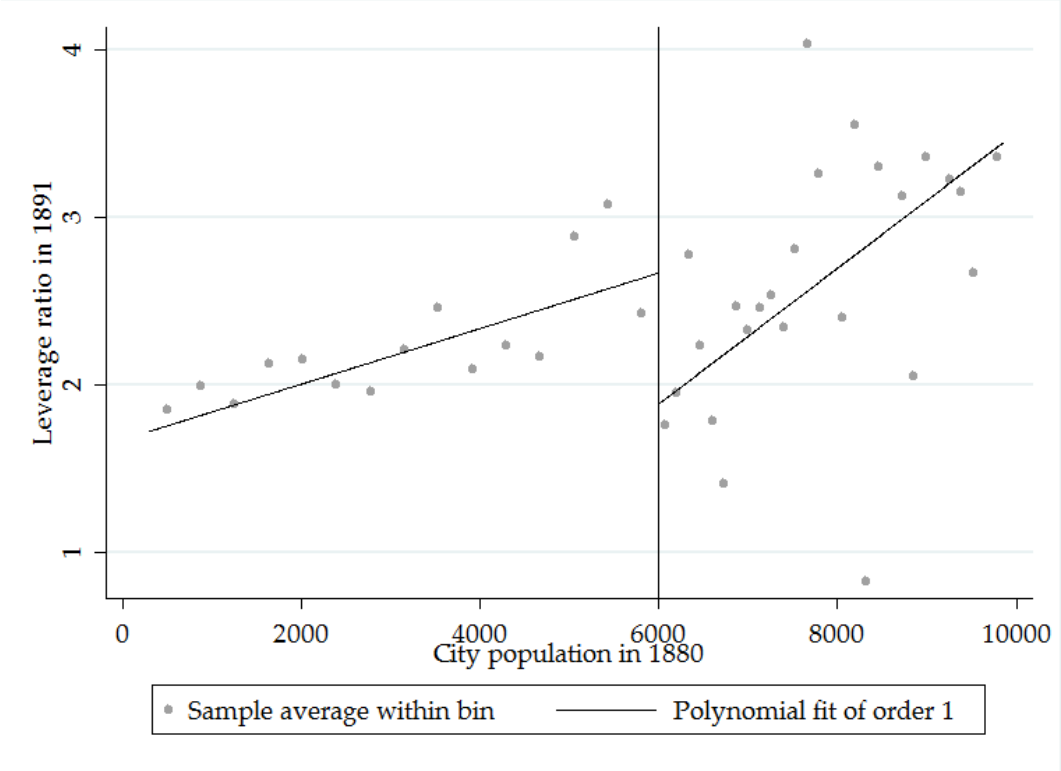


Figure 8: *Binned scatterplot of bank leverage in 1891 by city population in 1880.*

