Branching Out: Capital Mobility and Long-Run Growth*

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Abstract

We study the long-run effects of the first wave of U.S. banking market integration on capital mobility and manufacturing productivity. Using newly digitized bank and branch balance sheet data matched to state and county panels, we provide direct evidence that branching produced lasting productivity gains without aggregate capital deepening by leveraging internal capital markets to improve the geographic allocation of capital. Our novel "deposit market access" measure shows that bank funding grew most in capital-constrained counties within branching states. Both market access and border discontinuity designs indicate that branching's organizational structure reduced capital allocation frictions to generate persistent growth.

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1 Introduction

Uneven access to capital across geographic areas can hinder economic development by constraining local investment and reinforcing regional disparities. While financial institutions can connect a capital-scarce "periphery" to a "core" of capital-rich areas, whether financial integration generates growth in financially constrained areas remains empirically ambiguous. Financial institutions have been found to direct capital to high-return projects in underserved locations (e.g., Bau and Matray, 2023), but they can also concentrate capital in already-developed areas thereby exacerbating regional disparities (e.g., Lucas, 1990; Alfaro, Kalemli-Ozcan and Volosovych, 2008).

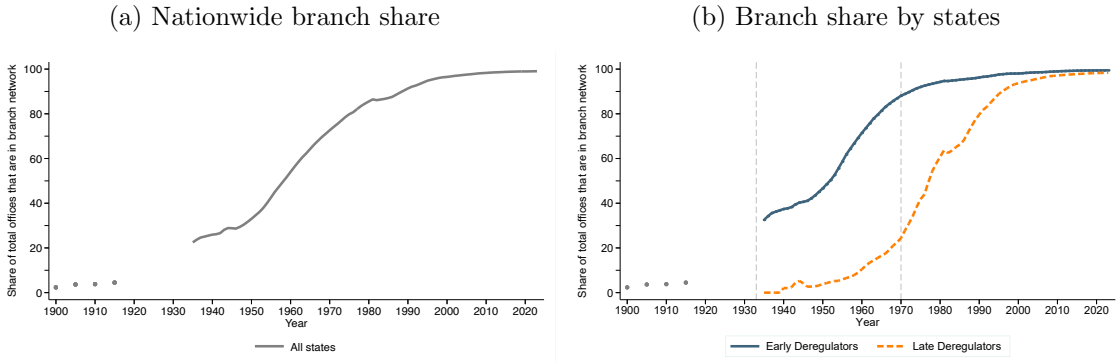
These contrasting implications have shaped debates over financial liberalization policies from the antebellum U.S. to modern developing economies and raise a fundamental question at the heart of the finance-growth nexus: how does the geographic scope and organizational form of financial institutions shape capital flows and impact the sources of economic growth?

We make progress on this question by focusing on a formative but understudied episode in U.S. banking history—the first wave of state-level bank branching reforms in the 1930s—that marked the beginning of banking market integration through multi-establishment banking institutions that could operate offices across different locations within a state. The contemporary debates surrounding these reforms presage our research question: while advocates saw branching as a mechanism to channel capital from financial centers to underserved areas, critics feared they would in fact concentrate network resources in already well-developed urban centers, thereby exacerbating existing spatial disparities (Southworth and Chapman, 1941). By studying the adoption of this first wave of branching reforms in the mid-1930s, we can examine the consequences of introducing bank branch networks on capital flows and economic growth over the subsequent seven decades.

This historical setting offers several additional advantages for studying the long-run effects of the initial establishment of multi-office branch networks on capital mobility and growth. The nature of the reforms provides substantial and plausibly exogenous variation in branching. Figure 1 shows that by 1940, states that legalized branching experienced a rise in their share of banking offices in branch networks from near zero in 1920 to over 40%. The impact of this first wave of branch law changes was so significant that by the eve of the more recent wave of deregulations in the 1970s, approximately 70% of U.S. banking establishments were already part of a branch network.

Moreover, because nearly all U.S. states debated implementing these regulatory changes, we can study their effects across a broad cross-section of geographic regions, economic conditions, and levels of initial development. These heterogeneous conditions allow us to isolate the effects of branching from broader financial market trends and to examine the impacts of institutional change across the distribution of pre-reform development. Following this initial wave, states did not revisit branching regulations until the 1970s (Kroszner and Strahan, 1999; Calomiris and Gorton, 2000).

Figure 1: Banking offices in branch networks



Notes: This figure shows the share of total banking offices operating as part of branch networks from 1900–2020. Branch networks are defined as banks operating multiple offices across different locations within a state. Panel (a) displays the nationwide trend. Panel (b) separates states by their branching laws as of 1937: "Early Deregulators" allowed branching by 1937, while "Late Deregulators" maintained unit banking restrictions. The vertical dashed line in panel (b) marks 1933, the peak of the first wave of reforms, and 1970, the start of the second reform wave. Sources: State session laws, Federal Reserve System (1931), FDIC BankFind, and authors' calculations.

We begin our empirical analysis by first documenting that states that adopted branching during the 1930s experienced persistent changes to the branching composition of their banking markets. Consistent with Figure 1, we show that the the state-level correlation in the intensity of branching from 1940 to 1990 is over 80%. By estimating local projections, we find similar evidence that branching states experience a sustained expansion of branch networks with increased numbers of banking offices overall and shrinking numbers of banks. This variation in the extent of branching across the U.S. forms the foundation of our analysis.

States that adopt branching also experience long-run gains in manufacturing value-added per worker, as observed in all censuses between 1920 to 2000. To guide our empirical analysis of the sources of this state-level productivity growth, we draw on a general production function with technology, capital, and labor inputs in which value-added can increase through three channels: capital deepening (an increase in capital per worker), technological productivity growth, and/or improved allocation of resources across firms or locations. We find little evidence that these value-added gains are due to state-level changes in financial deepening, measured by aggregate and per-capita deposits and lending. Consistent with the absence of financial deepening, we also find no meaningful changes in manufacturing employment nor capital accumulation. Finally, we find no evidence that branching reforms led to technological upgrading, as proxied by patenting activity, thereby leaving changes in resource allocation as the primary explanation.

In order to assess the role of capital reallocation, we turn to unique hand-collected bank and *branch*-level balance sheet data from 1937. To our knowledge, these records come from the only time in U.S. banking history that regulators required branch-level reports from both state and

national banks. This unique dataset offers a rare lens into how capital moved both across and within banks, allowing us to directly compare branch and unit banks' funding and asset allocation strategies holding constant bank size, regulatory constraints, and location of operations.

Using these data, we provide direct evidence that branch networks, unlike unit banks, use their internal capital markets to channel funds to the most capital-constrained counties they serve, thereby plausibly improving capital allocation to raise productive manufacturing activity even without increasing state-level aggregate credit supply. While both unit and branch banks rely on similar funding sources—deposits, equity capital, and interbank borrowing—they differ sharply in how they deploy capital. Unit banks invest a significantly larger share of their portfolios in traded securities, whereas branch banks allocate more of their assets towards loans to firms and households. This shift toward lending by branch banks does not translate into aggregate financial deepening, however, because branch expansion coincides with a decline in the total number of banks as unit institutions are absorbed into branch networks.

Our establishment-level balance sheet data provide three dimensions of evidence that the asset allocation difference between branch and unit banks stems from branch networks' internal capital markets reallocating funds across space to relax local financial constraints. First, we find that branch networks systematically redistribute deposits within their organizations, enabling specialization in which some branches lend very high shares of their assets while others primarily raise deposits. Second, these patterns of specialization are economically meaningful: branch offices located in counties with high output-to-horsepower ratios—the proxy for capital constraints available in the historical date—are twice as likely to receive funding on net from other banks and branches than comparable unit banks in the same areas. Third, branches in capital-constrained areas allocate more of their assets to non-bank lending, whereas those in less-constrained areas behave indistinguishably from unit banks, consistent with internal funds expanding local credit where the returns are likely high.

Our balance sheet analysis shows that the organizational form of bank branching meaningfully alters capital flows so that local credit supply depends on the structure and reach of bank networks. Consequently, standard measures of local financial depth such as bank presence or local deposits fail to capture this capital mobility channel and its potential gains.

In order to address these limitations of standard measures of financial depth, we develop a new metric built on principles from spatial trade models, which we call "Deposit Market Access" (DMA). DMA quantifies the pool of capital that can potentially be deployed in a local market based on the geographic reach of the banks operating there. The key parameterization, borne by the empirical evidence, is that multi-office banks have lower agency frictions between offices than independent banks do between each other, and branch networks can therefore internally reallocate

funding to allow each branch to tap into the broader deposit base of the entire network. DMA thus provides a network-based lens of financial access that links the potential availability of capital in a given place to the institutional structure of branches and unit banks.

We validate and document the relationship between DMA growth and branching reforms using newly digitized records of bank market structure from 1929 and 1937 and the detailed features of state branching laws. These features include population thresholds, geographic restrictions, and competition rules, and they allow us to construct a granular measure of county-level eligibility for branching, which we find strongly predicts changes in DMA. We also find a positive relationship between branching and DMA growth, particularly in more constrained counties (i.e., with higher manufacturing output-to-horsepower ratios), but only in states that have legalized branching. Consistent with our balance sheet data, then, branch networks reduce capital misallocation by directing funding to where it is most scarce, a technology unavailable to unit banks.

In the final part of our analysis, we show that counties' growth in potential access to capital (DMA) strongly predicts their subsequent manufacturing productivity growth, with no differential pre-trends prior to the reform. In the raw data, manufacturing productivity grows everywhere in subsequent decades, but a gap between high and low growth DMA counties emerges immediately after 1937 and does not close. We complement the raw data with an event study estimation that includes state by time fixed effects and pre-reform county characteristic by time fixed effects to absorb the effect of all factors correlated with state or county-level characteristics such as differential macroeconomic productivity trends, labor market dynamics, or other location-specific growth drivers that predate the reforms. Consistent with our evidence that local manufacturing productivity growth stems from the internal capital flows of branch networks, we find that all the gains are driven by counties that are financially constrained ex-ante, proxied with local deposits per capita.

We complement this analysis with a border-discontinuity design that compares outcomes in adjacent counties located across state lines that differ in their adoption of branching reforms. This empirical strategy holds constant unobserved local shocks and geographic conditions relevant for economic activity in order to isolate the effects of differential access to branch networks. Using this local comparison, we also find that counties in states with access to branching experience significantly higher manufacturing value-added per capita for decades. These results are robust to controlling flexibly for trends correlated with pre-reform banking intensity, population levels and changes, and severity of the Great Depression, as well as to placebo tests using randomly reassigned treatment status, comparisons of counties one step removed from borders to address cross-border spillover concerns, and controls for World War II spending and other 1930s banking legislation.

Together, these patterns provide direct evidence that the institutional structure of branching—rather than simply expanded banking access—is the key driver of improved capital allocation that

fueled both local and state-wide manufacturing productivity growth.

Related literature: Our paper bridges several strands of research on the spatial allocation of capital, banking organizational form, and the institutional foundations of economic development.

A first body of work emphasizes how spatial frictions in capital markets can perpetuate regional development disparities. Theoretical models show that capital often flows toward already-developed areas due to agglomeration effects and information asymmetries, reinforcing core–periphery imbalances (e.g., Krugman and Venables, 1995). Financial integration can affect these patterns by identifying regional specialization and risk-sharing (e.g., Kalemli-Ozcan, Sørensen and Yosha, 2003; Kleinman, Liu, Redding and Yogo, 2023), and even high-return opportunities in underserved locations (Bau and Matray, 2023). We contribute to this literature by providing direct evidence that institutional design—specifically, multi-office banking networks—can mitigate spatial frictions. In doing so, our work complements recent research on spatial connectivity in markets for goods, labor, and capital, especially in the U.S. historically (Donaldson and Hornbeck, 2016; Hornbeck and Rotemberg, 2024; Xu and Yang, 2024; d'Amico and Alekseev, 2024; Angelova and D'Amico, 2024). Unlike these settings that feature national market integration, our context uniquely focuses on a regional reform that restructured local financial linkages to states' capital markets.

By documenting the characteristics of the largely overlooked first wave of U.S. bank branching reform and providing new evidence on its impact, our paper also contributes to the literature focusing on the intrastate and interstate deregulations of the 1970s–1990s. This second wave has been shown to improve income growth, bank efficiency, and industrial concentration while reducing economic volatility (Jayaratne and Strahan, 1996; Morgan, Rime and Strahan, 2004; Cetorelli and Strahan, 2006; Kroszner, Laeven and Klingebiel, 2007). Subsequent work documents how branch networks enhanced risk-sharing and facilitated capital reallocation across space (Gilje, Loutskina and Strahan, 2016; Goetz, Laeven and Levine, 2016; Bai, Carvalho and Phillips, 2018), with spillover effects on entrepreneurship, financial inclusion, inequality, and labor markets (Black and Strahan, 2002; Beck, Levine and Levkov, 2010; Hombert and Matray, 2017; Célerier and Matray, 2019). However, the mechanism for growth is fundamentally different: the later reforms expanded an already-developed banking system and increased the overall supply of credit (e.g., Mian, Sufi and Verner, 2020) while also changing the nature of bank competition and concentration. The 1930s reforms, in contrast, allowed within-state branching on a much more limited scale. Branch networks emerged in the wake of widespread banking collapse and in an environment of limited capital mobility. These reforms restructured banks' geographic footprints that established new internal capital markets within branching organizations and allowed resources to be shifted across locations rather than raising the aggregate supply of credit.

The key mechanism of enhanced capital mobility also relates to the literature on banking or-

ganization and internal capital markets. Theoretical work shows how organizations can reallocate resources internally to overcome external financial constraints (Stein, 1997), although these benefits may be offset by agency frictions and inefficient cross-subsidization (Rajan, Servaes and Zingales, 2000; Scharfstein and Stein, 2008). Our paper is among the first to provide direct empirical evidence of internal capital markets operating within banking organizations in which we document both the extent and *direction* of flows. This direct evidence complements existing work showing that bank networks reallocate liquidity across locations both today and historically (e.g., Guiso, Sapienza and Zingales, 2004*a*; Gilje, Loutskina and Strahan, 2016; Quincy, 2024; Aguirregabiria, Clark and Wang, 2025). We capture how institutional design governs capital flows with our unique branch-level balance sheets as well as our network-based deposit market access (DMA) measure.

Our focus on capital mobility also ties into the broader literature on financial development and misallocation. Foundational work highlights the importance of financial intermediation for economic development (e.g., King and Levine, 1993; Levine, 1997), although subsequent work shows that financial depth is not always correlated with growth (e.g., Demetriades and Hussein, 1996; Rousseau and Wachtel, 2011; Müller and Verner, 2024; Dai, Müller and Verner, 2025). This disconnect partly reflects the idea that productivity gains can arise from better allocation of existing resources rather than just increasing the quantity of capital. Research on capital misallocation shows that reducing frictions in how funds are deployed can generate substantial productivity improvements even without changes in aggregate investment levels (e.g., Bertrand, Schoar and Thesmar, 2007; Buera, Kaboski and Shin, 2011; Midrigan and Xu, 2014; Moll, 2014; Bau and Matray, 2023; Matray, Mueller, Xu and Kabir, 2024). Similarly, we find little evidence of aggregate financial deepening, and instead find evidence consistent with reduced resource misallocation through the introduction of bank branching.

As in the literature on financial inclusion, we provide evidence on the importance of financial access for economic development. While much of this literature focuses on the "last mile" problem of providing any access to financial services (e.g., Burgess and Pande, 2005; Bruhn and Love, 2014; Fonseca and Matray, 2024), our results emphasize the importance of institutional design. Underbanked areas could be connected via unit banks, small network banks, or large network banks, but we show that access to networks with larger geographic footprints accelerates development due to internal capital markets. Our setting therefore emphasizes that the regulatory design of financial systems is key for fostering long-run growth outside of established financial centers.

Finally, our work contributes to the literature on the legacy of the Great Depression and the institutional responses it provoked. Prior research shows that financial frictions played a central role in the severity and duration of the Depression (Bernanke, 1983; Eichengreen, 1992; Romer, 1992; Benmelech, Frydman and Papanikolaou, 2019; Quincy, 2024), prompting national legislative

action to stabilize the macroeconomy through policies such as deposit insurance and central bank reforms (Friedman and Schwartz, 1963; Calomiris and Haber, 2014). In contrast to this federal response, we highlight a distinct sub-national institutional reform—branch banking deregulation, which shaped local financial development and regional economic trajectories over the long run. By doing so, we mark the moment most states departed the previously agricultural elite-focused unit banking regime that had increased financial instability and limited economic growth for decades (White, 1983; Carlson and Mitchener, 2006; Dehejia and Lleras-Muney, 2007; Fulford, 2015; Rajan and Ramcharan, 2015; Jaremski and Wheelock, 2020; Carlson, Correia and Luck, 2022; Correia, Luck and Verner, 2024).

2 Historical Context

2.1 Branch bank regulation before the 1930s

The United States arrived late to bank branching. After the U.S. Civil War, state and national bank regulators largely prohibited banks from opening multiple offices, in contrast to other advanced economies that had rapidly consolidated their banking sectors in the 19th century (Chapman and Westerfield, 1942).[1] Between the 1860s and 1920s, regulators repeatedly lowered charter capital requirements to permit ever-smaller banks to enter the market, leading to small, independent banks being the dominant arbiters of credit access in most of the nation (Chapman, 1934).

Legislators seriously discussed the potential benefit of having larger, geographically diversified bank branch networks for the first time when post-WWI agricultural prices declines led rural areas into both financial and economic crisis (Rajan and Ramcharan, 2015; Jaremski and Wheelock, 2020). Small towns' diminishing access to credit became a rallying cry for academic economists and bankers in favor of branch legalization.[2] Branch supporters also argued that the concentration of capital was so strong in financial centers that national commercial paper and interbank lending markets still failed to create regional interest rate convergence (Chapman and Westerfield, 1942). However, unit bankers ultimately won the day, as Congress passed the McFadden Act in 1927, which effectively capped bank branch expansion (Rajan and Ramcharan, 2016).[3]

[1] The dual charter banking system did not offer significant variation in bank branching permissions, unlike in the case of minimum charter capital, as branching was largely *de facto* prohibited by state and national regulators in the National Banking Era even in the absence of outright abolition (Chapman, 1934; White, 1983).

[2] See, for instance, Southworth (1926) or Collins (1926) in the 1920s or Cartinhour (1931) and Southworth and Chapman (1941) in the 1930s for academic opinions. Chapman (1934) describes debates at the American Bankers Association during the 1920s and 1930s over whether to endorse branching.

[3] Prior to 1927, national banks could not branch. The McFadden Act allowed national banks to have bank branches for the first time, so long as they were already operating by the time of the act's passage and state law permitted it, but prohibited further branch openings outside of the bank's headquarter city.

2.2 The Glass-Steagall Act of 1933

Banking crisis and reform. After 1929, banking instability intensified, renewing debates about how best to provide widespread, safe access to credit. Congress focused on two main issues: a loss of public confidence in bank solvency and high rates of bank failure, especially among smaller banks. The House of Representatives passed bills legalizing deposit insurance, reasoning that federal guarantees would stop bank run-based failures and permit banks to begin lending again (Burns, 1965). The Senate, in contrast, favored legalizing cross-city bank branching in order to allow large banks to restore banking services in rural areas (Chapman, 1934). Although none of these bills made it through the other chamber before the height of the banking crisis in early 1933, these attempts at legislative reform became the basis for the Banking Act of 1933, more commonly called the Glass-Steagall Act.

The Glass-Steagall Act was an omnibus of new financial regulation intended to create long-run stability after the banking holiday in March 1933. Tightening bank liability requirements and separating investment and commercial banking were seemingly self-evident solutions to several drivers of the crisis (73rd Congress, 1933*a*,*b*).[4] Legislators then debated how to address the most pressing challenge facing communities across the country—the widespread loss of banking services—with deposit insurance and bank branching emerging as the two primary solutions that might restore banking access without undermining financial stability.

Debate over bank branching. The pro-branching camp, led by Virginia Democrat Carter Glass, argued that cross-city branching would allow large, well-run urban banks to serve towns too small to sustain their own (safe) unit banks. Proponents pointed to the Depression as evidence that small banks were most vulnerable to failure, leaving rural areas without adequate banking services during downturns. One senator reluctantly embraced bank branching because the "stockholder reservoir [was] relatively dry" and depositors were convinced that unit banks were unsafe in towns where local investors had been wiped out by the previous decade and a half of bank failures (72nd Congress, 1932, p.1417).[5]

However, this view failed to sway many congressmen, who believed that branching would concentrate funds in the hands of the wealthy urban elites (72nd Congress, 1932; 73rd Congress, 1933*a*,*b*). These critics feared that urban banks would establish branches in small towns primarily to collect deposits, which would then be funneled back to ventures in major cities rather than supporting local farmers and merchants. They pointed to the Canadian banking system, where nationwide

[4]Later investigations on the separation of commercial and investment banking found the provision to be more controversial (White, 1986; Benston, 1989; Kroszner and Rajan, 1997; Ramirez, 1999).

[5]Local investors were unwilling or unable to fund enough capital required to establish new bank by the third year of the crisis, often due to the slow resolution of failed banks and popularity of double liability (Macey and Miller, 1992; Anari, Kolari and Mason, 2005).

branch networks were accused of systematically extracting rural savings to fund urban development, leaving agricultural regions chronically under-served (72nd Congress, 1932). Senator Fletcher of Florida captured this sentiment, relaying that his constituents felt that branching "means an irretrievable step toward putting the key banking resources of [the] community more at the disposal of the big financial centers" (72nd Congress, 1932, p.9895). Anti-branching legislators also worried that the concentration of economic power would allow a handful of large banks with extensive branch networks to dictate credit terms across vast geographic areas and potentially manipulate local economies for their own benefit.

