

BRANCH BANKING AND THE TRANSFORMATION OF BANKING IN CALIFORNIA

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Because California was a pioneer in the development of intrastate branching, we use its experience during the 1920s and 1930s to assess the effects of the expansion of large-scale, branch-banking networks on competition and the stability of banking systems. Using a new database of individual bank balance sheets and branch establishment, we examine the characteristics that made a bank a more likely target of a takeover, how competing unit banks responded to the presence of branch banks, and how branching networks affected the probability of survival of banks during the Great Depression. We find some evidence that well-capitalized banks and those displaying characteristics of more profitable institutions were the most likely targets for acquisition. We show that unit banks responded to the expansion in branch banking by changing their operations in ways consistent with efforts to increase efficiency and profitability. Our analysis suggests that, as a result of competition, unit banks competing with branch bank networks, especially with the Bank of America, were more likely to survive the Depression than banks that were not facing such competition. Thus, our results support the hypothesis that branch banking produces an externality in that it improves the stability of banking systems by increasing competition and forcing other banks to become more efficient.

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I. Introduction

The deregulation of interstate branching in the United States, due to interstate agreements and the Riegle-Neal Interstate Banking and Branching Efficiency Act, unleashed a flurry of bank mergers and acquisitions as banks sought to expand their scale and scope. The dramatic changes in the banking landscape have renewed interest in understanding how branch-banking networks affect competition among banks and the stability of the nation's banking system (Berger, Demsetz, and Strahan (1999) provide a detailed survey). Researchers have examined the characteristics that make banks targets for merger and acquisition as well as how such consolidation influences the behavior of competing banks. To a more limited extent, the literature has also explored how the wave of consolidation and the creation of larger banking networks affect systemic stability. Policymakers have recognized the importance of issues affecting financial stability, citing the large costs associated with instability.¹ Nonetheless, it is difficult to assess the long-run effect of branching networks on the stability of the U.S. banking system, especially on the viability of smaller banks, using data from a consolidation process that is still underway. Moreover, a problem of observational equivalence exists: the recent dearth of bank failures may simply be due to the fact that there have been no large macroeconomic shocks to test how the emerging interstate branch banking system performs when it is stressed.²

The current bank merger wave in US banking is not without historical precedent. The 1920s were also a period of banking consolidation and rapid expansion in branching (Alston, Grove, and Wheelock 1994, Carlson and Mitchener forthcoming, Wheelock 1993, and White 1985). Most notably, branch banking expanded dramatically in California as large banks purchased numerous smaller banks to create branching networks. By 1929, 48 percent of the banks in California that existed in 1922 had been

¹ Hoggarth and Saporta (2001) suggest that the fiscal costs of banking crisis resolution have recently averaged 16% of GDP.

² According to NBER business cycle data, the most recent business cycle downturn was among the shortest and least severe in the postwar period.

absorbed by other banks. This is comparable in scope to the recent period, during which 32 percent of the banks that existed in the United States in 1997 were purchased by other banks by 2004.³ The expansion of branching in California in turn was due largely to A.P. Giannini, founder of Bank of America, whose branching policies made California the unrivaled leader in the branch banking movement of the 1920s. Due to the Bank of America's leadership, California's branching networks developed more quickly and more extensively than those of any other state during this decade (see Table 1). As Bank of America's branches blanketed the state, several other large banks were compelled to respond to Giannini's competitive threat and set up their own branching networks.

Using a new historical data set containing information about balance sheets of individual commercial banks as well as bank mergers and branch establishment, we assess the effects of the expansion of branching in California on the competitive environment and on financial stability. This data set provides an excellent opportunity to examine these effects because we are able to follow developments at individual banks as they are exposed to competition and then are subjected to a large macroeconomic shock. We first identify characteristics of banks and the communities in which they resided made them attractive targets for acquisition. We then examine how banks responded to increased competition from the large branch-banking networks. Finally, using survival analysis we test how the expansion of branching affected the survivability of California banks during the Great Depression.