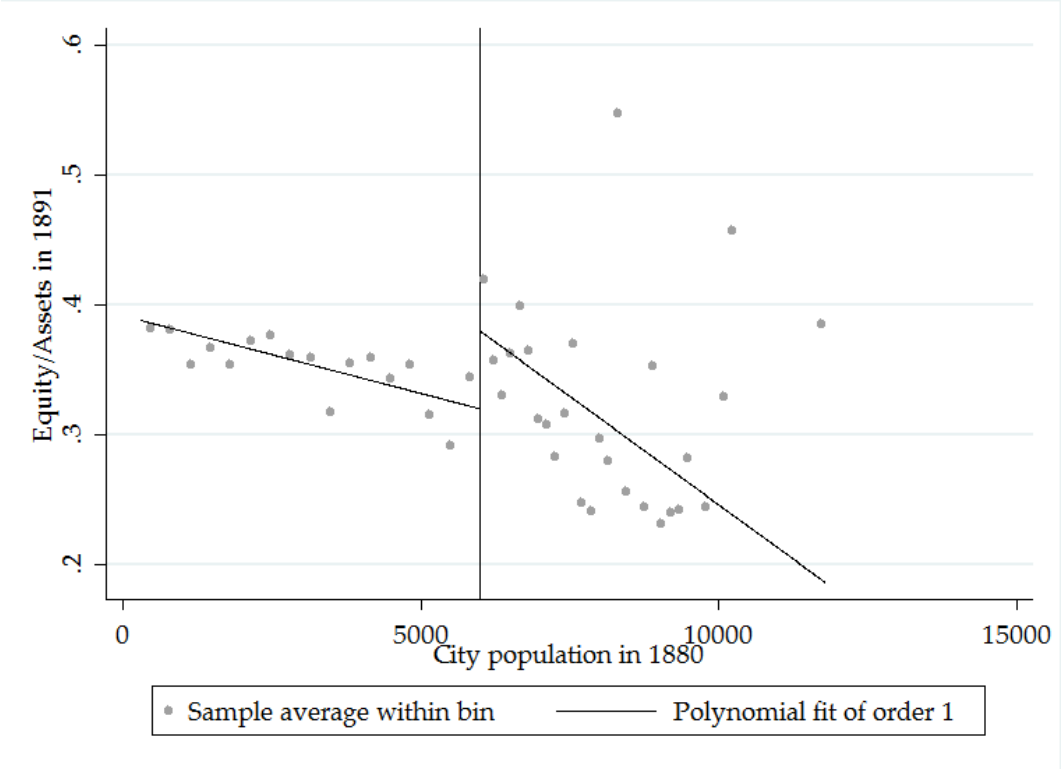


Figure 9: *Binned scatterplot of bank capital ratio in 1891 by city population in 1880.*

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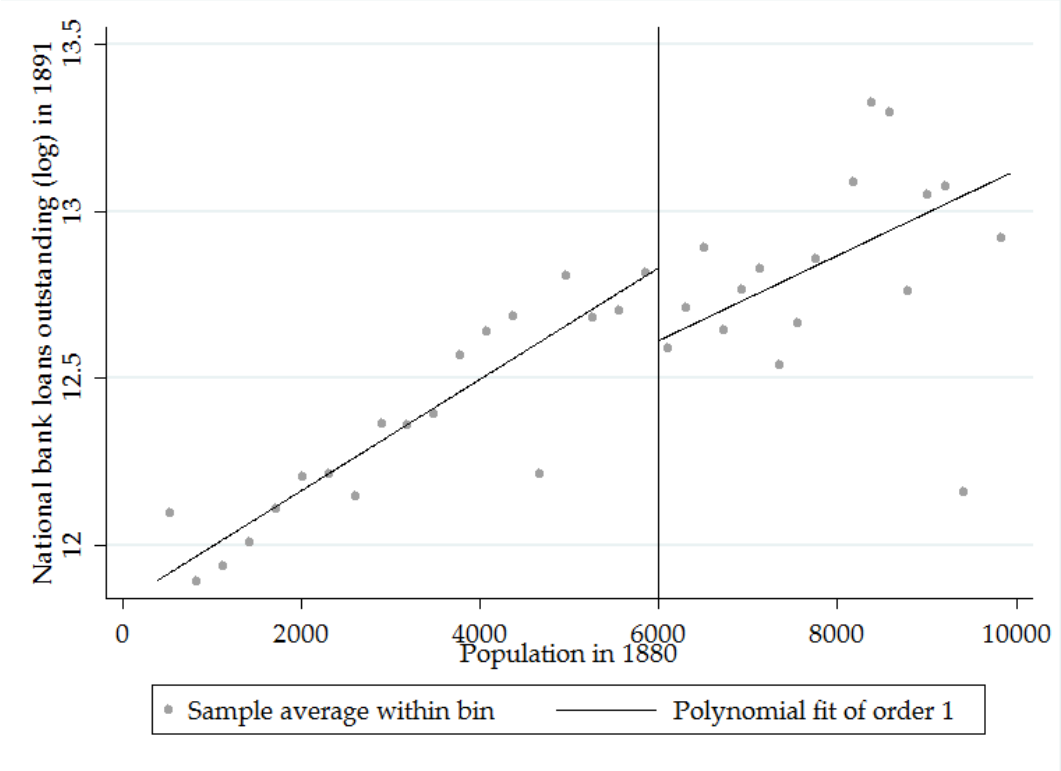


Figure 10: *Average amount of national bank loans outstanding (in log) by city population in 1880.*