Deposit insurance emerged as the more appealing solution for legislators who attributed the crisis to large banks. Alabama Democrat Henry Steagall and his supporters argued that protecting depositors from losses caused by banker misconduct was a matter of fairness, even while opponents highlighted the moral hazard such protection would create (Flood, 1991). For these legislators, deposit insurance was a pragmatic solution that would also stimulate bank entry while limiting the political and geographical concentration of financial power in large, multi-branch institutions.

Legislative deadlock and compromise. This fundamental disagreement over bank branching—encompassing debates about capital flows and the concentration of financial power—lay at the heart of these legislative battles. Months of debate failed to resolve this impasse, but Congress faced a firm deadline at the end of the legislative session in June 1933. Carter Glass, unable to sway the populist wing of his Democratic majority to support branching, was forced to broker a compromise.[6]

The resulting compromise established nationwide deposit insurance but delegated the most contentious issue—bank branching—to the states.[7] This decision had lasting consequences: from 1933 until the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994, state laws governed branching permissions for all banks operating in their boundaries, regardless of charter.

3 Data

We integrate several newly created datasets with existing records on financial development and economic activity. We use three main types of data: (1) state-level laws governing bank branch regulations; (2) banking sector outcomes including bank branch-level balance sheets; and (3) measures of financial and real economic outcomes.

[6] Neither region nor party are sufficient enough to characterize support for this policy: two of the fiercest anti-branching advocates were Democratic Louisiana Senator Huey Long and Alabama Representative Henry Steagall.

[7] Appendix Figure B.3 provides the relevant excerpt of the Glass-Steagall Act.

3.1 Bank branch regulations over time

We collect a new comprehensive regulatory database of bank branching laws from 1910 to 1994. This panel documents the intricate and often interlocking conditions governing bank branching established by each state legislature as they transitioned from branching prohibition in the National Banking Era to unrestricted *de novo* branching. Our repository categorizes each state's branching regulations along four dimensions:

1. Geographic: Distinction between banks being permitted to open branches only in their headquarter city or across cities
2. Competition: Restrictions based on existing banking presence and local market conditions
3. Population: Thresholds based on community size that determined branching eligibility
4. Capital: Requirements including both minimum bank capital necessary to operate any branches and additional capital required for each new branch location

The database also includes related entry regulation on minimum capital requirements. Further detail on database construction and definitions are in Section B and Section B.2, respectively.

3.2 Banking data

We combine several complementary data sources to create state and county-level panels of banking sector outcomes.

Bank Market Structure. At the state-level, we capture pre-1935 annual banking market structure using data digitized by Flood (1991) from Federal Reserve publications. After 1935, we use FDIC's BankFind database for both the number of banks and the number of banking offices.

At the county-level, we digitize two historical cross-sections of bank operations: 1929 (Rand McNally Banking Directory) and 1937 (Federal Reserve call reports). The latter only includes Federal Reserve member banks. We create a proxy for Federal Reserve membership in 1929 by including all national banks, and we link state banks that were members as of 1937. We link the geographical information of bank operations from towns to counties, and we harmonize these with 1930 county borders.

Financial Development. We trace out state-level financial development by harmonizing FDIC BankFind loan and deposit data with Flood (1991). At the county-level, we proxy for financial development with bank deposits from 1920 to the present. In the pre-1933 period, we use the FDIC Banking Changes dataset (Federal Deposit Insurance Corporation, 1992), which records deposits at bank headquarters. The 1937 cross-section is calculated from the bank-level Federal Reserve call reports (Federal Reserve Board, 1937), which includes only member banks. For the post-1940s period, we use the City and County Databooks (Haines, 2010), which correctly measure deposits

by banking office location. We extend this series forward using the FDIC Summary of Deposits dataset after 1994. We also observe individual banking office locations in both 1929 and 1937, which we use to reconstruct branch network linkages over space (McNally, 1929; Federal Reserve Board, 1937).[8]

Bank Branch-Level Balance Sheets. We hand-collect a unique dataset of establishment-level balance sheets for all Federal Reserve member banks in 1937. Unlike more recent branch-level data, e.g. the FDIC Summary of Deposits, these data separately record detailed assets and liabilities for each banking office, including their deposits raised and use of both internal and external capital markets. Branch data were recorded separately from bank data, requiring us to generate a new database of branch network membership to match bank charters to their member branch offices. We provide more detail in Appendix Section C.1. Table 1 reports the summary statistics.

3.3 Economic outcomes

We construct a panel spanning from 1920 to the 1990s of county-level economic activity that captures both establishment counts and output measures across multiple sectors. Our primary source is a collection of decennial census data, supplemented with county data books, which also provide census of manufacturing and agricultural statistics (Haines, 2010), as well as patents (Petralia, Balland and Rigby, 2016). We complement this panel with additional interwar manufacturing data (Janas, 2024; Fishback and Kantor, 2018) and agricultural censuses (Haines, Fishback and Rhode, 2018).[9] We construct per-capita measures by scaling outcomes using linearly interpolated population data between census years for counties and construct annual state population measures using Bureau of Economic Analysis estimates. We further use state-level per capita income from Easterlin (1960). Finally, we construct a panel of state-level capital expenditures by combining data from Haines (2010) and archival Census of Manufactures reports. Table A.1 reports the summary statistics for real outcomes at the state and county levels.

4 Characterizing the 1930s Reforms

After the Glass-Steagall Act delegated branch banking restrictions to the states in June 1933, similar debates over the merits of branch banking played out in state legislatures across the country. State legislators faced the same fundamental challenge as their federal counterparts: how to restore banking services without alienating constituents who harbored deep skepticism toward large-scale finance. As Cartinhour (1934) reports, almost every state legislature considered updates to their

[8] We thank Matt Jaremski for facilitating our access to the 1929 Rand McNally data.

[9] For simplicity, we refer to the 1919, 1929, and 1939 manufacturing censuses as 1920, 1930, and 1940 when combining with decennial population census data.

branch banking laws between 1933 and 1934, regardless of party affiliation.[10]

4.1 State branch adoption

Figures 2a and 2b map the state-level laws governing geographic restrictions in bank branching from prior to the Great Depression (1929) to the end of this first wave of branching deregulation (1937). In 1929, the vast majority of states maintained restrictive unit banking regimes, with only a handful of western and southern states permitting any form of cross-city branching.[11] By 1937, the regulatory map had been fundamentally redrawn as half of U.S. states introduced cross-city branching. The number of states not allowing any form of bank branching fell from 29 to 14 while the number permitting statewide branching rose from 9 to 18 (Counsel of the Board of Governors, 1930, 1939). Adoption occurred in all regions of the U.S, overcoming deeply entrenched regional banking preferences.

Economic indicators do not predict branching adoption: Figure 2c shows that there were no observable differences in states' banking markets or real economic activity, both in levels or growth rates, before the Great Depression.

However, the economic crisis of the early 1930s had shifted the political landscape. As Quincy and Xu (2025) documents, the Depression transformed the politics of rural banking: communities that had supported high capital requirements and restrictive entry laws in the 1920s reversed course after waves of failures left them without banks. While large businesses had long supported branching to gain access to large loans more easily than through other means, rural support represented a new and decisive force (Giedeman, 2005; Rajan and Ramcharan, 2016; Calomiris, 2000). These rural constituencies, once defenders of unit banking, became advocates for branching as a means of restoring access to credit.[12] Throughout our state-level analyses, we control for the rural population share to account for any direct impact of this "rural realignment" (Quincy and Xu, 2025).

4.2 Qualitative characteristics

The first wave of bank branching reform in the 1930s was exceptionally rapid, far-reaching, and persistent: no other period between 1910 and 1990 exhibited comparable change in intrastate regulations. We plot the number of states allowing each type of branching by geographic extent

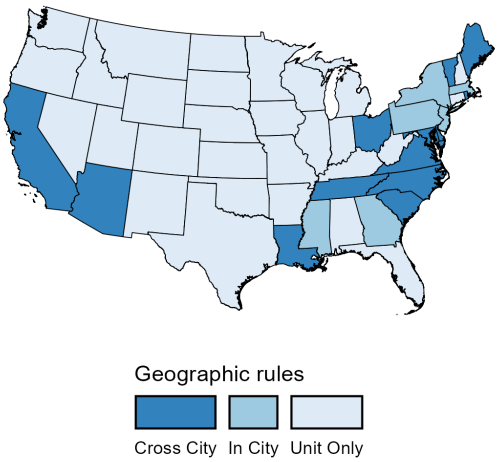
[10] For instance, a coalition of Oregon Democrats joined the Republican majority to legalize statewide bank branching in 1933 over the objections of other Republicans.

[11] This geographic pattern largely reflects historical settlement patterns and regional banking traditions. Before the 1930s, southern states promoted bank branching as a way to finance long-distance agricultural trade (Calomiris, 2000). Other states, like Arizona, legalized branching upon seeing the success of the Bank of Italy (later renamed to the Bank of America) in rural California (Carlson and Mitchener, 2009; Quincy, 2024).

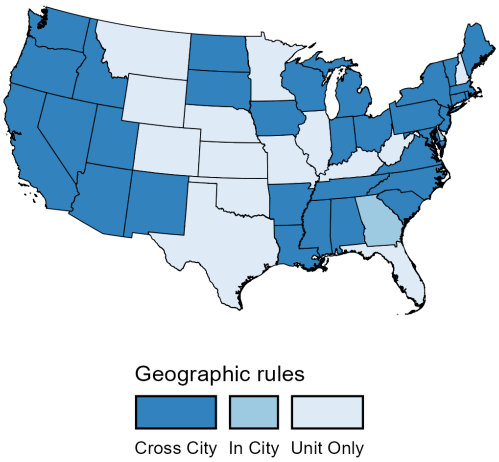
[12] We find no evidence that other interest groups, such as chain and group banking, the historical predecessor to bank holding companies, can explain branching reform adoption. These bank holding companies were also not a sufficiently large lobbying group to create an alternative to branching: there were 97 such groups in 1931 and by 1936, they contained only 3.2 percent of banks in 1936 (Board of Governors, 1938).

Figure 2: Geographic bank branching restrictions by state

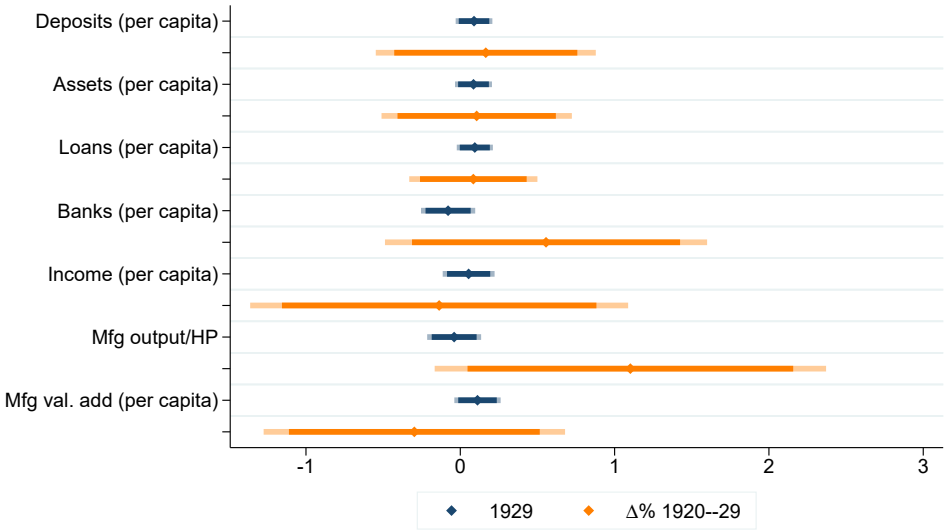
(a) 1929



(b) 1937



(c) Balance on state economic and financial characteristics



Notes: Panels (a) and (b) map the state-level geographic restrictions on branching in 1929 and 1937, respectively. "Unit" banking refers to states either implicitly (though a lack of law granting permission) or explicitly prohibiting bank branching. "In city" refers to branching being allowed within city borders. "Cross-city" refers to all potential geographic configurations larger than a city-only network. In Panel (c), each row is the result of a regression on state-level outcomes on an indicator for deregulating branching during the 1930s, omitting states allowing cross-city branching before 1929, along with 90% confidence intervals in dark bands and 95% confidence intervals in lighter bands. Standard errors are robust. Sources: Bank data–Flood (1991), manufacturing data– Haines (2010), population–FRED, per capita personal income–FRED (1929) and Easterlin (1960), and authors' calculations.

in Figure 3a. The sharp decline in unit banking states, mirrored by the rise in branching, marks the rapid transition in bank regulations. The established geographic restrictions also remained remarkably persistent for nearly four decades, as evidenced by the effectively flat lines.

The branching reforms of the 1930s were also qualitatively different from the second deregulatory wave at the end of the century.[13] The latter, spanning the 1970s through the 1990s, was primarily driven by competitive pressures from technological innovation and regulatory arbitrage (Robertson, 1968; Kroszner and Strahan, 2014). These reforms typically took the form of omnibus legislation that entirely removed geographic barriers, often including sunset clauses and broad preemption of state restrictions. This wave culminated in the Riegle-Neal Act of 1994, which established nationwide interstate branching with minimal prudential or concentration limits. The deregulation across so many dimensions fostered bank competition, a rapid displacement of the least productive banks, and financial deepening.

In contrast, the 1930s reforms emerged from crisis conditions and constructed multi-layered regulatory frameworks designed to permit branching while preserving other features of banking markets. Legislators intentionally balanced the geographic expansion of branching with provisions addressing market concentration, rural credit access, and the displacement of local financial institutions. The resulting patchwork of conditional permissions allowed branching to proceed, but only under the primary goal of restoring banking services. Mississippi's branch legislation (Figure B.2) illustrates this complex arrangement, including bank- and branch-specific minimum capital requirements, geographic radius limits, and maximum branch counts.

Figure 3b shows that most states introduced branching while simultaneously imposing new types of restrictions.[14] As in Figure 3a, the solid blue line shows the steady increase in the number of states allowing cross-city branching, but the other lines demonstrate how this permission was accompanied by significant constraints.

For example, branching often only became legal in towns without existing banking services, which we term "competition-based restrictions," and which we plot in the dotted red line. An example of such a restriction is Idaho's 1935 banking act, which allowed branches only if they merged with an existing bank and received approval from local bankers, or served previously unbanked towns (Counsel of the Board of Governors, 1936). Other regulations include city populations or bank capital minima to prevent large banks from displacing rural institutions, shown in the dashed yellow and dashed red lines respectively.[15] Figure A.1 maps the distribution of these additional

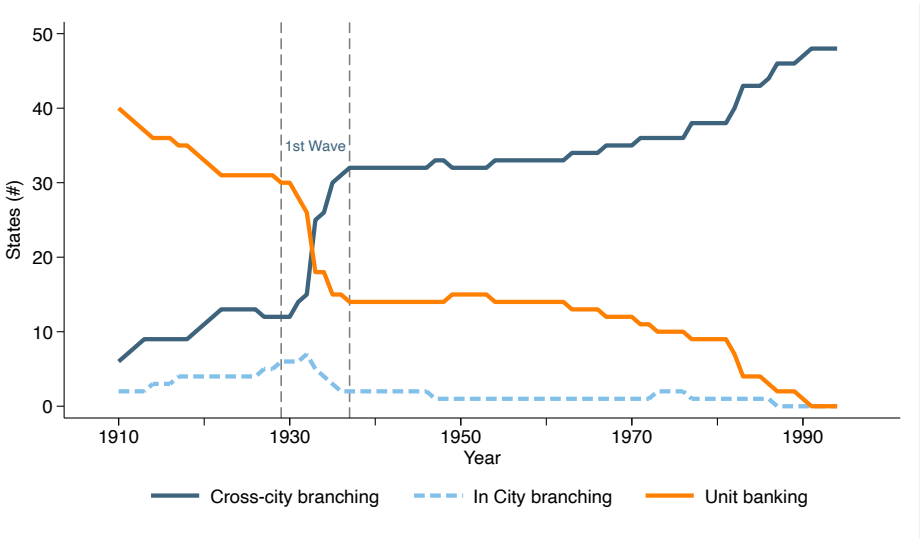
[13]The second wave of deregulation beginning in the 1970s is visible in Figure 3a as unit banking restrictions disappeared and cross-city branching permissions expanded. During this latter period, banking networks grew significantly in size as the regulatory approach focused on interstate competition rather than just branching within states.

[14]These laws heavily promoted *de novo* branching but did permit mergers.

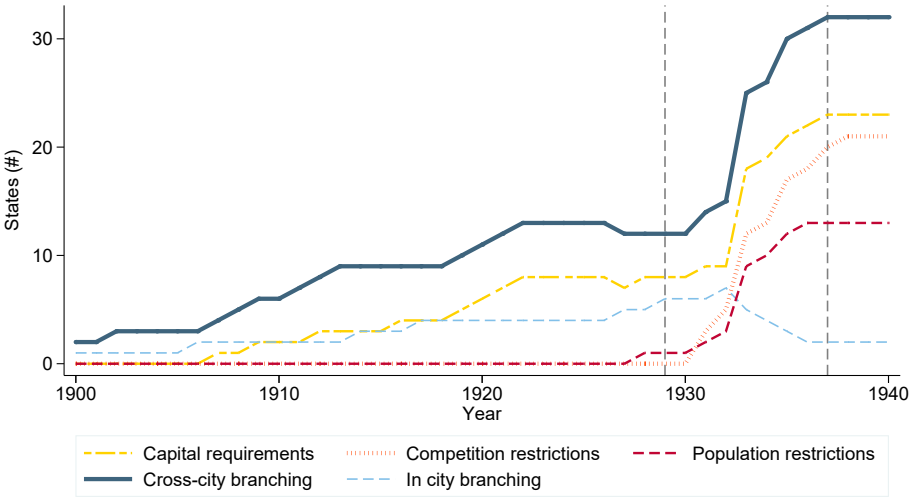
[15]The Glass Steagall Act raised paid-in capital thresholds for national and state member banks, and many state legislatures followed suit. Figure A.4d plots the number of states raising versus lowering charter capital requirements for each year from 1930 to 1940 relative to their 1929 levels and shows that the vast majority raised requirements.

Figure 3: Characteristics of the 1930s branching reforms

(a) Branching regimes by year



(b) Conditions required for bank branching



Notes: Panel (a) plots the number of states operating with each type of geographic restriction to bank branching from 1910 to 1994. "Unit" banking refers to states either implicitly (though a lack of law granting permission) or explicitly prohibiting bank branching. "In city" refers to branching being allowed within city borders. "Cross-city" refers to all potential geographic configurations larger than a city-only network. Panel (b) plots the number of states operating with additional restrictions on bank branching. The vertical dashed lines in 1929 and 1937 mark the beginning and end of the 1st wave of deregulations. See Section 3.1 for details on dataset construction. Sources: State session laws and authors' calculations.

laws and shows that they were concentrated in the newly branching states. The first wave of deregulation should therefore mostly be viewed as a way to restore financial inclusion outside of established banking centers with *a priori* no effect on competition and with limited impact on financial deepening.[16]

5 Long-Run Aggregate Effects

The U.S. financial system shifted from predominantly unit banking to one where for roughly half of U.S. states, cross-city branch networks became the norm in the 1930s. We first document the long-run relationship between this shift in branching regulations and state outcomes using Jordà (2005) local projections with the following specification:

$$\Delta \log Y_{s,h} = \beta_0 + \beta^h \cdot BRANCH_{s,1937} + \delta_r + \varepsilon_{sh} \tag{1}$$

where $\Delta \log Y_{s,h} \equiv \log Y_{s,h} - \log Y_{s,1930}$ denotes the cumulative change in outcome Y for state s from 1930 to year h. The indicator variable $BRANCH_{s,1937}$ captures branching permissions as of 1937, the year of the last reform. Census region fixed effects δ_r control for broader unobserved shocks within census regions. The coefficient β^h measures the correlation in initial branching regulation and outcomes at various horizons h. We calculate robust standard errors, and we omit states that already allowed cross-city branching as of 1929 to avoid conflating newly-branching with already-branched outcomes.

5.1 Banking markets

Figure 4 presents the first set of results on the relationship between branching reforms and the structure of banking markets. Figure 4a shows that states introducing bank branching in the 1930s experienced significantly stronger growth in banking offices relative to their 1937 levels, with the gap peaking at approximately 40 percent in the late 1970s before narrowing with the onset of modern branching deregulation.[17] Figure 4b shows that the number of banks in fact falls once branching becomes legal in the 1930s and does not fully recover in the subsequent decades.[18] Together, these two results indicate that branch legalization led to a large expansion in branches and a substitution

[16] The Depression-era emphasis on branch entry in bankless towns limits the extent of market competition and departs from the earlier bank entry regime characterized by population-based charter capital requirements (e.g., Carlson, Correia and Luck, 2022).

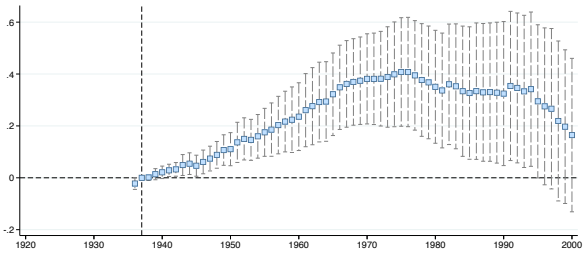
[17] We do not observe total banking offices before 1935, nor do we observe the number of branches in unit banking states until they deregulate, so we use 1937, the last 1930s deregulation year, as the omitted year.