Our study has several important implications for the literature on branch banking, competition, and stability. First, we are able to compare the current wave of U.S. consolidation and branch bank expansion with a previous era and provide an interesting perspective on how consolidation, induced by branch banking, has affected bank competition during different periods. Second, analyzing how the California banking system fared in the Great Depression offers a unique test of how the removal of geographical restrictions on banking and the adoption of branch banking affect financial stability. As Allen and Gale (2004) have argued, it is not necessarily the case that there is

³ In California, the acquired banks represented about 35 percent of the banking systems assets in the 1920s whereas those that were taken over more recently represented around 40 percent of the assets of the US banking system in 1997. The amount of consolidation during the recent period may be overstated as these figures include some consolidation within holding companies.

a negative tradeoff between competition and financial stability. Our paper offers new empirical evidence on this issue. Third, our research relates to a growing literature on how foreign bank entry affects banking markets in developing countries (Claessens, Demigurc-Kunt, and Huizinga 2001; Claessens and Laeven 2003; Demigurc-Kunt, Levine, and Min 1998; and Crystal, Dages, and Goldberg 2001). The expansion of foreign banks into markets in Latin America and Eastern Europe in the 1990s has several parallels to the entry of large branching networks in California during the 1920s, including understanding how entry affects the efficiency and profitability of incumbent banks and how increased competition affects systemic stability.⁴

Our analysis also sheds light on notable debates regarding the banking system in the Great Depression. It has long been argued that the United States banking system was especially exposed to the shock of the Great Depression because of its unit banking structure (Friedman and Schwartz 1963, Calomiris 2000). This has led other scholars to explore the political economy dimensions of branch-banking restrictions (Economides, Hubbard, and Palia 1996). The empirical evidence on the effects of branch banking on financial stability, however, has presented somewhat of a puzzle. Studies using state level data find that states allowing branching had lower failure rates (Mitchener 2005, Wheelock 1995), while studies of individual banks find that branch banks were more likely to fail than other banks (Calomiris and Mason 2003, Carlson 2004). Carlson and Mitchener (forthcoming) offer a partial resolution to this puzzle by showing a connection between the expansion of branching and increased competition. Using state-level data, they show that, *ceteris paribus*, branch-banking states experienced more mergers and voluntary liquidations in their banking systems, and suggest that the competitive shakeout that occurred had salutary effects on the stability of these states' banking systems. They suggest that consolidation (induced by branch banking) improved stability, but they lack the micro-level data to test whether it is because weak banks were pruned from the system or because banks that were not taken over became more efficient. Because this study utilizes detailed information on individual banks and branch locations, we are able

⁴ The International Monetary Fund (2000) suggests that current empirical research on the effects of foreign bank entry on systemic stability is inconclusive.

to explore exactly how branch banking affected the banking system and provide a more thorough resolution to this empirical puzzle.

In this paper, we find that branches tended to be established in larger cities possibly because there were more business opportunities in these locations. Bank of America's strategy differed from other networks in that its geographical expansion was notably more extensive. We also find some evidence that banks with a stronger capital position or more loans and securities (interest-earning assets) relative to total assets were more likely to be acquired, and interpret this result as evidence that is consistent with the view that more profitable banks were more likely to be taken over. These results are similar to those of research regarding merger patterns in recent times such as Stiroh and Strahan (2003), which suggests that banks enter markets by buying good banks and competing against poor performers.

We also find that banks that competed with branch banks, especially those that competed with multiple branch networks, took measures to improve their profitability, likely in response to a change in the competitive environment. Relative to other assets, unit banks shifted their portfolios towards assets like loans, which typically earned higher returns. They also increased the share of demand deposits, relative to savings deposits, since these paid lower rates of interest to depositors. These findings mirror those of studies examining recent bank behavior (such as Jayaratne and Strahan 1998 and DeYoung, Hasan, and Kirchhoff 1998), which find that reductions in banking restrictions lead eventually to increased efficiency. In particular, they are similar to Evanoff and Ors (2002), which also focuses on incumbent banks and finds improved efficiency in response to the removal of barriers to entry on banking.