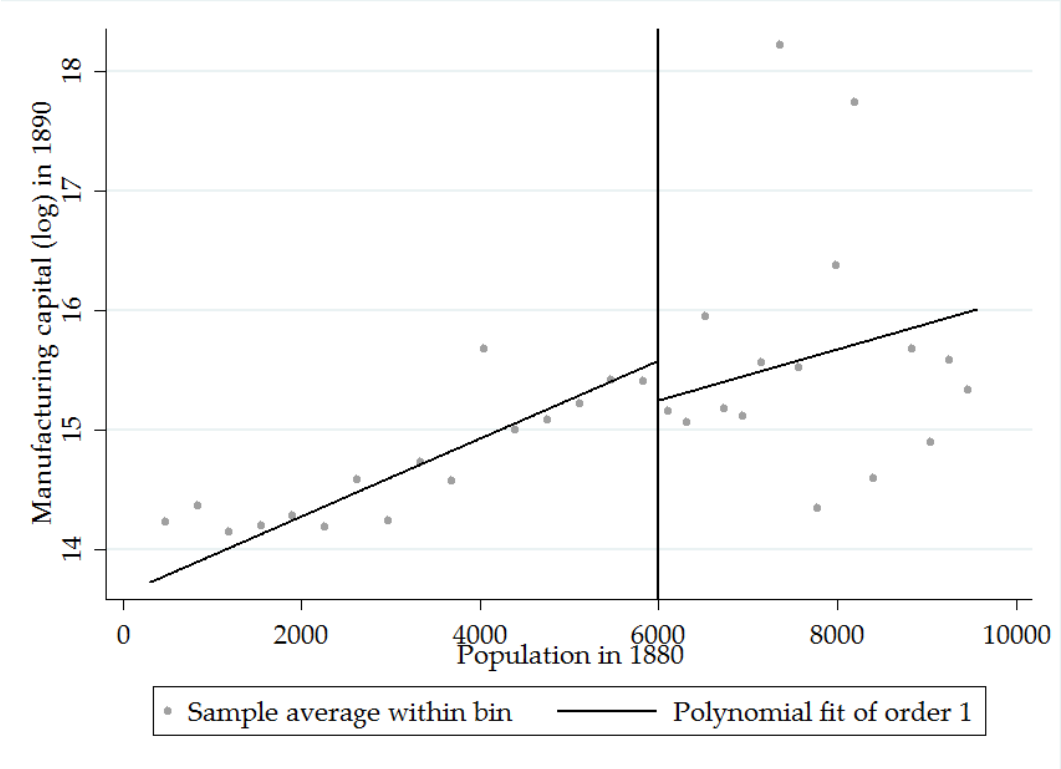


Figure 11: *Average manufacturing capital invested in 1890 by city population in 1880.*

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10 Tables

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Table 1: ***Descriptive statistics I***— *balance sheet characteristics in 1881 for national banks founded before 1881 and located in cities with less than 6,000 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	43.79	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
Capital/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
Age	10.99	4.32	4.00	9.00	14.00	14.00	14.00	816

Data restricted to banks with entirely correct balance sheet and charter in operation in 1881 and 1891.

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Table 2: ***Descriptive statistics II***— *comparing characteristics of cities with less than 6,000 inhabitants in 1870, at least one national bank in 1881, but different entry barriers 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
N	680		69			

Capital, total assets, and loans are from national banks only.

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Table 3: ***Descriptive statistics III—*** *comparing sample national banks in 1881 across markets with different entry barriers 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
Capital/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
Age	10.993	4.292	10.951	4.640	-0.042	-0.075
N	734		82			

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.

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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

$$y_c = \exp\left(\alpha_s + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \gamma Z_c + \varepsilon_c\right),$$

where y_c is the number of national banks entering the market of city c between 1882 and 1891. We estimate the equation with Poisson and report average marginal effects. 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 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.

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Table 5: ***Entry II***— *city-level evidence on existence of national and state chartered institutions 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

$$y_c = \exp\left(\alpha_s + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \gamma Z_c + \varepsilon_c\right),$$

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 average marginal effects. All estimations are restricted 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.

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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

$$y_c = \exp\left(\alpha_s + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \gamma Z_c + \varepsilon_c\right),$$

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.

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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:

$$y_b = \alpha_s + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \gamma X_b + \varepsilon_b,$$

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.

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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:

$$y_b = \alpha_s + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \gamma X_b + \varepsilon_b,$$

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.

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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

$$y_{bt} = \alpha_{ct} + \beta 1_c^{\text{pop1880}>6{,}000} \times \text{Census} + \gamma X_{bt} + \varepsilon_{bt},$$

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.