[18] We find similarly persistent patterns in the raw data; Figure A.2 maps state branching density, which we extend into pairwise decadal correlations for each state in Figure A.3. Even in the year 2020—after the second wave of deregulation, full interstate banking legalization in Riegle-Neal, multiple financial crises, and technological transformation—the correlation with 1940 branching patterns remains at 0.48 and statistically significant.

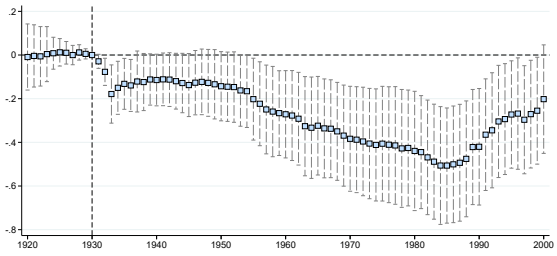
in the type of bank (unit or branch) likely to operate in any given location.[19]

Figure 4: Branching reforms and banking structure

(a) Banking offices



(b) Banks



Notes: These figures plot the point estimates and 90% confidence intervals from estimating Equation 1 on different outcomes at each horizon. Outcomes are calculated as the log change relative to the base year. Banking offices were not recorded by state until 1935, limiting our pre-period in Panel (a). The estimation excludes early branching states that permitted cross-city branching as of 1929. Sources: State session laws, FDIC, Flood (1991), and authors' calculations.

Several additional pieces of evidence are consistent with branch reforms being the source of these changes in bank market structure. First, Figure 2c shows balance on all observable real and financial variables, both in levels and in growth rates, and in particular, it shows no evidence of differential banking growth before the 1930s. Second, we use the heterogeneity in the *extent* of geographic branching allowed and show that the looser the geographic restrictions were, the more developed the financial sector became (Figure A.14). As in our baseline analysis, these results are driven by branches rather than unit bank expansion. Third, our results are unchanged if we include all states in our analysis, including those that already allowed branching as of 1929 (Figure A.5).

5.2 Productivity growth

Having established the impact of branch reform on banking market structure, we next examine the effects on the real economy. Figure 5a shows that manufacturing value-added per worker rises significantly in branching states.[20] As in the patterns for banking structure, the effects emerge within the decade following the reform period and persist through the end of our sample period.

We interpret these effects using a standard production function framework with capital and labor in which increases in aggregate value-added per worker (Y/L) can result from: (i) technological improvements that raise firm-level productivity (captured by the productivity parameter A); (ii) capital deepening through increased capital per worker (K/L); or (iii) improved allocation of capital across heterogeneous firms or locations, which raises aggregate TFP by channeling capital toward

[19] Population growth did not respond to branch reform (Figure A.9). Dynamics are almost identical in per-capita terms.

[20] We find similar effects of branching reform on aggregate manufacturing value-added as well (Figure A.10).

more productive uses.[21]

In contrast to the changes in banking market structure and productivity, we find little evidence of branching reforms increasing financial depth. Figure 5b shows that branching has no impact on lending, and deposits (shown in Figures A.5 to A.7) display similarly weak patterns. These patterns continue to be statistically indistinguishable from zero after including pre-1930 deregulating states (Figure A.5), lags in the dependent variable (Figure A.6), and controls for states' Great Depression severity (Figure A.7) and 1930 rural population share (Figure A.8). Overall, the 1930s branching reform wave did not spur aggregate financial deepening, unlike the post-1970s changes towards interstate banking (e.g., Jayaratne and Strahan, 1996; Mian, Sufi and Verner, 2020).

Consistent with the absence of financial deepening, we also find no differential impact on capital accumulation (Figure 5c) or employment growth (Figure 5d). Given that neither capital nor labor meaningfully increased at the state level, manufacturing value-added growth in this framework reflects productivity gains, either technological or allocative.

We find no evidence that branch deregulation improves manufacturing productivity through technological improvements proxied by innovation. Figure 5e shows that patenting follows a similar pattern to deposits and loans in which there is a slight decline in the 1930s, but that the post-branching levels are not significantly different from those pre-branching. These results are unchanged after controlling for the severity of the Great Depression (Figure A.11), the 1930 rural population share (Figure A.12), including lags (Figure A.13a), and focusing only on the most impactful innovations (Figure A.13b).

Our empirical analysis so far shows that branching reforms changed the market structure of banking by re-orienting its growth towards offices within networks, but are not correlated with broad-based financial deepening at the state level. These results contrast with the effects of later banking sector deregulations, as those reforms created gains in lending and input accumulation that fueled aggregate economic development. We therefore ask: how did institutional changes in banking structure create long-run productivity growth without aggregate financial expansions?

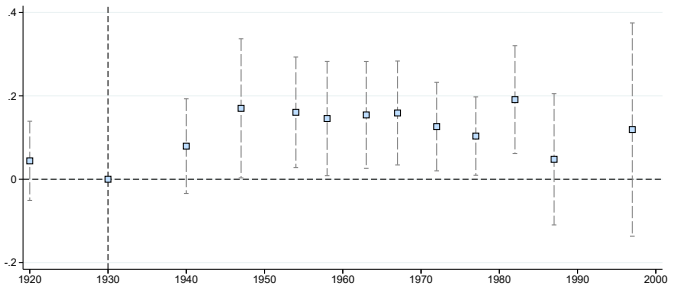
6 Capital Reallocation and Growth

We argue that branching reform increased productivity through more efficient capital reallocation arising from fundamental differences in the financial intermediation methods available to branch and unit banks. Conceptually, we adopt insights from economic geography in which locations are endowed with labor and production technologies but differ in the availability of local savings

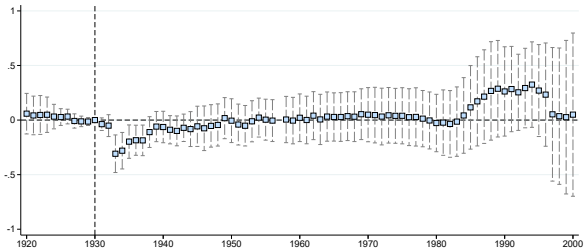
[21] This framework has $Y_i = F(A_i, K_i, L_i)$ in location i where A_i denotes total factor productivity, and K_i, L_i are capital and labor inputs. Aggregate manufacturing productivity is $\frac{Y}{L} = \sum_{i=1}^{N} \theta_i \frac{Y_i}{L_i}$, where $\theta_i \equiv \frac{L_i}{L}$. Decomposing this expression (and omitting the weights) gives: $\Delta \ln\left(\frac{Y}{L}\right) = \Delta \frac{K_i}{L_i} + \sum_{i=1}^{N} \theta_i \Delta \ln A_i + \text{cov}(K_i, MRPK_i)$.

Figure 5: Productivity growth, financial depth, inputs, and technology

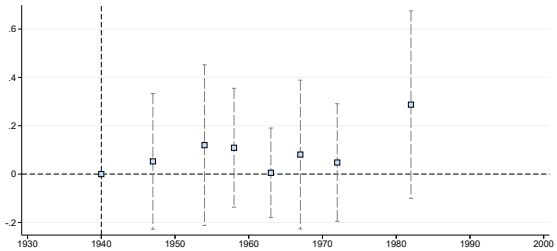
(a) Manufacturing value-added per worker



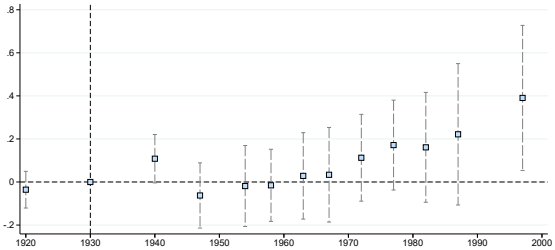
(b) Loans



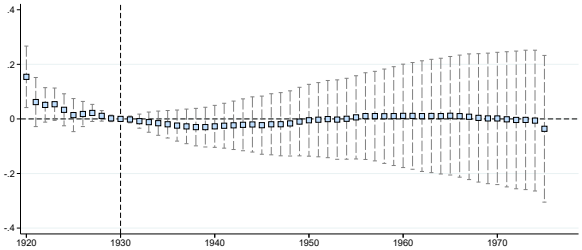
(c) Capital investment



(d) Employment



(e) Patents



Notes: These figures plot the point estimates and 90% confidence intervals from estimating Equation 1 on different outcomes at each horizon. Outcomes are calculated as the log change relative to 1930 other than for capital investment, which is first available in 1939. The sample excludes early branching states that permitted cross-city branching as of 1929. Sources: State session laws and authors' calculations; Panel (a): total value-added per manufacturing worker Haines (2010); Ruggles et al. (2021); Janas (2024) Panel (b): Flood (1991), FDIC; Panel (c): new capital expenditures by manufacturing firms (1939 and 1947 Censuses of Manufactures, Haines (2010)); Panel (d): total employment in manufacturing industries (Ruggles et al., 2021; Haines, 2010); Panel (e): cumulative patents from 1920 to year t (Petralia, Balland and Rigby, 2016).

and investment opportunities.[22] In the presence of information and contractual frictions that increase with distance, deposits may not be efficiently matched to the highest-return uses, leaving some locations capital-constrained while others hold excess funds. Integrated branch networks can potentially relax distortions in this setting by reallocating more funds across space as internal capital markets can lower informational and contractual frictions. This institutional innovation allows capital to flow from deposit-rich areas to locations with productive investment opportunities that had previously been underserved. Banking integration can therefore raise aggregate productivity by improving the allocation of capital across heterogeneous producers (e.g., Hsieh and Klenow, 2009; Baqaee and Farhi, 2020; Bau and Matray, 2023) and space (e.g., Hornbeck and Rotemberg, 2024) even without additional input accumulation.

As in the empirical literature on capital misallocation, we adopt a measure of the average returns of capital as a proxy for its marginal productivity, and hence, the degree of capital constraints. In our historical setting, measures of firm-level marginal revenue products of capital (MRPK) are unavailable, so we proxy for capital scarcity observed at the local market level (counties). Our measures are taken from 1929, the most recent census of manufacturing before the reforms. Because the 1929 census does not report capital stock directly, we use manufacturing value-added per horsepower as a proxy for capital productivity, following prior work that uses horsepower as a consistent measure of mechanical capacity (e.g. Goldin and Katz, 1998; Atack, Bateman and Margo, 2008; Lafortune, Lewis and Tessada, 2019). While this measure excludes non-mechanical forms of capital and abstracts from differences in utilization rates, it provides a consistent and interpretable proxy for capital scarcity across counties.

Our empirical strategies using measures of capital constraints do not rely purely on cross-sectional variation across counties in which unobserved heterogeneity in production functions may drive capital flows. In our branch-level balance sheet analysis (Section 6.1), we compare branch and unit banks within the same county, holding constant local production characteristics through county fixed effects. In our analysis of local economic effects (Section 7), we include county fixed effects throughout to limit our comparison of counties to itself over time. In these analyses, we only require the standard difference-in-difference identification assumption that within-county production technologies evolve smoothly and are not systematically correlated with treatment timing across treatment and control groups.

We provide evidence for this capital allocation mechanism through two complementary analyses that link institutional banking differences to real economic outcomes. First, we use newly digitized bank-level balance sheets from 1937 to document systematic differences in how branch networks

[22] Our empirical analysis focuses on the reduced-form effects of the 1930s branching reforms on local capital allocation rather than deriving predictions from a fully specified quantitative model, such as the one of interstate financial integration from 1953 to 1983 in d'Amico and Alekseev (2024).

and unit banks allocate their portfolios. Second, we use our unique branch-level balance sheet data to provide direct evidence that the direction of capital flows and the location of lending within branch networks follows the degree of local capital constraints.

6.1 Branch networks and local lending

We begin our analysis by comparing the investment behavior of unit and branching banks in 1937 holding fixed bank size, regulatory constraints captured by their charter type, and location of operations. This empirical exercise isolates variation in organizational form while holding constant the key determinants of investment opportunities and lending capacity, which ensures that observed differences reflect institutional constraints rather than heterogeneity in local economic conditions or bank characteristics. Table 1 reports summary statistics of balance sheet variables at the bank (Panel A) and branch-office (Panel B) levels.

Figure 6 reports coefficients and confidence intervals from a series of regressions of standardized bank-level balance sheet ratios on an indicator for being a branch bank, estimated under progressively richer sets of controls. The first specification includes no controls, the second adds bank size quartiles, the third further controls for bank charter type (state vs national) interacted with state fixed effects, and the most restrictive specification includes both bank size and charter type interacted with county fixed effects. Standard errors are clustered at the state level in all cases.

The top panel, "Funding Sources," includes three key liability categories: deposits-to-assets (capturing the primary funding source for most banks), equity-to-assets (measuring bank capitalization), and interbank inflows-to-assets (reflecting reliance on external funding from other banks). The bottom panel, "Portfolio Shares," shows two main asset allocation measures: loans-to-assets (indicating the share of assets devoted to loans held directly on the balance sheet) and securities-to-assets (capturing investment in nationally-traded bonds and equities).

Figure 6 shows that similarly sized branch networks and unit banks operating in the same geographic area under the same charter regulations have virtually identical funding structures but follow fundamentally different investment strategies. In the top panel, the funding source coefficients are small in magnitude and statistically insignificant across all specifications, indicating that branch and unit banks relied similarly on their deposit bases, maintained comparable capital ratios, and made equivalent use of interbank funding markets.

Portfolio allocation, however, differed greatly by bank type. Branch networks specialize in extending loans directly, with loan-to-asset ratios 0.25 standard deviations higher than unit banks. In contrast, unit banks hold a significantly larger share of their investments in securities. These differences remain statistically precise and economically meaningful even in the most restrictive specification that compares banks headquartered in the same county in the same size bin and with

Table 1: Summary statistics: Bank and branch balance sheets, 1937

Panel A: Bank-level characteristics

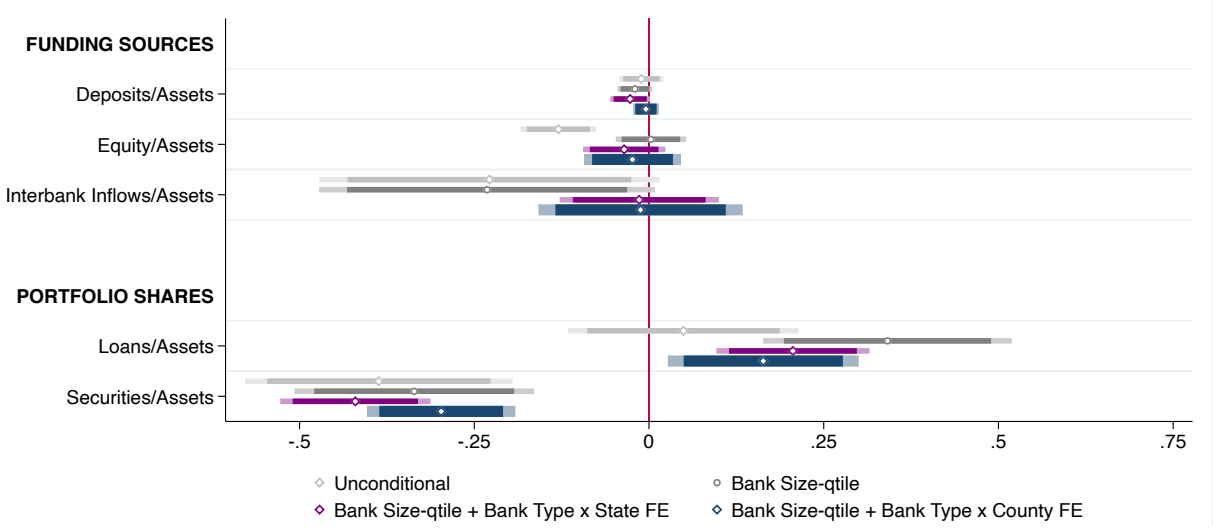
	Mean	Std. Dev.	p25	Median	p75
Branching bank	0.05	0.21	0.00	0.00	0.00
Branches	6.18	12.61	1.00	2.00	5.00
National bank	0.83	0.38	1.00	1.00	1.00
Total assets	6.98	55.64	0.55	1.14	2.75
Loan-Asset ratio	0.33	0.13	0.23	0.32	0.42
Securities-Asset ratio	0.18	0.13	0.09	0.16	0.26
Loan-Deposit ratio	0.45	2.41	0.27	0.37	0.50
Inflows-Asset ratio	0.16	0.11	0.09	0.14	0.21
Outflows-Asset ratio	0.03	0.07	0.00	0.01	0.02
Leverage ratio	0.15	0.19	0.10	0.13	0.17
Reserve ratio	0.35	1.51	0.21	0.28	0.38
Observations	6,262				

Panel B: Branch-office characteristics

	Mean	Std. Dev.	p25	Median	p75
Branch office	0.26	0.44	0.00	0.00	1.00
Total assets	3.87	24.24	0.56	1.14	2.48
Loan-Asset ratio	0.30	0.18	0.19	0.29	0.41
Loan-Deposit ratio	0.39	2.14	0.21	0.34	0.47
Inflows-Asset ratio	0.29	0.29	0.10	0.18	0.36
Outflows-Asset ratio	0.14	0.15	0.04	0.11	0.20
Observations	8,098				

Notes: Panel (A) reports summary statistics for bank-level balance sheet variables from the 1937 Federal Reserve Call Report data. Each observation is at the level of a bank. "Branching bank" is an indicator equal to 1 if the bank operates at least one branch office. "Branches" is the number of branches conditional on being a branching bank. "National bank" is an indicator equal to 1 if the bank has a national bank charter. "Total assets" is the book value of total assets, measured in millions of dollars. "Loan-Asset ratio", "Securities-Asset ratio", and Inflows-Asset ratio" are the share of total assets held in loans and securities and inflows from other banks, respectively. "Loan-Deposit ratio" is the share of lending out of total deposit liabilities. "Leverage ratio" is the ratio of total assets to total capital. "Reserve ratio" is the ratio of reserves held to deposits. Panel (B) reports summary statistics for branch-level balance sheet variables in which each observation is at the level of a bank headquarters or branch office. "Branch office" is an indicator equal to 1 if the observation is a branch rather than the bank's main office. "Total assets" is the book value of total assets, measured in millions of dollars. "Loan-Asset ratio" is the share of total assets held in loans. "Loan-Deposit ratio" is the ratio of total loans to total deposit liabilities. "Inflows-Asset ratio" and "Outflows-Asset ratio" refer to the shares of total assets held in due-from and due-to balances, respectively, which capture interbank inflows and outflows. Sources: 1937 Federal Reserve call reports and authors' calculations.

Figure 6: Comparing branching and unit bank balance sheets in 1937



Notes: This figure plots the point estimates with 90% and 95% confidence intervals (in dark and light bands, respectively) of individually estimated regressions of a standardized balance sheet ratio on a branch-bank indicator. "Unconditional" does not include any bank controls. "Bank size" is a fixed effect for the quartile of bank size. "Bank type" refers to the bank's charter (national vs state). "State" and "County" are the location of the bank's headquarters. Standard errors are clustered at the state level. The empirical specification is: $y_i = \beta \mathbb{I}(\text{Branch Bank})_i + \gamma_{\text{bank size-q}} + \alpha_{\text{bank type x county}} + \varepsilon_i$ where i denotes individual banks. Sources: Federal Reserve Board (1937) and authors' calculations.

the same charter type, indicating that organizational structure itself—rather than scale, regulatory constraints, or local economic conditions and opportunities—drive these distinct approaches to financial intermediation.

This divergence is consistent with branch and unit banks diversifying investments according to different informational and geographic constraints. Banks can diversify their asset positions in two ways: by lending across space or by investing in securities issued by firms in different locations. Lending requires substantial local information about borrowers' creditworthiness, prospects, and collateral values, which is costly to acquire and verify across geographic distances. Branch networks have advantages in gathering this soft information and maintaining relationships that reduce information asymmetries in their local markets (e.g., Guiso, Sapienza and Zingales, 2004*b*; Hombert and Matray, 2017). Moreover, the physical presence of branch offices facilitates loan monitoring and collection, while the backing of a larger network provides the capital needed to fund worthwhile local projects.[23]

Unit banks are by definition constrained to operate within a single location and therefore face limitations in expanding their lending beyond their immediate geographic footprint. Although they

[23]These differences were discussed by contemporaries (Chapman and Westerfield, 1942) and in later studies (Shull and Horvitz, 1964; Benston, 1989; Schweiger and McGee, 1961).

have detailed knowledge of the market in which they operate, once they approach concentration limits with individual borrowers, they cannot easily extend credit to promising opportunities in other areas due to information and monitoring constraints (Petersen and Rajan, 2002). As a result, they channel remaining deposits into more "information-insensitive" securities (e.g., Dang, Gorton and Holmström, 2013). In contrast, branch networks can continue expanding direct lending by reallocating capital internally across their geographic footprint, thereby reducing their need to hold residual funds in securities.[24]

6.2 The direction of capital flows

The 1930s battle over branching centered on whether urban branch networks would funnel money towards or away from communities starved of credit. We provide direct evidence that capital within branch networks differentially flows towards *high*-return locations in the next part of the paper.

Lower information and contractual frictions within branch networks yield three empirical predictions about the locations where banks allocate capital and lend. First, if there is geographic variation in the ratio of deposits to investment opportunities, we should observe systematic specialization and variation in net capital flows across branch offices, with some acting as net providers of funds and others as net recipients. Second, these flows should follow an economically meaningful pattern, with funds moving from deposit-rich areas toward locations with higher marginal returns to capital, i.e., those with greater lending opportunities. Third, branches receiving net capital inflows should deploy those funds into greater lending activity in more capital-constrained locations.

Our branch-level balance sheet data provide a unique window into internal capital flows of branch networks. First, we provide clear evidence of branch-level specialization within branch networks. Figures 7a and 7b plot the distributions of bank loan-to-asset and non-bank loan-to-asset ratios for unit banks (orange) and branches of multi-establishment banks (light blue).[25] In both cases, branches exhibit highly skewed behavior relative to unit banks. These figures show that while some branches originate few loans or transmit little funding, others concentrate lending activity or serve as major sources of capital. This bimodal structure suggests that branch networks systematically assign distinct roles to different branches in which some specialized in collecting deposits while others operated as lending hubs. While such specialization is a central feature of branch networks, it is fundamentally unavailable to unit banks.

In the second step of our analysis, we estimate the relative difference in the probability of receiving net capital inflows by branches relative to similarly sized unit banks. We classify branches

[24] We unfortunately do not observe the exact securities that banks hold. However, in the first half of the 20th century, the vast majority of the U.S. market capitalization in corporate bonds were in the railroad and industrial sectors, which were, by that point, large and geographically diversified firms (Hickman, 1953).

[25] Bank loans are defined as loans to other establishments within the same network and/or other banks.

Figure 7: Branch network specialization: capital flows and lending



Notes: Panels (a) and (b) plot the distributions of asset allocation ratios for unit banks (orange) and branches of multi-establishment banks (light blue) in 1937. Panel (a) shows the distribution of non-bank loans-to-assets, while Panel (b) shows the distribution of bank loans-to-assets. Branch asset shares are calculated using branch-level balance sheets while unit bank ratios use bank-level balance sheets. For branches, bank loans include both inter-bank loans and intra-bank loans, while unit banks include only inter-bank loans. Panels (c) and (d) plot the patterns of internal capital allocation within branch networks in 1937. Panel (c) plots the estimated β coefficients and 95% confidence intervals from Equation 2, where the dependent variable is an indicator for receiving positive net capital inflows. Branches are classified into terciles within branch network based on the horsepower-to-manufacturing output ratio in their county, with the first tercile (dark blue) representing the most capital-constrained locations and the second and third terciles (gray) being less constrained. The first set of results (hollow points) within each tercile controls separately for state and charter-type while second set (filled points) controls for their interaction. Panel (d) plots separately estimated coefficients and confidence intervals from regressing non-bank loan-to-asset ratios on a branch indicator for "All' counties (in green), the subset of "Constrained" counties defined as having above-median 1930 output-to-horsepower ratios (in dark blue), and "Unconstrained" counties defined as having below-median ratios (in gray). The specification includes state-charter-type by headquarter-county fixed effects and is weighted by branch-level lending. Branch asset shares are calculated using branch-level balance sheets while unit bank ratios use bank-level balance sheets. The sample includes all Federal Reserve member bank offices. Sources: Federal Reserve Board (1937) and authors' calculations.

within a network into terciles by the ratio of horsepower per unit of manufacturing output of the county of operation. This within-network ranking captures the core economic comparison: the ability of branch networks to reallocate capital across their geographic footprint. The lowest tercile corresponds to the most constrained locations within a branch network while the highest tercile contains the least constrained counties. Using our office-level balance sheet data, we estimate:

$$\mathbb{I}(Inflows)_{bis} = \sum \beta_{tercile} \mathbb{I}(b \in tercile_i) + \alpha_s + \Gamma' X_i + \varepsilon_{bis} \tag{2}$$

where the dependent variable is an indicator for branch b in bank i in state s receiving positive net capital inflows. We control for charter-type fixed effects, state of operations, and total bank assets. The β coefficients for each tercile capture the likelihood of receiving capital on net from other banks or establishments relative to unit banks.

Because our exercise uses within-bank network variation in the degree of constraints, the same county can rank in different terciles across different bank networks. Our approach therefore only relies on the relative rankings of counties within their own networks rather than on cross-sectional differences in the full distribution of counties, which helps to address concerns about measurement error in our proxy for capital constraints.

Figure 7c documents a clear pattern of systematic capital reallocation within branch networks. Branches operating in the most capital-constrained locations (first tercile) have a 5.5 percentage point higher probability of receiving net capital inflows compared to similarly sized unit banks. The baseline probability of receiving net capital inflows is 5 percentage points, so these branches are twice as likely to receive capital. In contrast, branches in the second and third terciles show no significant differences from unit banks in their likelihood of receiving capital transfers. The concentration of capital inflows in the most constrained locations, rather than a general tendency for all branches to receive more funding than unit banks, is consistent with branch networks channeling capital to locations where it would likely generate the highest returns.

Having shown that branch networks direct capital toward high-return areas, we now examine whether the lending differences between branches and unit banks documented in Figure 6 are concentrated in locations that receive these capital inflows. Specifically, we test whether branches' higher lending intensity relative to unit banks is driven by "Constrained" counties—those where internal capital markets would be most valuable—or whether it is uniform across all locations. We use the establishment-level balance sheets to estimate the relative lending intensity of branches relative to unit banks by regressing loan-to-asset ratios on a branch indicator in three different samples. The first sample includes all counties. The second restricts to "Constrained" counties that we define as those having above-median manufacturing output per horsepower, and the third includes "Unconstrained" counties with below-median ratios. Our specification controls for overall

bank size and includes county fixed effects to absorb local economic conditions and credit demand interacted with bank charter type. The regression therefore examines the relative difference in lending behavior between branches and unit banks within different types of locations.

Figure 7d plots the results. In the full sample of "All" locations, we replicate the heterogeneity in portfolio allocation at the bank level, shown in Figure 6.[26] At the branch level on average, branches maintain loan-to-asset ratios approximately 10 percentage points higher than unit banks in the same counties.

However, this average masks sharp differences by local capital scarcity. In particular, all of the average effects are driven by "Constrained" counties, in which the magnitudes of relative lending are statistically indistinguishable from average. By contrast, in "Unconstrained" counties, the difference in lending relative to unit banks is negligible and statistically insignificant. This asymmetry shows that the difference in lending intensity is driven by the most constrained locations, resulting from targeted reallocation.

Together, these results show that branch networks systematically channeled capital toward more constrained locations through internal redistribution methods unavailable to unit banks rather than necessarily expanding the overall supply of credit. This internal capital market allowed branch networks to overcome the spatial segmentation that constrained unit banks in order to direct funds from deposit-rich areas to locations where local lending opportunities exceeded local deposit availability, thereby raising aggregate productivity.

These results highlight efficiency gains from reallocating existing funds. However, branching also altered the geography of financial access by integrating local deposit markets. We next explore how this broader access shaped the sources of growth across places.

6.3 Discussion of bank-level and aggregate outcomes

The evidence in Sections 6.1 and 6.2 shows that branch banks systematically differ from unit banks in how they allocate capital: they lend more intensively while holding fewer securities than unit banks, and do so by using internal capital markets to reallocate funds toward constrained locations. These differences in portfolio allocation between branch and unit banks therefore raise the question: given that branch banks lend a larger share of their assets than unit banks, why do we observe no growth in aggregate state-level lending (Figure 5b)?

The answer lies in the consolidation of the banking sector that accompanied branching reform, as documented in Figure 4. When fewer, larger branch banks replace multiple unit banks, the increased lending intensity per institution is offset by the reduction in the number of institutions,

[26]The branch-level regressions are weighted by branch-level lending to address the highly skewed distribution of lending across branch offices within networks. This weighting allows us to recover bank-level aggregates consistent with our previous bank-level analysis while examining heterogeneity across individual offices.

leaving aggregate lending unchanged even as capital is reallocated more efficiently across space.

This consolidation mechanism, combined with the spatial reallocation documented in Section 6.2 provides the source of manufacturing productivity gains (Figure 5a) without aggregate financial deepening (Figure 5b). Appendix Section C.2 provides a detailed numerical example featuring banking sector consolidation, higher lending intensity by branch banks, and spatial reallocation to more constrained locations that generates these patterns of constant aggregate lending and increased capital flows to constrained areas.

7 Local Financial Access and Economic Growth

The differences in capital mobility between branch and unit banks underscore that the institutional structure of banking—not just local bank presence or deposit totals—shapes capital allocation across space. Branch networks enable a distinct model of financial intermediation in which lending is more geographically flexible and therefore potentially more responsive to local opportunities. These features are not captured by standard measures of local financial development such as branch counts or deposit levels, which implicitly treat bank offices as isolated entities.

In order to capture the network effects enabled by branching, and specifically the potential for non-local funding to support local investment, we develop a new measure of financial access: Deposit Market Access (DMA). DMA quantifies the potential pool of capital that a county could access given the geographic footprint of bank branch networks, and it provides a conceptually appropriate lens through which to assess how institutional form shapes capital mobility and economic development. We calculate DMA immediately before and after the first wave of reforms and show that the patterns of DMA growth are consistent with the direction of capital flows within branch networks, but only in branching states. Finally, we demonstrate that both DMA growth and branch legalization generate persistent gains in local manufacturing productivity.

7.1 Deposit Market Access (DMA)

Our measure of DMA builds on the market access approach used in trade and economic geography (e.g., Donaldson and Hornbeck, 2016) and adapted for financial instruments in Xu and Yang (2024) in which a location's potential access to a resource depends on the geographic distribution of the resource and the frictions involved in reaching this resource. In our context, the resource is deposit funding, and the friction is shaped by the institutional structure of the banking system.

Consistent with the banking literature (e.g., Petersen and Rajan, 2002) and the patterns documented in Section 6.2, contractual frictions are smaller between branches of the same bank that have access to information generated throughout the branch network when investing the bank's

own deposits. As a result, within branch networks, offices are able to provide credit and monitor loans to the same extent as the head office, and all resources in the network are effectively "local" from the borrower's perspective (e.g., Quincy, 2024). In contrast, these frictions are larger *between* banks where information is not fully shared and therefore more asymmetric.[27] Unit banks rely on interbank markets to obtain external funding and thus face contracting frictions arising from asymmetric information, collateral constraints, and enforcement risks that are exacerbated by geographic distance. Consequently, access to non-local deposits is costlier for unit banks.

7.1.1 Construction of Deposit Market Access (DMA)

Intuitively, Deposit Market Access (DMA) resembles measures of market access that aggregate available resources across space, weighted by access costs to those locations. Formally, we define DMA for each county i as the sum of population in other counties j, weighted by the frictional cost of accessing them, which depends on the structure of branch networks. We use population as a more exogenous proxy for potential deposits than observed past deposits following the trade literature on "market potential.[28] Access frictions vary depending on whether counties are part of the same branch banking network, whether the location is banked at all, and the geographic distance between them.

Let N_j denote the total population of county j, and τ_{ij} the effective distance or trade cost between counties i and j.[29] The parameter $\theta > 0$ determines how quickly access decays with distance. $\mathbb{I}_{\text{same network}_{ij}}$ is an indicator for whether counties i and j both host at least one bank belonging to the same branch network, and $\mathbb{I}_{\text{banked}_i}$ indicates whether county i has at least one bank.[30] For counties without any banks, we define $k(i)$ as the nearest banked county to i.

The measure of DMA is then given by:

$$\text{DMA}_i = \begin{cases} \displaystyle\sum_{j \neq i} \left(\mathbb{I}_{\text{same network}_{ij}} \cdot N_j + (1 - \mathbb{I}_{\text{same network}_{ij}}) \cdot \frac{N_j}{\tau_{ij}^{\theta}} \right), & \text{if } \mathbb{I}_{\text{banked}_i} = 1 \\ \dfrac{1}{\tau_{ik(i)}^{\theta}} \cdot \text{DMA}_{k(i)}, & \text{if } \mathbb{I}_{\text{banked}_i} = 0 \end{cases} \tag{3}$$

This formulation captures three key features of the deposit access environment. For banked

[27] To simplify, we assume no contractual frictions in our baseline, but results are similar as long as there is a gap based on institution type.

[28] In practice, these measures are highly correlated. We find that in the 1937 cross-section, the correlation between DMA using deposits rather than population is over 90%.

[29] To ensure comparability across states of different geographic sizes, we normalize distances using the standard deviation of distances from county i to all other counties in the state. This scaling preserves within-state spatial variation while avoiding systematic overstatement of access costs in large states.

[30] By 1929, only 76 U.S. counties had zero banks according to Federal Deposit Insurance Corporation (1992), so the variation in DMA is driven by branch network access rather than banking access.

counties, DMA includes all potential deposits within the same branch network at full value, reflecting the lack of contractual frictions between bank branches in a network. For unbanked counties, DMA is inherited from the nearest banked location, with an additional discount applied based on the cost of reaching that location. Finally, the parameter θ governs the strength of this friction: higher values of θ imply that deposit access declines more steeply with distance for out-of-network banks, reflecting tighter local segmentation of capital markets. We set $\theta = 1$ in our baseline analysis. By incorporating both the geographic footprint of banks and the institutional frictions that shape access to external capital, DMA provides a transparent and theoretically grounded measure of financial capacity at the local level.

To build intuition, we provide two examples of when DMA would change. First, a county's own banking market or population can change its DMA. Consider a county that is currently unbanked or served by a unit bank. Becoming part of a branch network would directly increase its DMA because it gains financial access. Even if there are no changes to a county's banking market, its DMA would also be impacted by its own population growth.

Second, a county's DMA can change due to changes in funding potential *elsewhere* in its network. In this case, consider a county that is already served by a branch of a multi-office bank. If the bank expands by adding a branch in a new county, or the other counties in the branch network grow, the county's DMA increases even if all of its own characteristics remain constant. Quantitatively, this type of network-driven growth can occur even if the county loses access to some branch networks, or other branch networks operating in the county shrink. Given that most counties in the United States were already banked in the 1920s and 1930s, changes in DMA are empirically likely to be driven by changes in the structure of banking networks rather than by local growth alone.

The network-based DMA approach has two additional key advantages. First, because DMA reflects the structure of entire bank networks rather than the realized presence of a bank in a given location, changes in DMA are plausibly more exogenous to local economic conditions than standard measures of financial development. While the decision to open a new bank or branch in a particular county may respond to anticipated growth, changes in DMA are driven by broader shifts in network configuration—often rooted in regulatory constraints or strategic expansion decisions made at the bank level. This logic mirrors the market access framework in Donaldson and Hornbeck (2016) and Xu and Yang (2024) in which changes to market access arise from changes in the surrounding network, not just local investment. As a result, we can directly estimate the impact of changes in county DMA on its productivity and growth.

The second advantage is that DMA reduces data demands by focusing on potential rather than realized flows of capital. Instead of requiring direct observation of all interbank and intra-bank transfers, which are rarely available, DMA relies only on information about bank networks and

population distributions. These lower data requirements make it a flexible and scalable tool for quantifying how institutional structure conditions financial access across space.

7.1.2 Patterns of DMA growth

Figure 8a maps the substantial geographic variation in changes to DMA from 1929 to 1937 both across and within states. The largest changes in DMA are concentrated in the West, parts of the South, and select areas of the Northeast, all of which had high branching adoption during the 1930s.

Before examining the overall patterns of DMA changes, we first validate that they captures meaningful variation driven by actual institutional changes. Our systematic codification of state branching laws allows us to construct granular measures of county-level branching eligibility based on the idiosyncratic population thresholds, competition restrictions, and geographic constraints embedded in each state's legislation. For each county, we calculate the share of overall population residing in branching-eligible towns. Tables A.3 and A.4 show that these legal criteria for branching eligibility successfully predict both where branches were actually established and subsequent DMA growth. Branch entry is concentrated in less-populated counties that met the statutory requirements, and increases in county-level branch eligibility directly predict DMA growth even when controlling for 1930 indicators of county development.

Having validated that branch eligibility increases DMA, we evaluate how branching reforms impact the geography of potential access to capital by correlating the changes in DMA with branching regulation and our empirical proxy for the likely returns to capital, manufacturing value-added-to-horsepower. Given the patterns of capital flows we have documented, we would expect the highest relative DMA growth between branching and non-branching locations to be in more capital constrained locations. We therefore directly compare the growth in within-county DMA over time in high versus low-return counties within branching and non-branching states.

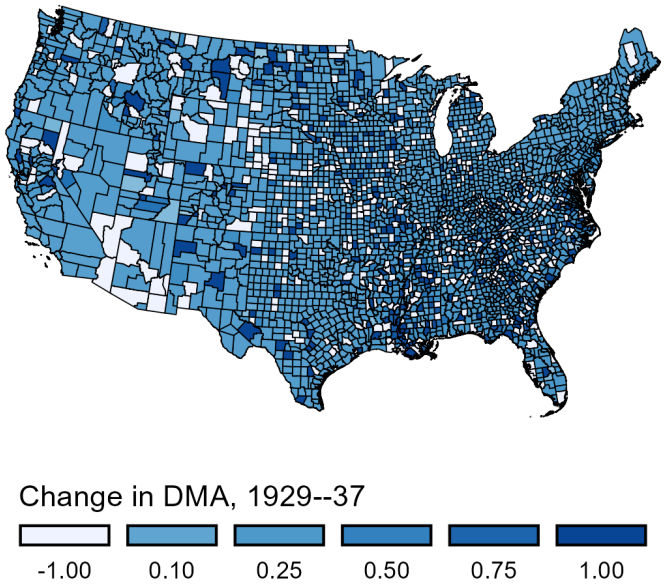
Figure 8b shows the results of this exercise, in which we plot ΔDMA against capital constraints separately for counties in branching and non-branching states. Figure 8b shows that in non-branching states (orange diamonds), counties with higher output-to-horsepower ratios—that is, those more capital constrained—saw systematically *lower* DMA growth. If anything, in non-branching states, additional financial access flowed toward already less-constrained areas. In branching states (blue circles), by contrast, the slope is flat, indicating that relative to non-branching states, branch networks differentially shifted capital toward more constrained locations.[31] Altogether, Figure 8b shows that banks in branching states differentially shifted capital

[31] Figure 8b therefore visualizes a triple-difference empirical design in which the vertical axis captures the within-county change in DMA over time (first difference), the horizontal axis compares counties along a measure of capital scarcity (second difference), and the blue versus orange lines provide the cross-state comparison between branching and non-branching states (third difference). Table A.5 reports these relationships in regression form.

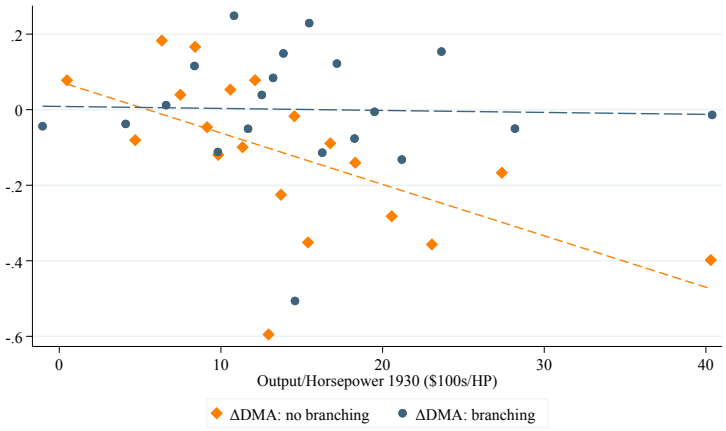
toward more constrained locations relative to those in non-branching states, consistent with the patterns of capital mobility documented in Section 6.2.

Figure 8: Changes in Deposit Market Access, 1929–1937

(a) Map of ΔDMA



(b) ΔDMA by 1930 constraints



Notes: Panel (a) maps the county-level percentage change in Deposit Market Access (DMA) between 1929 and 1937. The values range from -100% to +100%, with increases in DMA corresponding to continuously darker shading. DMA is calculated using Equation (3) with $\theta = 1$ and population as the baseline measure of deposit potential. Darker blue indicates larger increases in DMA. Panel (b) is a binscatter plot of the relationship between ΔDMA and 1930 manufacturing value-added per unit of horsepower, separately for counties in branching states (dark blue) and non-branching states (orange). Lines show fitted values from linear regressions with state fixed effects. Sources: State session laws, McNally (1929), Federal Reserve Board (1937), Haines (2010), and authors' calculations.

7.2 DMA growth and economic development

The preceding analysis shows that branching reforms expand deposit market access, particularly in counties that were initially capital-scarce, thereby improving spatial capital allocation. We now examine whether these shifts in potential access to financial capital led to longer-run differences in economic development. As we discuss in Section 7.1.1, DMA growth is plausibly more exogenous to local changes in banking because it reflects all changes in the network, and so our analysis includes all counties in states that had not branched as of 1929.

We first plot the relationship between DMA growth and manufacturing productivity in the raw data. Figure 9a plots the average county-level manufacturing value-added per capita for the group of above-median versus below-median DMA growth counties. It shows that there is an overall trend of productivity growth, and a gap in productivity emerges immediately between the two groups that grows over time.

We formalize this relationship by estimating the following dynamic difference-in-differences specification that compares counties before and after reform to their changes in DMA:

$$y_{ct} = \beta_t \cdot \Delta\text{DMA}_c + \alpha_c + \gamma_{st} + X_{c,1930} \times \delta_t + \varepsilon_{ct} \tag{4}$$

where y_{ct} is the log of manufacturing value-added per capita in county c at time t, and ΔDMA_c measures the change in deposit market access between 1929 and 1937 for county c. We include county fixed effects α_c to control for time-invariant differences and 1930 county characteristics $X_{c,1930}$ interacted with year fixed effects to control for differential trends based on initial conditions. We also include state-by-year fixed effects γ_{st} to account for state-specific shocks. Standard errors are clustered at the state level.