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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	$\%\Delta_{\text{Loans}}$	$\%\Delta_{\text{Deposits}}$	$\%\Delta_{\text{Total}}$
	(1)	(2)	(3)
$1_{\text{pop1880}>6000}$	-0.227*	-0.241	-0.129
	(0.109)	(0.165)	(0.086)
Population in 1880 (log)	-0.023	0.101	0.021
	(0.059)	(0.064)	(0.025)
Population growth, 1880-1890	0.097***	0.117**	0.045***
	(0.029)	(0.044)	(0.014)
Years of railroad access	0.003	-0.001	0.000
	(0.003)	(0.002)	(0.001)
Railroad access by 1891	-0.086	0.064	-0.033
	(0.152)	(0.190)	(0.065)
Railroad access by 1881	-0.036	0.065	0.017
	(0.142)	(0.160)	(0.047)
Total assets in 1881 (log)	0.313***	0.323**	0.315***
	(0.092)	(0.127)	(0.048)
Age	-0.085***	-0.075***	-0.041***
	(0.014)	(0.008)	(0.004)
$nb_{81} + sb_{81}$	-0.060	-0.073	-0.024
	(0.064)	(0.092)	(0.034)
Mean	.54	.48	.063
R^2	.3	.33	.43
No of Banks	467	467	467
No of Cities	467	467	467
No of Counties	289	289	289
State FE	Yes	Yes	Yes

This table shows coefficients from estimating:

$$y_b = \alpha_s + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \gamma X_b + \varepsilon_b,$$

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.

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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:

$$y_b = \alpha_s + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \gamma X_b + \varepsilon_b,$$

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.

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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:

$$y_b = \alpha_s + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \gamma X_b + \varepsilon_b,$$

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.

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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:

$$y_b = \alpha_s + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \gamma X_b + \varepsilon_b,$$

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.

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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:

$$y_c = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} + \delta Z_c + \gamma_s + \varepsilon_c.$$

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.

Electronic copy available at: https://ssrn.com/abstract=3202489

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.

Barnett, G. E. (1911). *State banks and trust companies since the passage of the National-bank act*. Thornton Cooke.

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.

Electronic copy available at: https://ssrn.com/abstract=3202489

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, March). Bank examiners' information and expertise and their role in monitoring and disciplining banks before and during the panic of 1893. Working Paper 24460, National Bureau of Economic Research.

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.

Calonico, S., M. D. Cattaneo, M. H. Farrell, and R. Titiunik (2017, June). rdrobust: Software for regression-discontinuity designs. *Stata Journal 17*(2), 372–404.

Carlson, M. (2013). *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. A. (2007, December). The National Banking System: a brief history. Working Paper 0723, Federal Reserve Bank of Cleveland.

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.

Electronic copy available at: https://ssrn.com/abstract=3202489

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.

Gissler, S., R. Ramcharan, and E. Yu (2018). The effects of competition in consumer credit markets. Technical report.

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? Technical report.

Grossman, R. (2001). Double liability and bank risk taking. *Journal of Money, Credit and Banking 33*(2), 143–59.

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.

Jaremski, M. and D. C. Wheelock (2017). Banking on the Boom, Tripped by the Bust: Banks and the World War I Agricultural Price Shock. Working Papers 2017-36, Federal Reserve Bank of St. Louis.

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

Electronic copy available at: https://ssrn.com/abstract=3202489

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.

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

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

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 (2017). How do credit supply shocks affect the real economy? evidence from the United States in the 1980s. Working Paper 23802, National Bureau of Economic Research.

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.

Electronic copy available at: https://ssrn.com/abstract=3202489

Peek, J. and E. S. Rosengren (2000, March). Collateral damage: Effects of the japanese bank crisis on real activity in the united states. *American Economic Review 90*(1), 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.

Schaeck, K., M. Cihak, and S. Wolfe (2009). Are competitive banking systems more stable? *Journal of Money, Credit and Banking 41*(4), 711–734.

Scharfstein, D. S. and A. Sunderam (2013). 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.

Electronic copy available at: https://ssrn.com/abstract=3202489

U.S. Census Bureau and E. Steiner (2017). *Spatial History Project*. Center for Spatial and Textual Analysis, Stanford University.