The specification in Equation 4 isolates the effects of branching-induced changes in deposit access from a range of potential confounding factors. Restricting our identifying variation to being within states means that we crucially do not require randomness in the state-level branching legislation. The state-by-year fixed effects also account for state-level shocks such as policy changes, New Deal spending, and broader economic restructuring that may have coincided with or occurred because of branching reforms. In addition, county fixed effects absorb time-invariant differences in industrial structure or geography. Finally, by interacting 1930 county characteristics with year indicators, we flexibly control for all differential trends correlated with initial county size, industrial activity, or other observable features. These controls help to rule out many alternative channels, such as a general recovery of rural areas, agglomeration in urban areas, or local variation in production methods, and they strengthen the causal interpretation of the changes in manufacturing productivity reflecting improved financial access through branching.

Figure 9b shows that higher deposit market access growth during the first wave translated into sustained manufacturing productivity gains as well.[32] First, there are no significant pre-trends before 1937, indicating that counties with higher subsequent DMA growth were not already on differential trajectories in manufacturing productivity. Second, beginning shortly after most states had passed branching laws, counties that experienced larger DMA improvements by 1937 also had significantly higher manufacturing value-added per capita growth. Third, these effects grew over time and reach approximately 0.7% for each 10% increase in DMA by the 1990s. This magnitude implies that a one-standard deviation increase in ΔDMA generates a 10% increase in manufacturing productivity in the subsequent decades.

These productivity gains are concentrated in counties that were initially less financially developed. Figure 10 separately estimates Equation 4 for counties above and below the 1930 median in deposits per capita. Counties with below-median deposits experience substantial and statistically significant productivity gains from DMA growth, with effects emerging in the late 1930s and persisting through the 1990s. In contrast, counties with above-median deposits show no significant response to changes in DMA. This heterogeneity is consistent with the reallocation of capital through branch networks generating productivity gains in locations that had been capital-constrained, as documented in Section 6.2.

7.3 Branching eligibility and economic development

Finally, we provide complementary causal reduced-form evidence of the impact of branching reform on county-level manufacturing productivity. We leverage the sharp and persistent discontinuities in banking regulation at state borders where our empirical strategy compares adjacent counties that share a state border but were subject to different regulatory regimes. As in the state-level analysis, we exclude states that allowed cross-city branching before the 1930s. Figure A.17 maps the border counties in our analysis.

We estimate the following regression specification:

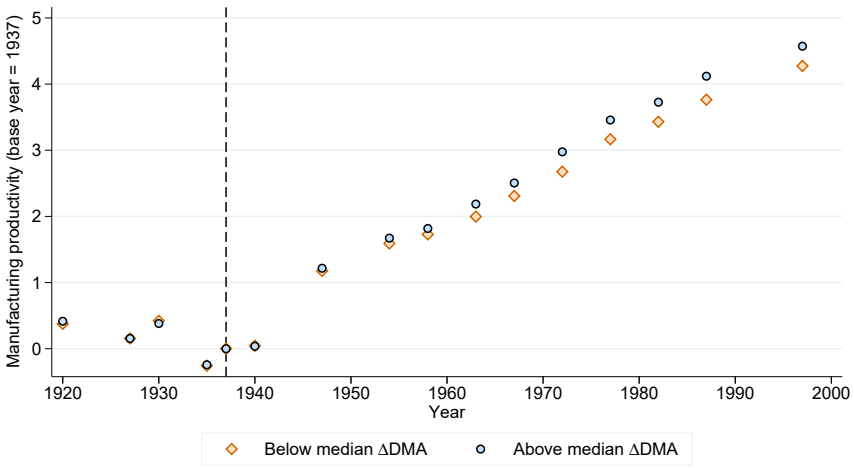
$$y_{cpt} = \beta_t \mathbb{I}(\text{1st Wave})_c + \alpha_c + \gamma_{pt} + \varepsilon_{cpt} \tag{5}$$

Our dependent variable y_{cpt} is manufacturing productivity measured by value-added per capita for county c in border-pair p at time t. The treatment variable $\mathbb{I}(\text{1st Wave})_c$ is an indicator that county c is located in a state that introduced cross-city branching during the 1930s. We include county fixed effects α_c to absorb time-invariant county-level differences and border-pair by year fixed effects γ_{pt} to absorb local shocks that might affect counties on both sides of a state border. These fixed

[32] Figure A.15 shows similar patterns of the impact of DMA growth on total manufacturing value-added at the county-level.

Figure 9: Effects of Deposit Market Access growth on manufacturing productivity

(a) Average productivity by ΔDMA

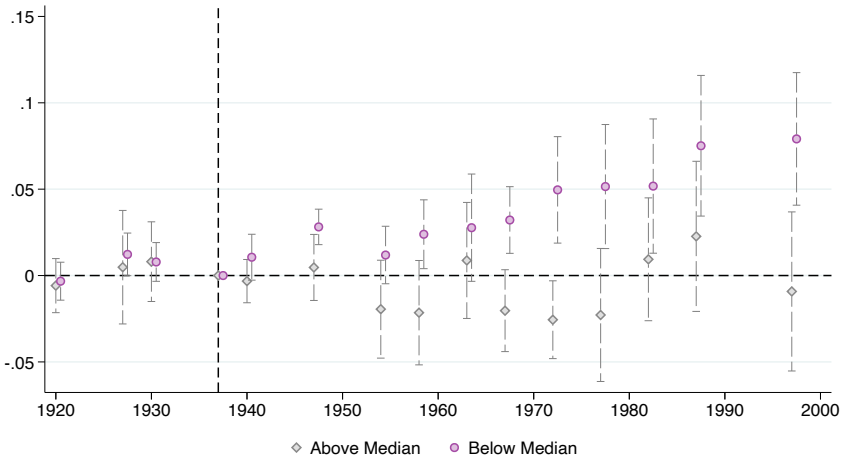


(b) Event study approach



Notes: These figures plot county-level log real manufacturing value-added per capita as a function of Deposit Market Access growth (ΔDMA) between 1929 and 1937. Panel A displays average log real manufacturing value-added per capita for counties above and below the ΔDMA sample median. Panel B visualizes the estimated coefficients β_k coefficients and 95% confidence intervals from Equation 4, where the dependent variable is log real manufacturing value-added per capita. The sample excludes early branching states that permitted cross-city branching before 1930. Standard errors are clustered at the state level. Sources: State session laws, McNally (1929), Federal Reserve Board (1937), Haines (2010), Janas (2024), and authors' calculations.

Figure 10: Heterogeneity by financial development



Notes: This figure plots the estimated coefficients β_k coefficients and 95% confidence intervals from Equation 4, where the dependent variable is log real manufacturing value-added per capita. ΔDMA measures the change in Deposit Market Access between 1929 and 1937. The gray diamond coefficients are for the subset of counties with above-median deposits per capita measured in 1930, and the purple round markers are for counties with above-median deposits per county. The sample excludes early branching states that permitted cross-city branching before 1930. Standard errors are clustered at the state level. Sources: State session laws, McNally (1929), Federal Reserve Board (1937), Haines (2010), Janas (2024), and authors' calculations.

effects restrict the identifying variation to within well-defined geographic areas, creating control and treated counties that are likely similar in both observable and unobservable dimensions. We cluster standard errors at the border-pair level, following standard practice for regional shocks.

The identifying assumption is parallel trends: absent treatment, counties on either side of the border would have evolved similarly. Although we do not require that deregulation was random at the state level for identification, we also show that treated and control states and counties are balanced on pre-reform observable characteristics in banking, manufacturing, and agricultural sectors measured in both levels and growth (Figures 2c and A.16).

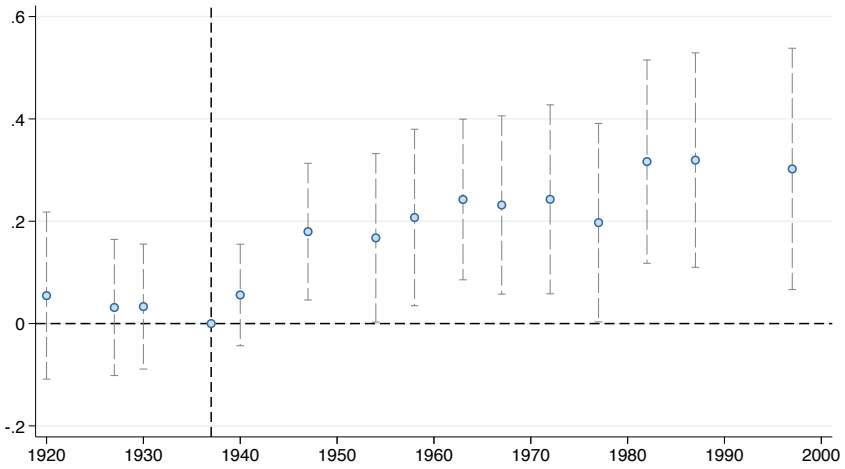
Figure A.16 shows that before the onset of branching reform, branch-eligible counties have similar capital intensity in both agriculture and manufacturing to neighboring counties.[33] In addition, the balance in observable characteristics suggests that branching and non-branching counties in highly localized geographic areas are likely to have been similar in other unobservable characteristics such as their expected profitability, and that as shown in Figures 4a and 4b, they primarily differed by whether their local banking office was a unit bank or branch.

Figure 11 plots the average growth in manufacturing value-added per-capita in newly-branched places relative to unit-banking border counties. There are no differential pre-trends between treated

[33]Very few counties had zero banks in 1929, so balance on these characteristics indicates that treated and control locations did not differ in their exposure to pre-Depression financial cycles such as the the World War I boom, or the subsequent bank and farm crises of the 1920s (Rajan and Ramcharan, 2015; Jaremski and Wheelock, 2020).

and control counties, and differences in manufacturing only begin to emerge after branching reform. The increasing magnitudes in subsequent decades is consistent with a financing channel in which bank branching accelerates economic development *after* deposits grow (e.g., King and Levine, 1993; Rajan and Zingales, 1998; Fonseca and Matray, 2024).

Figure 11: Effects of branch legalization on manufacturing value-added per capita



Notes: This figure plots the β_t coefficients for 1930s cross-city branching legalization from Equation 5 with 95% confidence intervals. Figure A.17 maps county border pairs with a discontinuity from the 1930s legalizations. Sources: State session laws, FDIC, Federal Reserve call reports, Janas (2024), Haines (2010), and authors' calculations.

We provide several robustness exercises. First, a potential concern with this strategy is cross-border spillovers from treatment leakage, where customers might access services across state lines. We empirically address this concern by comparing counties one step removed from state borders, which are more distant from each other and therefore less subject to potential diversion of resources across the state border, and we show that results remain unchanged (Figure A.18b). Moreover, historical evidence indicates banking markets were highly localized during this period when loan applications required bankers to assess borrowers' reputations and neighborhood "character" (Figure A.20), and regulators defined deposit markets at the neighborhood or city level (Delano, 1945).[34]

Second, we perform a placebo test in which we randomly reassign treatment status among border-pair counties that did not have a discontinuity in their laws and re-estimate effects across one thousand simulated datasets. We plot the distribution of coefficients in Figure A.19b, which shows the predominance of null results.

Third, our results are robust to controlling for county-level World War II spending, state-level Great Depression severity, and other 1930s banking legislation, each interacted with year fixed effects, which absorb differential trends correlated with these characteristics (Table A.2). Together,

[34]Even today, customers rarely travel far for banking services (e.g. Brevoort and Hannan, 2006).

Figures 9 and 11 provide consistent evidence that branch legalization, measured both directly and through its impact on potential access to deposits, has substantial, persistent impacts on local manufacturing productivity.

7.4 Discussion

Our results highlight the critical role of bank organizational structure in shaping the allocation of financial capital across space. Branch networks fostered economic growth not by increasing the total supply of credit, but by reallocating funds from deposit-rich locations to areas where productive investment opportunities were previously underserved. This mechanism—internal capital markets within branch networks—is distinct from, but complementary to, broader measures of financial development such as financial depth or branch density that do not capture the systematic movement of capital towards the periphery.

While we cannot observe all micro-level processes, our results are consistent with the mechanisms emphasized in the finance literature, including screening, monitoring, and relationship lending (e.g., King and Levine, 1993). These functions can operate in both unit and branch banks, but branch networks likely enhanced them through proximity to borrowers, enabling banks to overcome the information frictions faced by isolated unit banks.

Several caveats are worth noting. First, we cannot observe every contractual or informal arrangement that may have influenced credit allocation, such as access to alternative credit markets outside the branch network. Second, our proxy for capital scarcity—manufacturing output per horsepower—captures variation in local average returns and proxies for investment opportunities but omits other forms of capital. Third, we do not examine general equilibrium effects, such as changes in long-run banking competition, which may also shape outcomes. Finally, it is worth highlighting that banks may not face the same incentives to open and lend in branches in less-developed areas in regulatory regimes with less restricted branch entry.

8 Conclusion

This paper shows that the first wave of intrastate branch deregulation in the 1930s in the United States fostered economic growth by reallocating capital across space. These reforms allowed bank offices to pool deposits and direct funds toward areas with higher returns to capital rather than simply expanding local credit in proportion to local deposits. By easing spatial frictions in capital mobility, branch networks created an internal market for funds that improved the efficiency of credit allocation.

These findings underscore how institutional design can reduce geographic frictions in capital

mobility. When markets are segmented, the structure of intermediation, and not just its scale, determines which places gain access to investment. By enabling banks to move funds within their networks, branching reforms effectively connected the "last mile" of the financial system in ways that fragmented external capital markets could not.

In an era of ongoing financial innovation and integration, such as the proposed European banking union, understanding how institutional changes in capital mobility shape economic geography remains critical. The 1930s branching reforms, a formative episode in U.S. financial history, offer a historical laboratory for these dynamics, demonstrating that regulatory design can have lasting effects on the spatial distribution of economic activity by improving capital mobility across locations. Future work could explore how branch networks interacted with other dimensions of development—such as firm entry, labor mobility, or human capital accumulation—and how these dynamics evolved once nationwide banking became possible.

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A Additional Tables and Figures

A.1 Additional Tables

Table A.1: Summary statistics

Panel A: State-level characteristics

	Mean	Std. Dev.	p25	Median	p75
Branching	0.56	0.50	0.00	1.00	1.00
Population	2590.31	2664.45	682.00	1859.50	3080.00
Banks	6.00	4.90	2.44	4.27	9.75
Patents	1.31	2.48	0.08	0.31	1.19
Deposits p.c.	0.37	0.26	0.20	0.30	0.47
Loans p.c.	0.25	0.20	0.13	0.18	0.33
Manufacturing value-added p.c.	2.63	0.77	2.06	2.67	3.10
Manufacturing employment	224.94	319.65	34.08	91.38	262.16
Manufacturing investment	17.64	25.31	2.14	6.14	21.50
Observations	36				

Panel B: County-level characteristics

	Mean	Std. Dev.	p25	Median	p75
Branching	0.49	0.50	0.00	0.00	1.00
Population	54.09	216.01	9.71	16.71	31.32
Population growth	0.08	0.30	-0.05	0.03	0.14
Deposits p.c.	0.22	0.25	0.11	0.19	0.28
Farms p.c.	0.10	0.05	0.07	0.11	0.14
Manufacturing output per HP	16.62	13.02	8.32	13.54	20.49
Manufacturing value-added p.c.	1.91	1.42	1.03	1.63	2.45
Manufacturing employment	5.39	26.56	0.11	0.37	1.49
Manufacturing establishments	170.63	1,097.33	14.00	28.00	65.00
Observations	785				

Notes: Panels (A) and (B) report summary statistics for state-level and county-level characteristics , respectively, in 1929 unless otherwise noted. Both samples omit states that had legalized branching as of 1929. The county-level sample contains border counties at policy discontinuities."Branching" is an indicator equal to one if the state permitted branch banking by 1937 and zero otherwise. "Population" is measured in thousands of residents in 1930. "Population growth" is the percent change from 1920 to 1930. "Banks" is the number of commercial banks in hundreds. "Patents" is the number of patents granted, in thousands. All variables denoted with "p.c." are measured in dollars per capita. "Manufacturing employment" is the number of manufacturing employees, in thousands in 1930. "Manufacturing investment" is the value of investment in manufacturing, in thousands of dollars from 1939. Sources: State session laws, Haines (2010), Federal Deposit Insurance Corporation (1992), Flood (1991), and authors' calculations.

Table A.2: Branching effects on economic development with more controls

	(1) Baseline	(2) Depression severity	(3) WW2 spending	(4) Banking laws
A: Difference-in-difference				
Branch x post	0.168***	0.246***	0.172***	0.167***
	(0.05)	(0.07)	(0.05)	(0.05)
N	17,944	17,944	17,922	17,944
B: Triple difference				
County below median x post	0.011	0.003	-0.019	0.013
	(0.09)	(0.09)	(0.09)	(0.09)
Branch x post	0.067	0.147**	0.075	0.062
	(0.06)	(0.07)	(0.06)	(0.06)
Branch x below median x post	0.263**	0.283***	0.253**	0.264**
	(0.10)	(0.10)	(0.10)	(0.10)
N	17,944	17,944	17,922	17,944

Notes: Only counties in a border pair with a discontinuity in branching included (see Figure A.17). We estimate the difference-in-difference version of Equation 5 and then add in a third difference based on whether a county was below the 1930 sample deposits median: $y_{cpt} = \beta \mathbb{I}(\text{1st Wave})_c \times \text{Post}_t + \alpha_c + \gamma_{pt} + \varepsilon_{cpt}$. The triple difference specification with $\mathbb{I}(\text{Constrained})_c$ indicating a county below the 1930 sample median of log deposits is: $y_{cpt} = \beta_1 \mathbb{I}(\text{1st Wave})_c \times \mathbb{I}(\text{Constrained})_c \times \text{Post}_t + \beta_2 \mathbb{I}(\text{1st Wave})_c \times \text{Post}_t + \beta_3 \mathbb{I}(\text{Constrained})_c \times \text{Post}_t + \alpha_c + \gamma_{pt} + \varepsilon_{cpt}$. Samples run from 1920 to 2000. Standard errors clustered at border pair level. Population linearly interpolated between censuses. We also control for border pair-year dyad and county fixed effects. Column 2 adds year x state 1929-33 deposit growth controls. Column 3 adds year x county World War II contracts per capita controls (which is not available for all counties). Column 4 adds year x total state banking laws passed 1929–37. Sources: State session laws, FDIC, Federal Reserve Board (1937), Janas (2024), Haines (2010), Federal Deposit Insurance Corporation (1992), (Quincy and Xu, 2025), and authors' calculations.

Table A.3: Predicting branch locations in 1937 with local branching eligibility

	(1)	(2)	(3)	(4)	(5)
1(Branch eligible)	0.223***	0.192***			
	(0.06)	(0.07)			
Pop. share branching eligible			0.151***	0.187**	0.093*
			(0.05)	(0.07)	(0.05)
Log 1930 population	0.002	-0.009	0.003	-0.009	-0.010
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log of total deposits	0.055***	0.053***	0.010	0.055***	0.033***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Pop elig share x under median					0.079*
					(0.04)
1930 deposits under median					0.054***
					(0.02)
Constant	-0.430***	-0.338***	-0.088	-0.352***	-0.211**
	(0.11)	(0.12)	(0.08)	(0.12)	(0.10)
Dep Var Mean	0.14	0.11	0.08	0.11	0.06
N	2,012	1,641	2,012	1,641	1,641
Drop early branchers?	N	Y	N	Y	Y

Notes: Branching eligibility defined by applying 1937 state laws' geographic, competition, and population granular branching criteria to each city, then aggregating to the county level. The share of deposits held by branches calculated using 1937 call reports is the outcome except in Column 3 which is an indicator for having any branch. Both branch eligibility and deposit indicators are 1 if the share is greater than 0. Standard errors are clustered by state. * p<0.1, ** p<0.05, *** p<0.01. Sources: State session laws, Federal Reserve Board (1937), Ruggles et al. (2021), Haines (2010), Bleemer and Quincy (2025), and authors' calculations.

Table A.4: Predicting 1929–37 Deposit Market Access growth using local branching eligibility

	(1)	(2)	(3)	(4)
1(Permit Branching in 1930s)	0.202**	0.236***		
	(0.10)	(0.08)		
Pop. share branching eligible			0.196*	0.077
			(0.10)	(0.09)
Log 1930 population	0.001	-0.014	0.003	-0.027
	(0.03)	(0.02)	(0.03)	(0.02)
Log of total deposits	-0.132***	-0.138***	-0.131***	-0.126***
	(0.03)	(0.03)	(0.03)	(0.03)
Constant	0.909***	1.024***	0.910***	1.076***
	(0.23)	(0.21)	(0.23)	(0.22)
Dep Var Mean	-0.01	-0.05	-0.01	-0.05
N	2,334	2,916	2,334	2,916
Drop early branchers?	Y	N	Y	N

Notes: Branch permission defined as introducing cross-city branching between 1930 and 1940; early branchers introduce it before 1930. Branching eligibility defined by applying 1937 state laws' geographic, competition, and population granular branching criteria to each city, then aggregating to the county level. Deposits and population controls are as of 1930. Standard errors are clustered by state. * p<0.1, ** p<0.05, *** p<0.01 Sources: State session laws, Federal Reserve Board (1937), Ruggles et al. (2021), Haines (2010), McNally (1929), Bleemer and Quincy (2025), and authors' calculations.

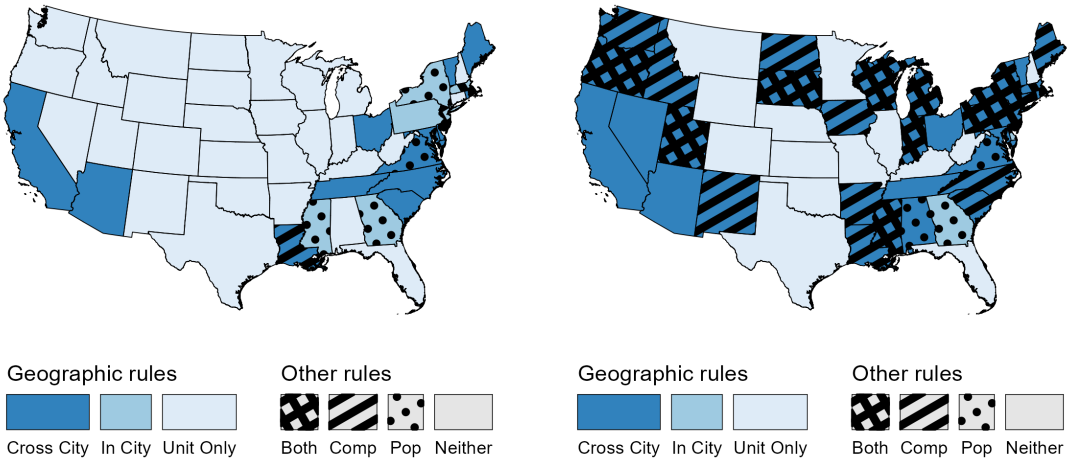
Table A.5: Deposit Market Access growth and pre-reform manufacturing input constraints

	(1)	(2)	(3)	(4)
1930 Output per HP x 1930s Brancher	0.0130*	0.0130*	0.0132*	0.0169**
	(0.00764)	(0.00764)	(0.00709)	(0.00739)
1930 Output per HP	-0.0134***	-0.0134***	-0.0107**	-0.0144***
	(0.00482)	(0.00482)	(0.00471)	(0.00512)
Log 1930 Pop			-0.219***	-0.226***
			(0.0595)	(0.0497)
Constant	0.0425	0.0425	2.190***	2.266***
	(0.0554)	(0.0554)	(0.587)	(0.495)
N	1,931	1,931	1,931	2,500
Drop early branchers?	Y	N	Y	N

Notes: The outcome variable is the change in deposit market access from 1929 to 1937. We proxy for the marginal revenue product of capital using manufacturing output divided by horsepower in the 1929 Census of Manufacturers, scaled so the units are $100 per horsepower. Branch permission defined as introducing cross-city branching between 1930 and 1940; early branchers introduce it before 1930. State fixed effects not shown. Standard errors are clustered at state level. * p<0.1, ** p<0.05, *** p<0.01 Sources: State session laws, Federal Reserve Board (1937), McNally (1929), Haines (2010), and authors' calculations.

A.2 Additional Figures

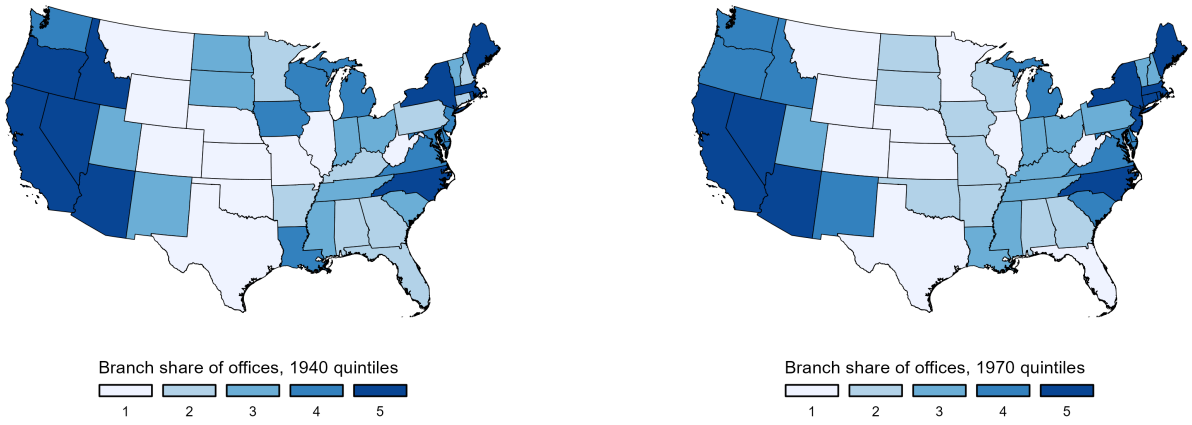
Figure A.1: Branch bank restrictions, 1929 and 1937



(a) 1929 (b) 1937

Notes: The depth of the color refers to states' geographic permissions. The overlaid patterns denote additional population and competition requirements (see Section B.2 for details). Sources: State session laws and authors' calculations.

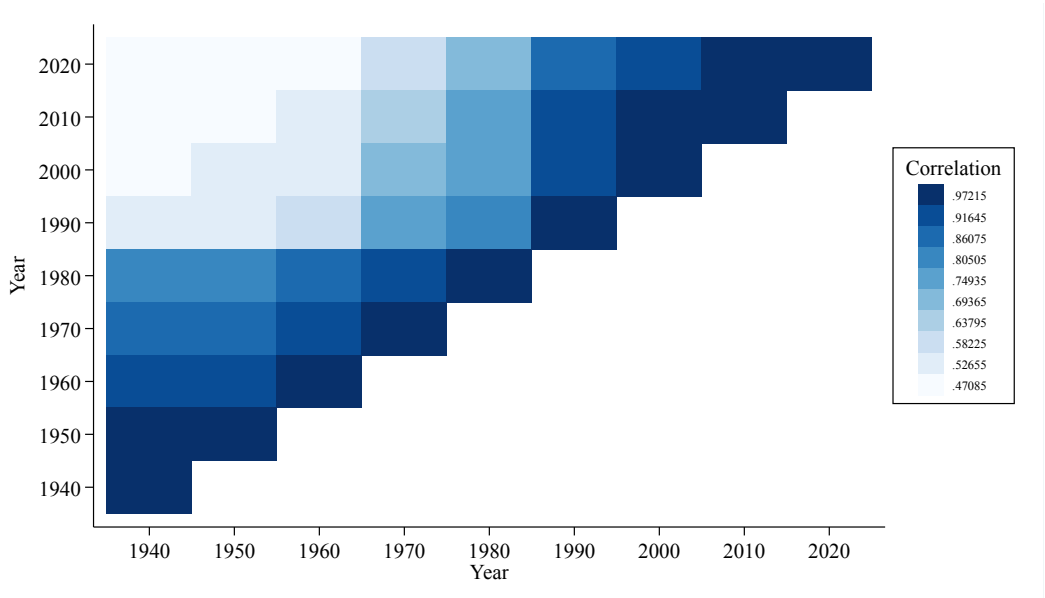
Figure A.2: Share of banking offices in branch networks



(a) 1940 (b) 1970

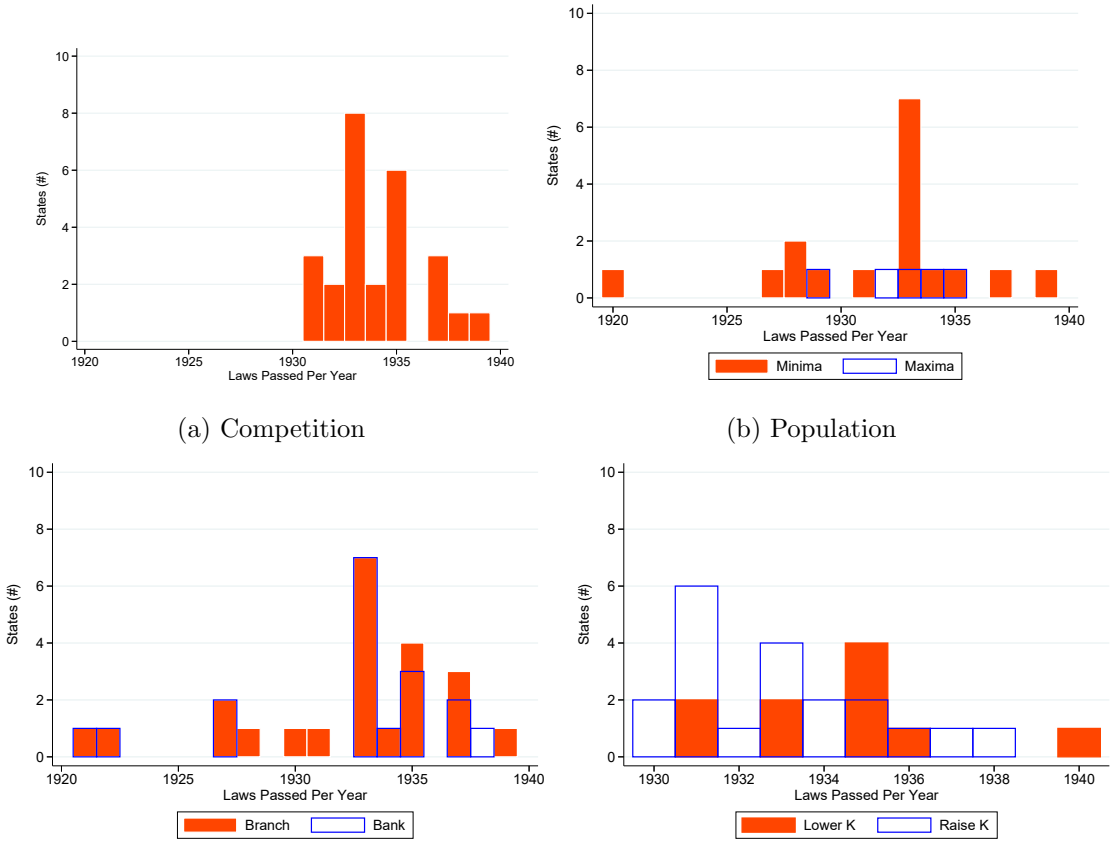
Notes: Shading refers to year-specific quintiles in the share of banking offices in a branch network in that state. Sources: FDIC BankFind, and authors' calculations.

Figure A.3: Pairwise correlations in states' branch office shares by decade



Notes: Each square is a correlation between states' branch office share quintile in the years corresponding to the row and column. All correlations are statistically significant. Sources: FDIC BankFind, and authors' calculations.

Figure A.4: Types of state bank regulation passed, 1920–1940



(a) Competition

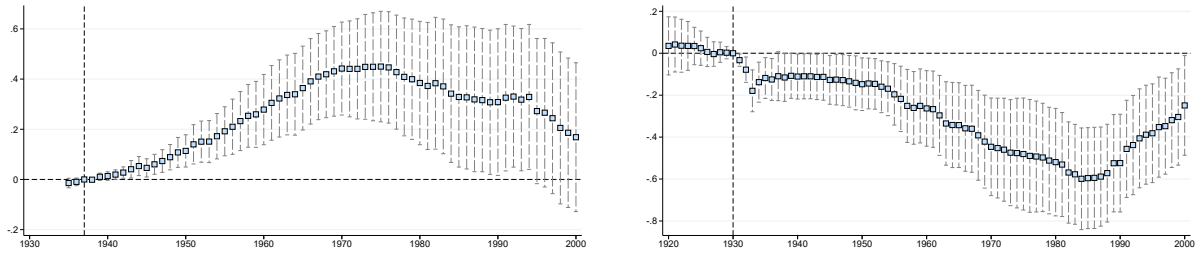
(b) Population

(c) Branching capital

(d) Bank minimum capital

Notes: Each subfigure categorizes the type of restrictions passed each year. Sources: State session laws and authors' calculations. Population thresholds typically served as exceptions to restrictions on branch entry where other banks already operated ("competition"). Branching capital restrictions were always binding and required branch banks to add charter capital for each branch ("branch") or meet some minimum threshold to have any branches ("bank"). Bank minimum capital requires to the amount of charter capital required to open any kind of bank. See Section B.2 for more detail on definitions. Sources: State sessions laws and authors' calculations.

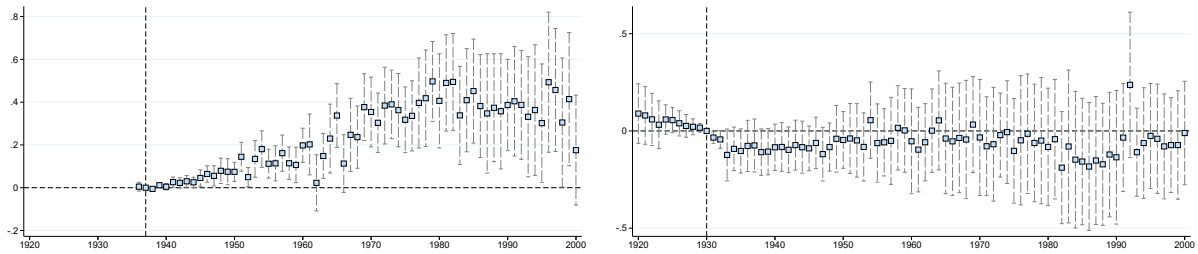
Figure A.5: State branching and banking markets including pre-1930 deregulators



(a) Banking offices (b) Banks

Notes: Each point results from estimating Equation 1 on the log change in the outcome in year t relative to 1930 for banks and 1937 for banking offices, controlling for census region fixed effects. Bars represent 90% confidence intervals from robust standard errors. The sample includes early branching states that permitted cross-city branching before 1930 in the control group. Sources: State session laws, FDIC, Flood (1991), and authors' calculations.

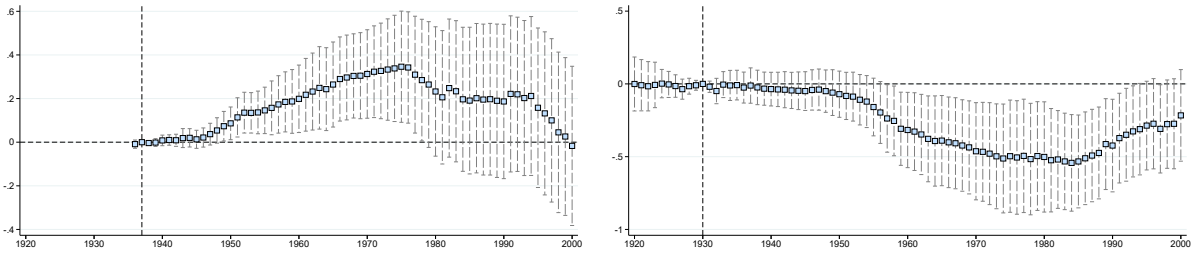
Figure A.6: State branching and banking markets, adding lags



(a) Banking Offices (b) Banks

Notes: Each point results from estimating Equation 1 on the log change in the outcome in year t relative to 1930, controlling for census region fixed effects and 2 lags of the logged dependent variable. Bars represent 90% confidence intervals from robust standard errors. The sample excludes early branching states that permitted cross-city branching before 1930. Sources: State session laws, FDIC, Flood (1991), and authors' calculations.

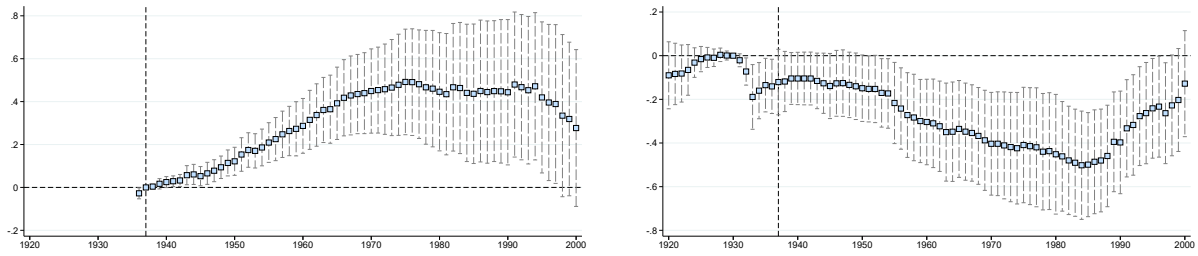
Figure A.7: State branching and banking markets, controlling for the Great Depression



(a) Banking offices (b) Banks

Notes: Each point results from estimating Equation 1 on the log change in the outcome in year t relative to 1930, controlling for census region fixed effects and 1929–33 state log deposit growth. Bars represent 90% confidence intervals from robust standard errors. The sample excludes early branching states that permitted cross-city branching before 1930. Sources: State session laws, FDIC, Flood (1991), and authors' calculations.

Figure A.8: State branching and banking markets, controlling for 1930 rural population share

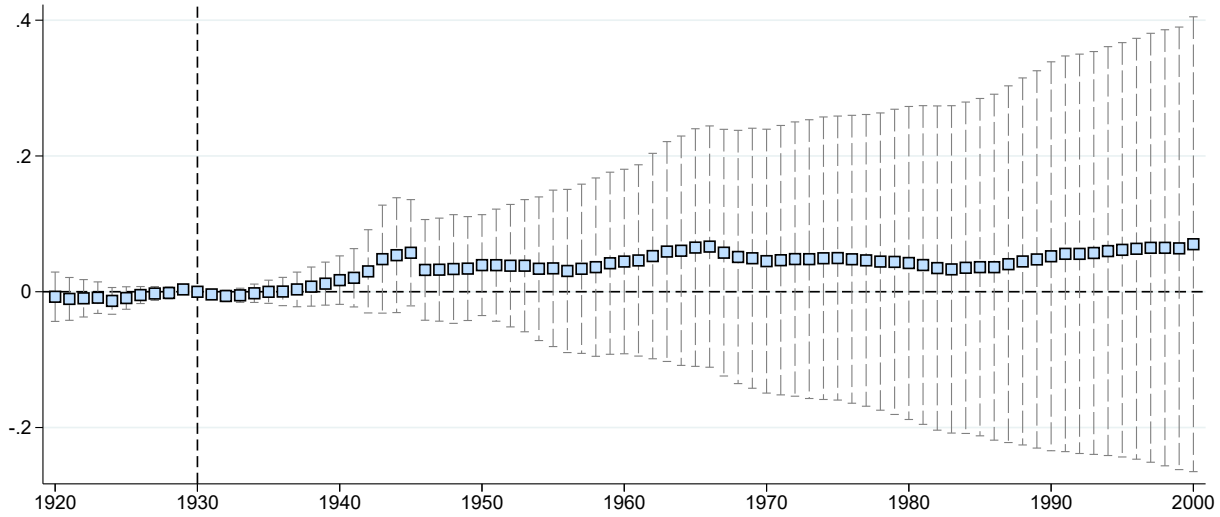


(a) Banking offices

(b) Banks

Notes: Each point results from estimating Equation 1 on the log change in the outcome in year t relative to 1930, controlling for census region fixed effects and state 1930 rural population share. Bars represent 90% confidence intervals from robust standard errors. The sample excludes early branching states that permitted cross-city branching before 1930. Sources: State session laws, FDIC, Flood (1991), and authors' calculations.

Figure A.9: State branching and population growth



Notes: Each point results from estimating Equation 1 on the log change in the outcome in year t relative to 1930, controlling for census region fixed effects. Bars represent 90% confidence intervals from robust standard errors. Sources: State session laws, US Census Bureau via FRED, and authors' calculations.

Figure A.10: State branching and manufacturing value-added growth

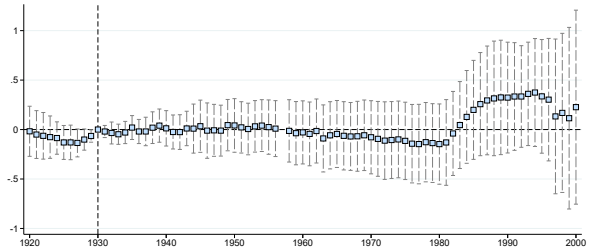


Notes: Each point results from estimating Equation 1 on the log change in the outcome in year t relative to 1930, controlling for census region fixed effects. Bars represent 90% confidence intervals from robust standard errors. Sources: State session laws, US Census Bureau via FRED, and authors' calculations.

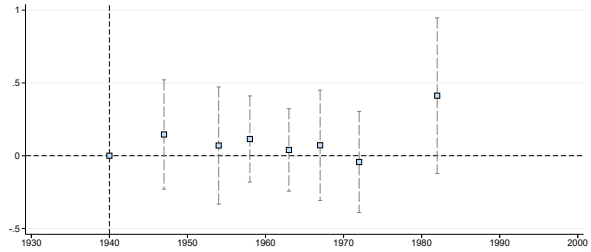
Figure A.11: Productivity growth, financial depth, inputs and technology, controlling for the Great Depression



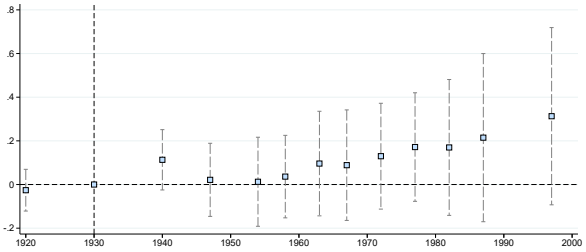
(a) Value-added per worker



(b) Capital investment



(c) Capital investment



(d) Employment



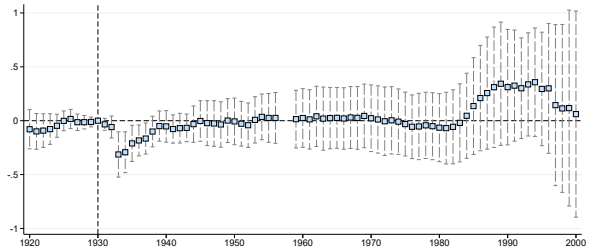
(e) Patents

Notes: These figures plot the point estimates and 90% confidence intervals from estimating Equation 1 on different outcomes at each horizon also controlling for 1929–33 deposit growth. Outcomes are calculated as the log change relative to 1930 other than for capital investment, which is first available in 1939. The sample excludes early branching states that permitted cross-city branching as of 1929. Sources: State session laws. Flood (1991), and authors' calculations; Panel (a): total manufacturing value-added per worker (Ruggles et al., 2021; Janas, 2024; Haines, 2010); Panel (b): total loans outstanding Flood (1991), FDIC; Panel (c): new capital expenditures by manufacturing firms (1939 and 1947 Censuses of Manufactures, Haines (2010)); Panel (d): total employment in manufacturing industries (Ruggles et al., 2021; Haines, 2010) ; Panel (e): Cumulative patents from 1920 to year t (Petralia, Balland and Rigby, 2016).