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

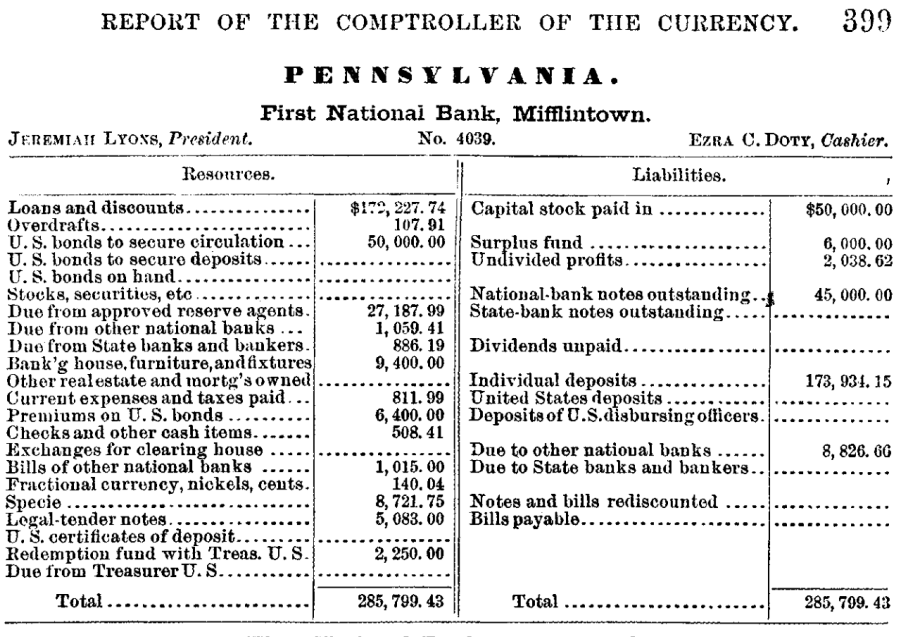
Zarutskie, R. (2006). Evidence on the effects of bank competition on firm borrowing and investment. *Journal of Financial Economics 81*(3), 503 – 537.

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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 12: *Excerpt from the 1891 OCC annual report.*

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

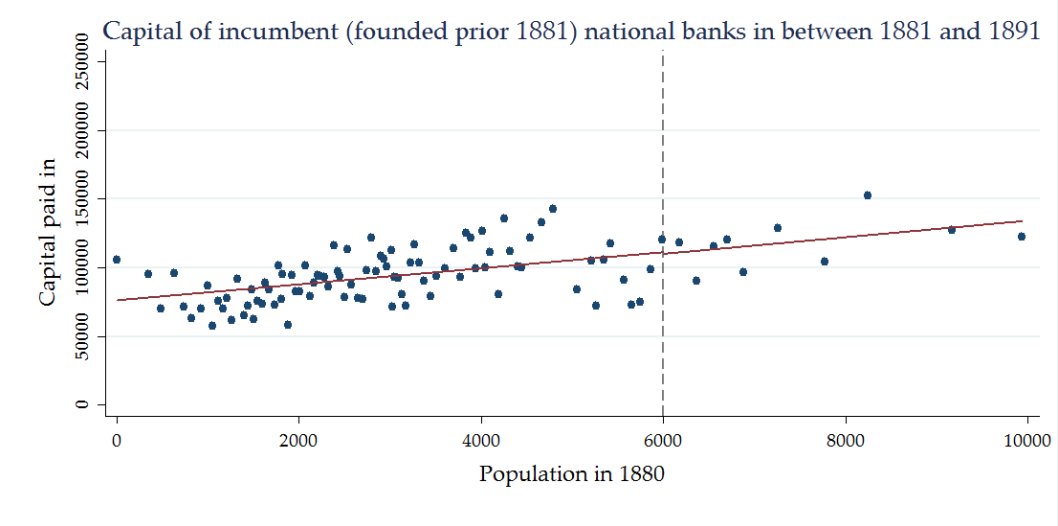


Figure 14: *Scatterplot of capital paid-in for all for banks that were founded prior to 1882 between 1881 and 1891, by population of bank location.*

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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

$$y_{bt} = \alpha + \beta \mathbb{1}_c^{\text{pop1880}>6{,}000} \times \text{Census} + \delta X_{bt} + \tau_t + \gamma_{ct} + \varepsilon_{bt},$$

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.

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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.

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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 6,000 inhabitants according to the census of 1870.

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