Figure A.12: Productivity growth, financial depth, inputs and technology, controlling for 1930 rural population share



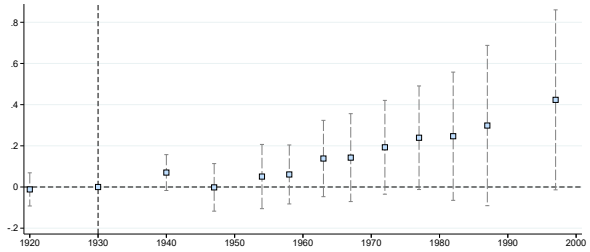
(a) Value-added per worker



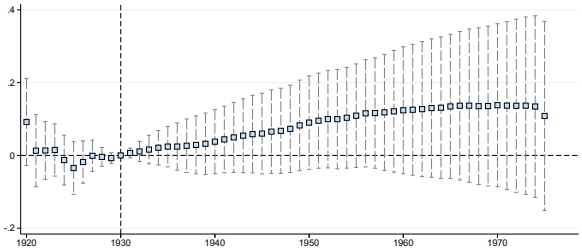
(b) Capital investment



(c) Capital investment



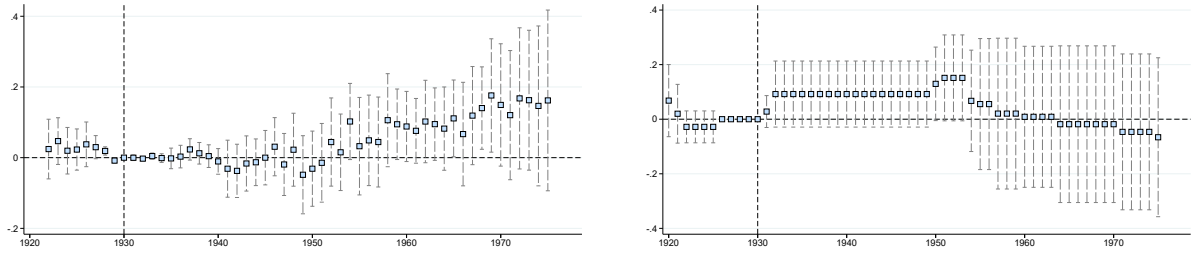
(d) Employment



(e) Patents

Notes: These figures plot the point estimates and 90% confidence intervals from estimating Equation 1 on different outcomes at each horizon also controlling for state 1930 rural population share. Outcomes are calculated as the log change relative to 1930 other than for capital investment, which is first available in 1939. The sample excludes early branching states that permitted cross-city branching as of 1929. Sources: State session laws, Haines (2010), and authors' calculations; Panel (a): total manufacturing value-added per worker (Ruggles et al., 2021; Janas, 2024; Haines, 2010); Panel (b): total loans outstanding Flood (1991), FDIC; Panel (c): new capital expenditures by manufacturing firms (1939 and 1947 Censuses of Manufactures, Haines (2010)); Panel (d): total employment in manufacturing industries (Ruggles et al., 2021; Haines, 2010) ; Panel (e): Cumulative patents from 1920 to year t (Petralia, Balland and Rigby, 2016).

Figure A.13: State branching and patenting, additional robustness

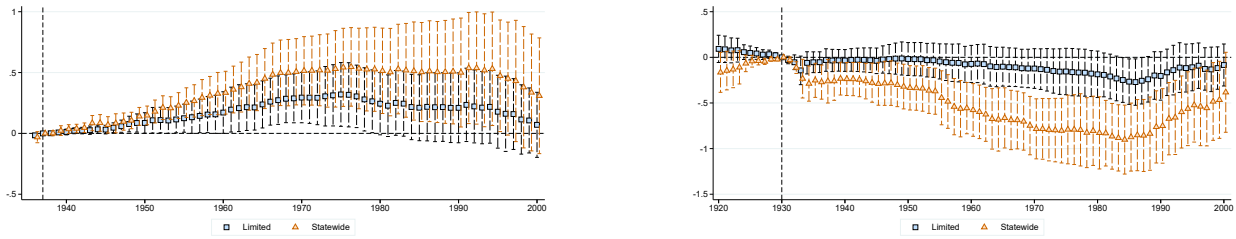


(a) Adding 2 lags

(b) Impactful innovations

Notes: Each point results from estimating Equation 1 on the log change in the outcome in year t relative to 1930, controlling for census region fixed effects, adding two lags in (a) and restricting to impactful innovations, defined by Kelly, Papanikolaou, Seru and Taddy (2021). Bars represent 90% confidence intervals from robust standard errors. Sources: State session laws, Petralia, Balland and Rigby (2016), (Kelly, Papanikolaou, Seru and Taddy, 2021), and authors' calculations.

Figure A.14: State branching and banking markets by level of geographic deregulation

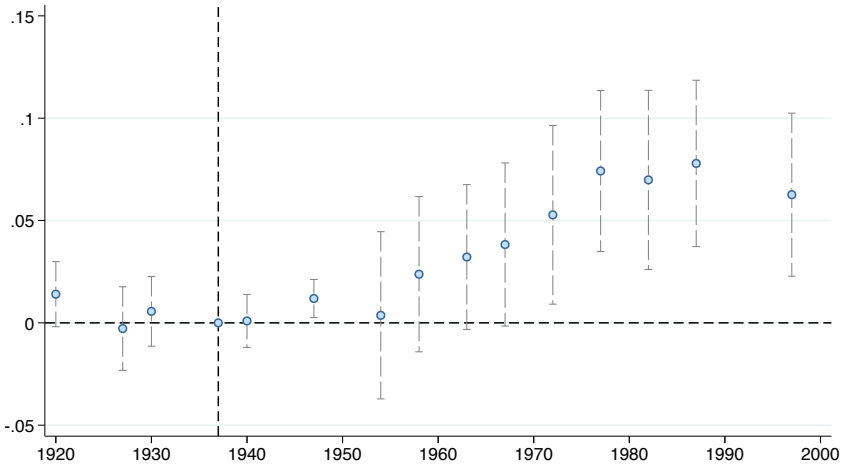


(a) Banking Offices

(b) Banks

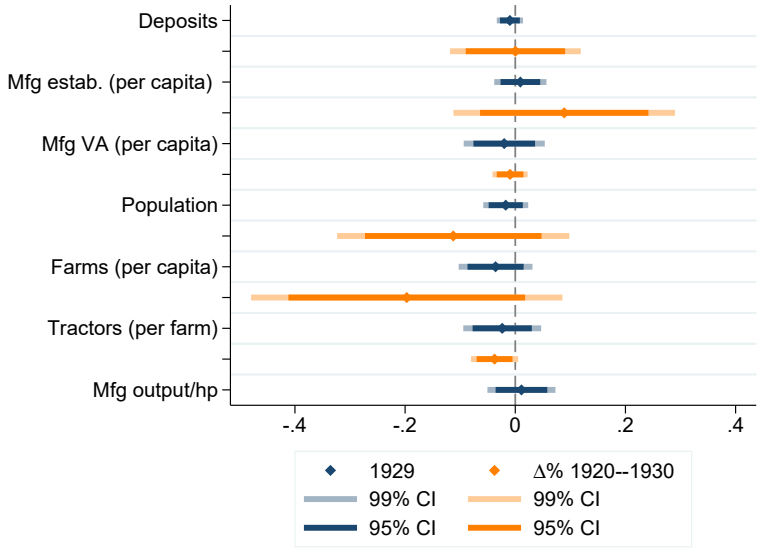
Notes: Each point results from estimating Equation 1 on the log change in the outcome in year t relative to 1930, controlling for census region fixed effects. Bars represent 90% confidence intervals from robust standard errors. The sample excludes early branching states that permitted cross-city branching before 1930. Here we split our treated states by whether they allowed branching statewide by 1939 or not. Sources: State session laws, FDIC, and authors' calculations.

Figure A.15: Effects of Deposit Market Access growth on manufacturing value-added



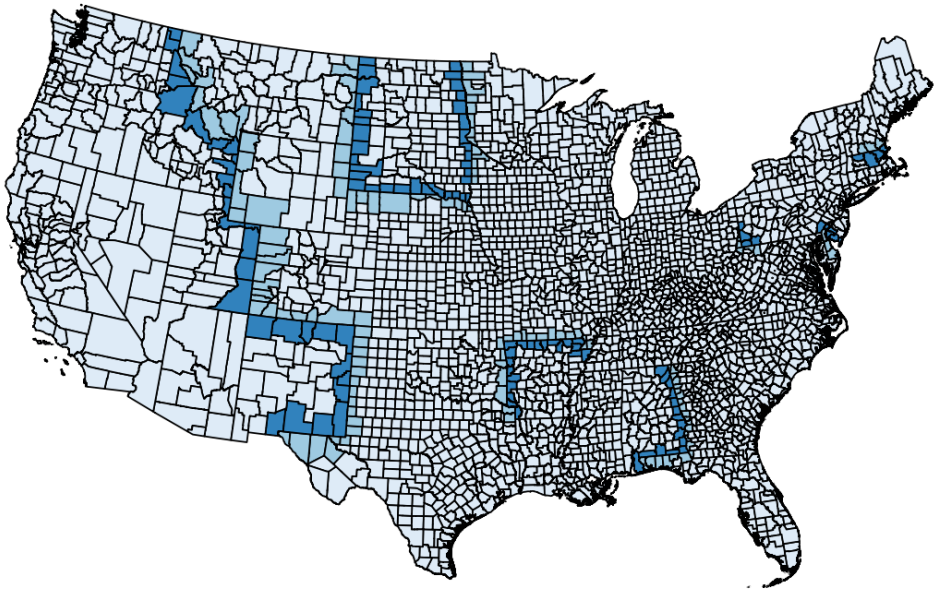
Notes: This figure plots the estimated coefficients β_k coefficients and 95% confidence intervals from Equation 4, where the dependent variable is log real manufacturing value-added. ΔDMA measures the change in Deposit Market Access between 1929 and 1937. The sample excludes early branching states that permitted cross-city branching before 1930. The regression is weighted by the county-share of manufacturing value-added within state in order to recover aggregate output. Standard errors are clustered at the state level. Sources: State session laws, McNally (1929), Federal Reserve Board (1937), Haines (2010), Janas (2024), and authors' calculations.

Figure A.16: County characteristics balance on branch introduction



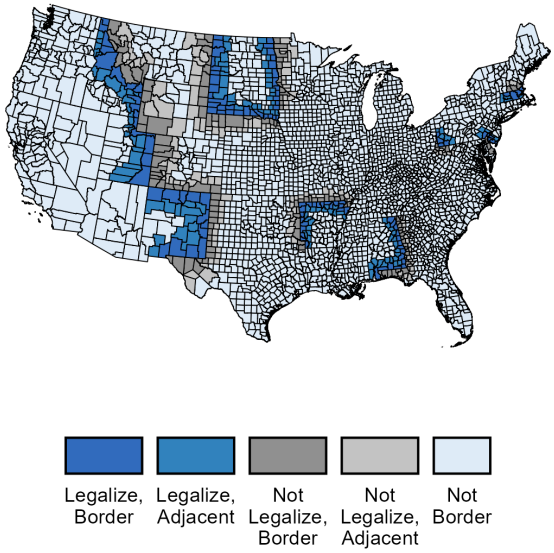
Notes: Each row is the result of a regression on county-level outcomes on an indicator for introducing cross-city branching during the 1930s with county border pair fixed effects, omitting states allowing cross-city branching before 1929, along with 95 and 99% confidence intervals. Standard errors are clustered at the county border pair level. Sources: State session laws, Federal Deposit Insurance Corporation (1992), Haines (2010), and authors' calculations.

Figure A.17: County border-pair sample map

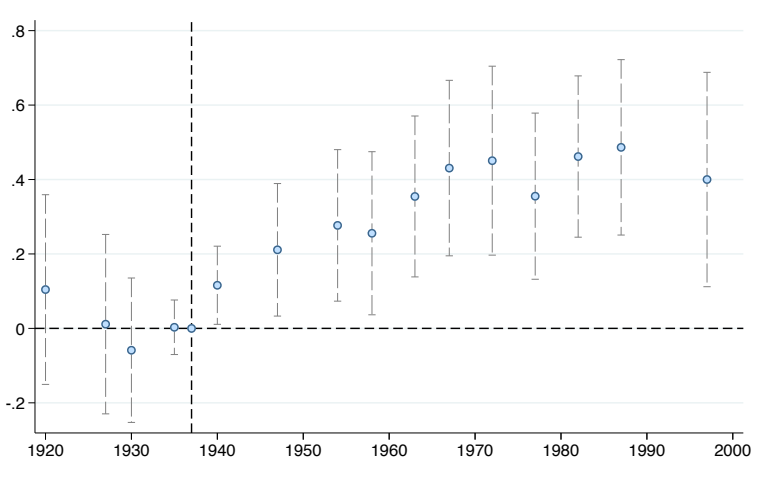


Notes: This map displays the counties which are on a state border where state branching laws change between contiguous states as of 1937. All states permitting cross-city branching in 1929 are dropped from the sample, as are state borders without a change in branching policy at the state line. Dark blue shaded counties permit cross-city branching while light blue counties do not. Sources: State session laws and authors' calculations.

Figure A.18: County border pair robustness: adjacent counties



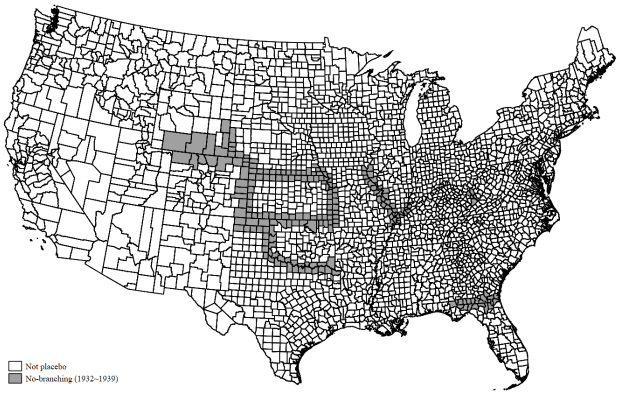
(a) Included counties



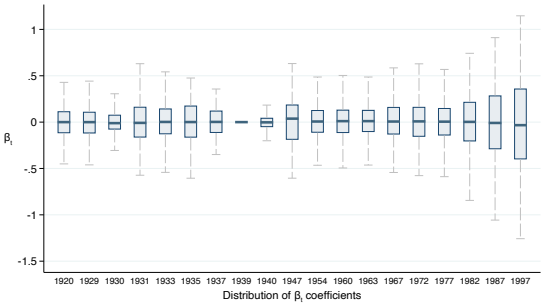
(b) Manufacturing value-added per capita

Notes: This specification uses counties which are adjacent to our border pair sample but not on the state border (Figure A.18a). Each point is the β coefficient for 1930s cross-city branching legalization from Equation 5 interacted with that year with 95 percent confidence intervals, defined using standard errors clustered at the border pair level. Deposits are for all commercial banking offices in that county in that year, except 1937, which is for only Federal Reserve member banks. We also control for border pair-year dyad and county fixed effects. Sources: State session laws, FDIC, Federal Reserve Board (1937), Federal Deposit Insurance Corporation (1992), Haines (2010), Janas (2024), and authors' calculations.

Figure A.19: County border pair robustness: simulated placebo border pairs



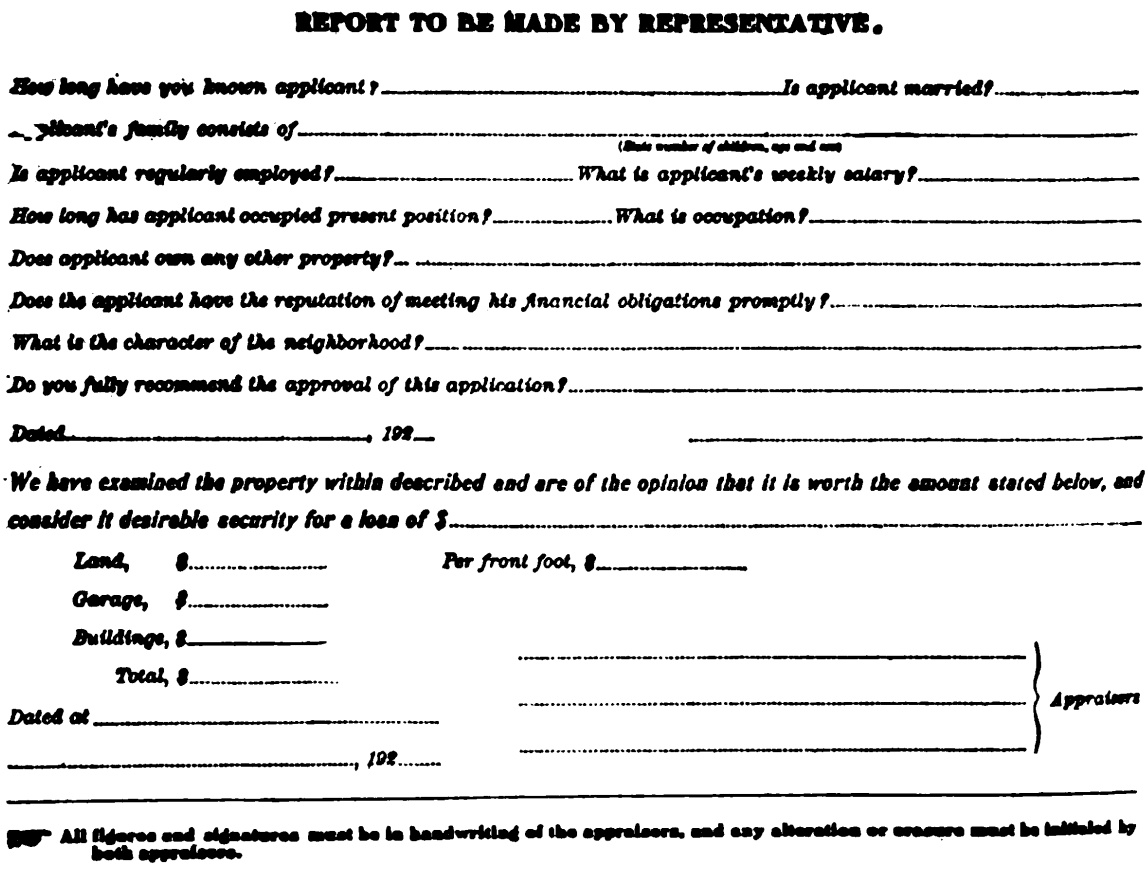
(a) Included counties



(b) Manufacturing value-added per capita

Notes: This specification estimates a placebo regression with simulated border pairs (Figure A.19a). Each point is the β coefficient for our placebo 1930s cross-city branching legalization from Equation 5 interacted with that year with 95 percent confidence intervals, defined using standard errors clustered at the border pair level. Deposits are for all commercial banking offices in that county in that year, except 1937, which is for only Federal Reserve member banks. We also control for border pair-year dyad and county fixed effects. Sources: State session laws, FDIC, Federal Reserve Board (1937), Federal Deposit Insurance Corporation (1992), Haines (2010), Janas (2024), and authors' calculations.

Figure A.20: Sample of 1920s loan application



REPORT TO BE MADE BY REPRESENTATIVE.

How long have you known applicant? ..... *Is applicant married?* .....

Applicant's family consists of ..... (State number of children, age and sex)

Is applicant regularly employed? ..... *What is applicant's weekly salary?* .....

How long has applicant occupied present position? ..... *What is occupation?* .....

Does applicant own any other property? .....

Does the applicant have the reputation of meeting his financial obligations promptly? .....

What is the character of the neighborhood? .....

Do you fully recommend the approval of this application? .....

Dated ....., 192... .....

We have examined the property within described and are of the opinion that it is worth the amount stated below, and consider it desirable security for a loan of $ .....

Land, $..... *Per front foot,* $.....

Garage, $.....

Buildings, $.....

Total, $.....

Dated at ..... } *Appraisers*

....., 192.....

All figures and signatures must be in handwriting of the appraisers, and any alteration or erasure must be initialed by both appraisers.

Source: Sample bank real estate loan from North and Smith (1928).

B Constructing the legal database

B.1 Data sources

We collect and standardize bank branching regulations from 1910 to 1994 based on the laws passed by each state legislature over that time frame. This allows us to identify the flow of conditions governing bank branching from the National Banking Era to the modern branch deregulation. We start with 11 collections of state laws put together by federal bank regulators and lawyers spanning 1910 to 1993. The first, Welldon (1910), lists a range of bank legal conditions in force in 1910. We take this as our starting point. Then, we check branching laws in a series of Federal Reserve Board (various years) articles (1924, 1930, 1932, 1936, 1939, 1959) and research publication (Federal Reserve System, 1931), which list the stock of current laws. After 1959, we use a series of law review articles (Gup, 1971; Hablutzel, 1977) and the post-1960 legal compilation conducted by Amel (1993) to trace out the geographic constraints governing bank branching (defined below).

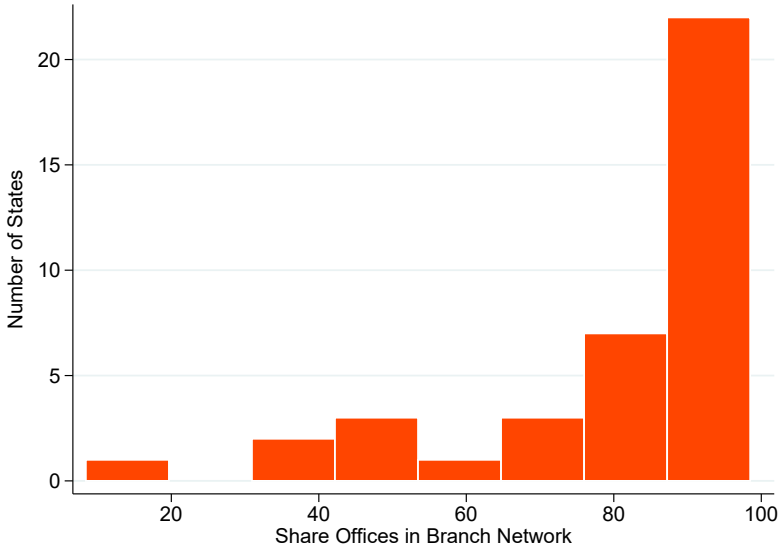
If there are any changes in law content between cross-sections, we manually search the flow of state laws, searching forward from the first cross-section of laws to the next to find each law change using the State Session Laws database on HeinOnline.[1] Keyword searches permit us to identify each law that mentions branching for each state over this time period for further review. We manually review each law to check whether it altered the conditions under which branch banking could occur.

This process yields a comprehensive list of branching laws for each state. These laws typically trace out the legal evolution of bank branching from total prohibition to modern *de novo* branching that is not conditional on any other requirements does not require any other pre-requisites. While previous research has typically focused on the final stage of deregulation (unrestricted *de novo* branching) as defined by Amel (1993), our approach differs in two important ways. First, we trace the entire legal evolution of bank branching, from total prohibition through various conditional stages to eventual full liberalization. Second, we examine a much longer time span than previous studies.

This broader approach is necessary because by the time states reached their final deregulation date as documented in Amel (1993), most already had extensive branch networks. Figure B.1 plots the branch share of banking offices in each state the year before their final *de novo* deregulation; over half of states had branch shares over 90% at that time. Therefore, we focus on understanding how branch expansion occurred under earlier, more restricted regulatory regimes, which captures the periods of most branching development in most states.

[1] This database contains high-quality text from every law passed by every state legislature at every meeting over our period.

Figure B.1: Branch share of banking offices in year prior to final branch deregulation



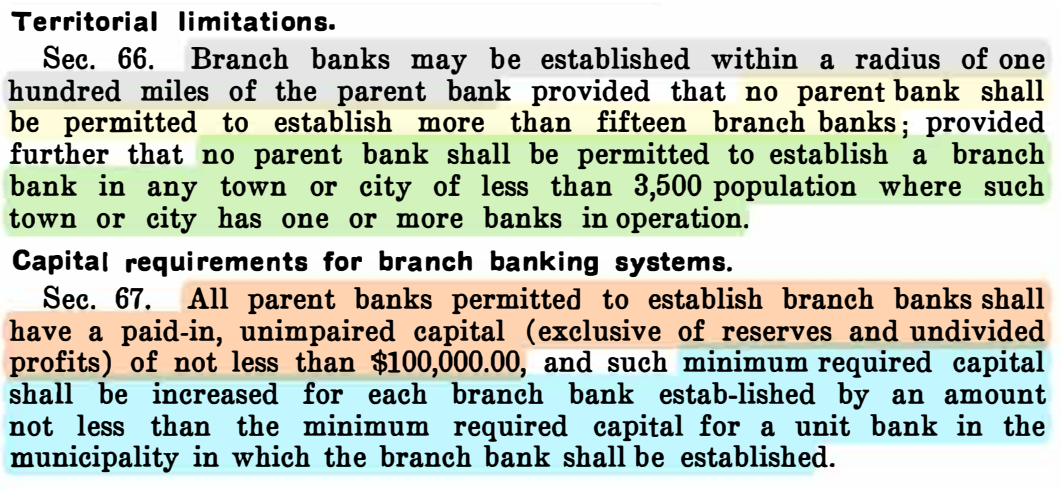
Notes: We calculate the share of banking offices in each state which are part of branch networks in the year prior to the intrastate full service branch deregulation from Jayaratne and Strahan (1996) sourced from Amel (1993) or the passage of the Riegle-Neal Act in 1994. This omits 11 states which permitted unrestricted intrastate branching before 1960 (AK, AZ, CA, DE, ID, MD, NV, NC, RI, SC, SD) and therefore are omitted from Amel (1993). Sources: FDIC BankFind and Amel (1993).

B.2 Definitions

We next categorize the branching laws in our database based on the conditions they impose on branch expansion. Because our focus is on geographical differences in branch access, we emphasize the *de jure* rules that govern where branches could be located. This approach deliberately sets aside changes in discretionary charter issuance, as we can directly observe those changes by tracking actual bank and branch openings. After reviewing the legal digests described above, we identify four main categories of regulatory conditions in our corpus of state session laws: (1) geographic rules, (2) population restrictions, (3) competition requirements, and (4) capital requirements. While in some instances these conditions operated independently, they were more often interdependent. Therefore, we examine each law for all four categories of conditions, documenting each instance in which a law either modified a previously enacted rule or established a new one. Figure B.2 illustrates this interdependence with an example from Mississippi, which shows how multiple entry conditions jointly regulated branch establishment for both state and national banks.

Geographic rules: Geographic rules limited the area in which banks could branch. These proscriptions ranged from within-city branching to state-wide branching (i.e., no restriction). We group together all laws permitting cross-city branching in our analysis, so changes in geographic rules occur if states switched between the following regimes: unit banking only, within-city branch-

Figure B.2: Sample of bank branching regulation



Territorial limitations.

Sec. 66. Branch banks may be established within a radius of one hundred miles of the parent bank provided that no parent bank shall be permitted to establish more than fifteen branch banks; provided further that no parent bank shall be permitted to establish a branch bank in any town or city of less than 3,500 population where such town or city has one or more banks in operation.

Capital requirements for branch banking systems.

Sec. 67. All parent banks permitted to establish branch banks shall have a paid-in, unimpaired capital (exclusive of reserves and undivided profits) of not less than $100,000.00, and such minimum required capital shall be increased for each branch bank estab-lished by an amount not less than the minimum required capital for a unit bank in the municipality in which the branch bank shall be established.

Notes: Each color corresponds to a different clause governing bank branching. These laws apply to all banks except capital for Federal Reserve member banks (which was higher). Sources: Mississippi Session Laws 1934, ch.134.

ing only, and cross-city branching. We treat a lack of any branching law as a unit banking state because, as in the Glass-Steagall Act (see Figure B.3), a lack of explicit branching permission prohibited creating new branches.

Population restrictions: Regulators used city population thresholds to govern the possibility of bank branching at a more disaggregated level than geographic restrictions alone. By restricting branch operation to larger cities ("population minima"), regulators limited the potential for branch banks to dominate rural banking markets. For the most part, the direct population thresholds set a minimum city size for branches (e.g. the 3,500 person number in Figure B.2) but there were exceptions. Georgia, for example, also set population maximum rules for branch entry.

Competition requirements: Many early branch banking laws sought to restrict branch network networks to locations where no other banks operated. These "bankless town" clauses restricted branch expansion to *de novo* branching only in places lacking any banking office, or they explicitly limited the ability to expand branch services through a merger with unit banks. For example, Idaho's 1935 banking act legalized branching in 3 specific scenarios tied to local competition: the expanding bank could merge with an existing unit bank in existence for five years, open a *de novo* branch with unanimous consent from existing bankers in a town, or open a *de novo* branch in a town currently without any banking offices (Counsel of the Board of Governors, 1936). The bankless town provisions were often the only exception allowed in branching regulations because they addressed a unique situation: by definition, a city without banks could not be merged into a network, so only de novo branching could serve these communities. This explains why locations without any banks frequently received special treatment in branching laws, as demonstrated in

section 66 of the Mississippi regulations (Figure B.2).

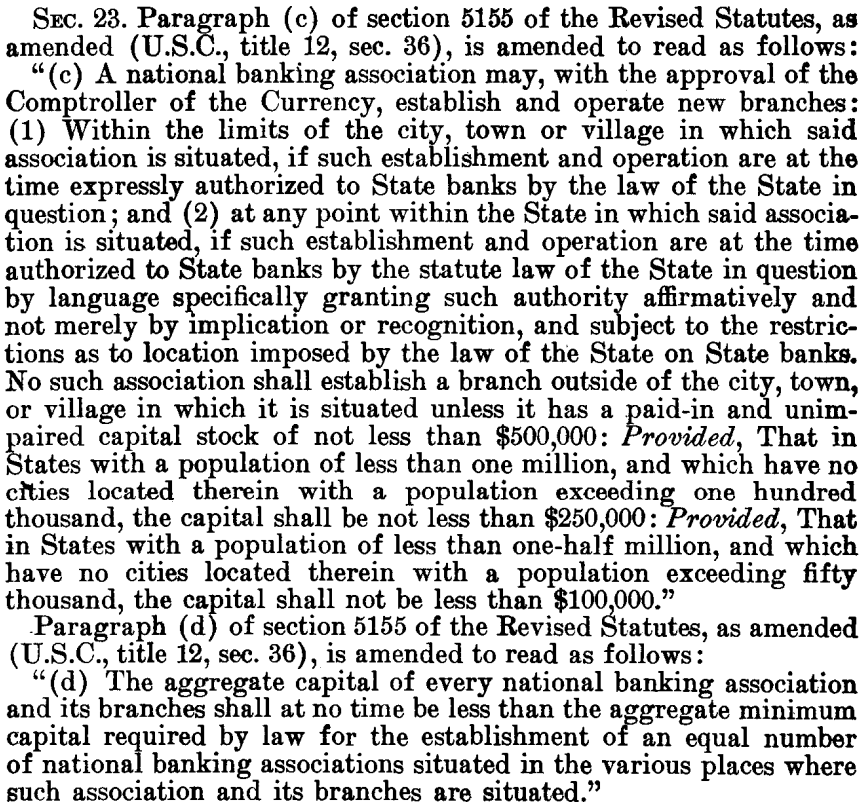
Note that we do not include in this definition the oft-nebulously worded "public convenience" criterion due to its uneven application by branch banking regulatory regimes over time.

Capital requirements: Bank capital governed branch entry in two distinct ways. First, regulators established minimum capital thresholds that banks needed to meet before they could begin branching. The Glass-Steagall Act, for example, used state population figures to determine the minimum required capital for any bank operating branches (see Figure B.3). State regulators employed similar requirements to ensure that only larger banks could operate multiple branches. Federal Reserve member banks were required to comply with whichever capital requirement was more stringent—federal or state.

In addition to branch-specific capital rules, we also trace minimum capital requirements for all state banks over time using the same iterative state session law process. Most states established a floor on the charter capital banks needed to open. In many cases, similar to national banks, these requirements increased at specific population thresholds. We collected these general capital requirements across the entire city size distribution in each state from 1910 to 1940 to ensure we could distinguish between changes affecting branch bank entry versus unit bank entry in our results.

Comparative regulatory context: To place bank branching regulation in a broader context, we also examine whether non-financial chain store laws changed during the 1929-1940 period using Library of Congress-authored legal digests first digitized by Quincy and Xu (2025). By comparing branch deregulation to changes in chain store taxation and expansion conditions, we can demonstrate that our results are specific to bank branch deregulation rather than reflecting overall pro-corporate regulatory attitudes.

Figure B.3: Branching provisions in the Banking Act of 1933



SEC. 23. Paragraph (c) of section 5155 of the Revised Statutes, as amended (U.S.C., title 12, sec. 36), is amended to read as follows:

"(c) A national banking association may, with the approval of the Comptroller of the Currency, establish and operate new branches: (1) Within the limits of the city, town or village in which said association is situated, if such establishment and operation are at the time expressly authorized to State banks by the law of the State in question; and (2) at any point within the State in which said association is situated, if such establishment and operation are at the time authorized to State banks by the statute law of the State in question by language specifically granting such authority affirmatively and not merely by implication or recognition, and subject to the restrictions as to location imposed by the law of the State on State banks. No such association shall establish a branch outside of the city, town, or village in which it is situated unless it has a paid-in and unimpaired capital stock of not less than $500,000: *Provided*, That in States with a population of less than one million, and which have no cities located therein with a population exceeding one hundred thousand, the capital shall be not less than $250,000: *Provided*, That in States with a population of less than one-half million, and which have no cities located therein with a population exceeding fifty thousand, the capital shall not be less than $100,000."

Paragraph (d) of section 5155 of the Revised Statutes, as amended (U.S.C., title 12, sec. 36), is amended to read as follows:

"(d) The aggregate capital of every national banking association and its branches shall at no time be less than the aggregate minimum capital required by law for the establishment of an equal number of national banking associations situated in the various places where such association and its branches are situated."

Notes: This is Section 23 of the Banking Act of 1933, better known as the Glass-Steagall Act. This section permits each state to set the minimum conditions required for bank branching by both state and nationally chartered banks, overturning the rules set out by the McFadden Act of 1927. The text of the entire law can be found here.

C Additional Institutional Detail

C.1 Branch and bank balance sheets

Once Congress passed the Glass-Steagall Act, the Federal Reserve began collecting statements of condition for national bank *branches* at the same frequency as their bank-level call reports. They also began tracking *state* member bank *branch* balance sheets after the FDIC requested help tracking the phenomenon in 1937.[2] This level of detail on branch-level operations is not available in modern banking data, which make these data unique in the history of U.S. banking.

After 1937, there was inconsistency in the preservation of branch-level data for state and national banks. Branch-level data for national banks was only preserved through 1938, while state member banks' branch balance sheets became significantly less detailed in later years.[3] As a result, there is only one regulatory call date for which both state and national member banks have extant

[2]See this 1937 Federal Reserve memo on its decision to ask state member banks for these records.

[3]The lack of branch data for national banks after 1938 is consistent with the declining number of reels held for these records, alongside an increase in frequency of calls in FRASER, see this summary.

branch-level reports of condition in comparable detail: 1937.

The Federal Reserve's branch-level records of condition document each branch's location, the name of its parent bank network, and separately reported its assets and liabilities. Since most bank branches maintained records of liabilities and loans originated at each office, completing these branch-level statements was straightforward (Chapman and Westerfield, 1942).

Branch-level and bank-level balance sheets were very similar in many ways. Most of the branch-level balance sheet categories correspond directly to items reported at the bank level. For example, branches separately report their time certificates of deposits and savings accounts (corresponding to items 1(a) and 2 on Schedule K of the bank-level call report), but these reflected funds collected specifically at that location. Other categories were more aggregated at the branch level, such as Christmas accounts (item 1(c) on Schedule K) and postal savings (item 3 on Schedule K), which were combined into a single "other time deposits" category. Table C.1 provides a detailed crosswalk between branch and bank-level reporting categories.

There are three major departures between the two sets of balance sheets. The first is that branches did not include capital, so assets equal deposits plus miscellaneous liabilities (for instance interest collected but not earned). Similarly, branches typically did not maintain their own account with the Federal Reserve, so that category, along with other headquarters-specific duties like security purchases, were not frequently reported at the branch level. We note that bank branches *did* conduct interbank payments, which is reflected in the "due from (to) other bank" categories, defined as the gross volume of each office's assets (liabilities) currently involved in interbank transactions. We refer to these cross-bank transfers, visible for both branches and unit banks, as "external capital markets" because they moved funds between firms.

The third and most unusual category on the branch balance sheet is an item that cannot exist on a unit bank balance sheet. That is the "from (to) rest of network" categories, defined as the net volume of each office's assets (liabilities) currently involved in *intra*bank transactions. Unlike interbank transactions, these must sum to zero for each bank because it either is a net donor or receiver of funds from its fellow branches. For example, assume a bank moves \$10 from Branch A to Branch B. Branch A is lending its deposits elsewhere in the network, so it would report having \$10 of funds due from the the rest of the network as an asset and zero funds due to the rest of the network. Branch B would have the opposite, as it lent zero funds to Branch A but owes \$10 to Branch A, yielding \$0 in the funds due from the the rest of the network asset category but \$10 in the funds due to the the rest of the network category. Bank branches typically tracked these transfers alongside their interbank accounts per FDIC deposit assessment guidelines (Langston, 1940). Because these transfers total to zero across an entire network and are unavailable to unit banks, they also imply that individual branch balance sheet categories are not directly equivalent

to bank-level categories.

Table C.1: Conversion between branch and bank call report categories

Branch category	Bank equivalent
Loans on real estate	Schedule E item 6
All other loans including rediscounts	Total loans minus the other two categories
Overdrafts	Summary line 2
Total loans	Summary line 1
US government and other securities owned	Summary line 3 plus 4
Banking house	Summary line 6-1
Furniture and fixtures	Summary line 6-2
Total house furniture fixtures	Summary line 6
Cash	Schedule I line 6
Checks and other cash items	Summary line 10, summary line 11
Due from head office or other branches	NA
Due from other banks including exchanges for clearing house	Summary line 9 less Schedule I item 6 (cash)
Other assets	Could be securities borrowed (line 12), other real estate owned (line 7), reserve with Federal Reserve bank (line 8)
Total assets	Total assets*
Checks and letters of credit outstanding	Schedule J item 7 ("transit account")
Total demand deposits except bank deposits	sum below
Individual demand deposits	Schedule J item 1
Certificates of deposit–demand	Schedule J item 1
State, county, and municipal demand deposits	Schedule J item 3
Other demand deposits excluding US	Schedule J item 5
Total time deposits including postal savings	sum below
State, county, and municipal time deposits	Schedule K item 4
Total savings pass book accounts	Schedule K item 2-1
Total savings pass book time deposits	Schedule K item 2-2
All other time deposits, including postal savings	Schedule 1a, 1b, 3 of Schedule K
Due to head office, or to other branches	NA
Due to other banks	Schedule J item 4-6 plus Schedule K Items 5-7
US deposits other than postal savings	Schedule J item 2
Total deposits	Summary line 18c
Other liabilities	Could be summary lines 19-30
Total liabilities	Total liabilities, less capital account*

C.2 Numerical example: Reconciling bank-level and aggregate lending patterns

We provide a detailed numerical example of two counties in a state illustrating how the systematic differences in portfolio allocation between branch and unit banks documented in Section 6.1 can be consistent with the absence of aggregate financial deepening shown in Section 5.2. The example demonstrates that banking sector consolidation, combined with branch banks' higher lending

intensity and capital reallocation across space, can generate productivity gains without expanding aggregate credit supply.

Consider two counties, A and B, where county A is capital-constrained (e.g. returns to investment are high) and county B is less constrained. We compare banking market outcomes before and after branching reform.

Unit bank world. There are 10 unit banks total (5 headquartered in county A, 5 in county B). Each county has $500 in deposits, and all banks are the same size in each county. For simplicity, we assume that there is no other source of liabilities, so each bank has $100 in assets. Unit banks are constrained by local diversification limits and information frictions, so each allocates $30 to loans in its own county and the rest to securities.

Aggregate outcomes:

- Total loans: $300 ($150 to county A, $150 to county B)
- Total securities: $700
- Number of banks: 10
- Number of bank offices: 10
- State-level loan-to-asset ratio: 30%

Branch bank world. State branching reform leads to consolidation and compositional change in the banking sector. There are now 8 banks total, comprising 4 unit banks and 4 branch banks. Each bank has $125 in assets, maintaining total banking sector assets at $1,000.

The 4 unit banks (2 in county A, 2 in county B) each allocate: $12.50 in loans to their own county and $112.50 in securities.[4] The 4 branch banks operate across both counties. With access to internal capital markets, branch banks can diversify geographically and reallocate capital toward higher-return locations. Each branch bank allocates: $50 in loans to county A, $12.50 in loans to county B, and $62.50 in securities.

Aggregate outcomes:

- Total loans: $300 ($225 to county A, $75 to county B)
- Total securities: $700
- Number of banks: 8

[4]These unit banks have reduced their lending relative to the pre-reform period because they face increased competition from branch banks and may have lost their best lending opportunities to the larger, more diversified branch networks.

- Number of bank offices: 12
- State-level loan-to-asset ratio: 30%

Key insights from the example

1. Constant aggregate lending despite higher branch-bank loan intensity. Aggregate lending remains constant at $300 despite branch banks having substantially higher loan-to-asset ratios (50% vs. 10%). The stability at the state-level occurs because the reduction in the number of banking institutions (from 10 to 8) offsets the increased lending intensity per branch bank.

2. Consolidation in the banking sector. The number of banking offices increases from 10 to 12 while the total number of banks shrinks from 10 to 8, which matches the defining characteristic of the shift from unit banking to branch banking documented in Figure 4.

3. Capital reallocation toward constrained areas. County A (the capital-constrained location) receives $225 in loans in the branch banking world compared to $150 in the unit banking world—a 50% increase. Meanwhile, county B receives $75 in loans compared to $150 previously—a 50% decrease. This reallocation is driven almost entirely by branch banks: they direct 80% of their lending to county A ($200 out of $250 in branch bank loans) compared to only 50% of total lending going to county A in the unit banking world.

4. Reallocation generates productivity gains without financial deepening. The total amount of credit in the economy remains $300 in both scenarios, and the overall loan-to-asset ratio is unchanged at 30%. However, in the branch banking world, more of this credit flows to county A where returns are higher. This improved allocation of existing resources would raise aggregate productivity even without any increase in the total supply of credit.

This stylized example captures the essential features of our empirical findings: branch banks maintain higher loan-to-asset ratios than unit banks (Figure 6), the number of banking offices increase while banks decline (Figures 4a–4b), aggregate lending shows no significant change (Figure 5b), and manufacturing productivity increases (Figure 5a). The example clarifies that these patterns are mutually consistent when banking sector consolidation accompanies the introduction of branch networks with internal capital markets that enable spatial reallocation of funds.