Finally, and perhaps most interestingly, we find that unit banks in locations where large branch banks established offices were more likely to survive the Depression. Thus we find that the same banks that became more efficient also became more financially stable. We find benefits from competition even after accounting for the possibility of selection bias in our econometric model. Our result appears especially relevant for very large branching networks, such as the Bank of America, which had the widest geographic scope and appeared to prompt the largest changes in balance-sheet positioning, and also for competition from multiple branching networks. Thus, Giannini's assault on local

geographic monopolies appears to have transformed California's banking system, producing an externality such that extant banks to improve their efficiency in ways that enabled them to better cope with the macroeconomic shock of the Great Depression. This finding is important for three reasons. First, it suggests that the banking system of the United States would have been less fragile in the 1930s had states allowed more branching, not necessarily because the branch banks would have been more diversified, but because the system would have consisted of more efficient banks. Second, it allows us to conjecture that, following the current shakeout, the wave of consolidation will improve the stability of the banking system for both large and small banks. Third, regarding the literature on banking systems in developing countries, it suggests that there may be a link between studies finding that increased foreign participation increase efficiency (Sturm and Williams 2002) and studies finding that increased foreign participation is associated with decreased probability of a crisis (Demigure-Kunt, Levine, and Min 1998).

The paper is organized as follows. Section 2 discusses the history and legal environment surrounding the growth of branch banking in California in the 1920s. Section 3 presents analysis of the factors that led towns and banks to be desirable for mergers. Changes in bank behavior following the addition of a branch nearby are discussed in Section 4. Section 5 discusses the effect of branching on the stability of the banking system. Section 6 explores the robustness of the results to concerns about endogeneity. Section 7 concludes.

II. Branch Banking in the 1920s

A. Expansion in California

While branching had occurred on an *ad hoc* basis in California for some time, the banking act of 1909 prescribed a formal process by which banks could establish branches throughout the state, subject to the approval of the state bank superintendent.⁵ The use of

⁵ Section 9 of the 1909 act stated that "No bank in this State...shall hereafter open or keep an office other than its principal place of business, without first having obtained the written approval of the superintendent of banks to the opening of such branch office, which written approval may be given or withheld in his

branching started slowly and then increased rapidly in the 1920s (Figure 1). Two decades later, on the eve of the Depression, branch-banking activity was more extensive in California than in any other state in the country. There were more branches than in any other state (Table 1), and the impact was felt statewide: unlike some other well-branched states, like New York and Michigan, the majority of the branches were established outside the city of the bank's parent institution or home office. By the end of the decade, California was the only state to have more branch offices than banks. California's rapid expansion of branching piqued regulators' interest in the 1920s, and fueled a debate over the merits of branch banking: "This makes us interested in seeing how branch banking has actually been working under American conditions, and California is supposed to be the field of greatest experience thus far."⁶

California's growth in branching relative to other states benefited from entrepreneurial talent and leadership as well as from an initially hospitable regulatory environment. State regulators saw it as their legal duty to enforce the banking act by defending the rights of any state bank interested in establishing branches. Moreover, an amendment to the act facilitated branching by enabling mergers to occur with no additional capital.⁷

Another feature that made California particularly ripe for the expansion of branching in the 1920s was its diversity of crops and industrial production. Unlike many Midwestern states, agricultural cycles were not coincident in timing in California. With harvests and plantings for various crops occurring at different times of the year, geographically-dispersed branching systems were well-suited to shifting funds from one area or region to another in order to maximize the utilization of existing bank capital.⁸

discretion, and shall not be given by him until he has ascertained to his satisfaction that the public convenience and advantage will be promoted by the opening of such a branch office." House of Representatives, (1930, Volume 2, Part 2, pp.1342).

⁶ House of Representatives, (1930, Volume 1, p.18).

⁷ Minimum capital requirements for banks with branches were higher than those without branches and each additional branch raised the required minimum. However, if a bank already had the minimum required amount of capital, no additional capital needed to be posted. In many cases, the absorbed unit bank's capital, while it functioned as a unit bank, was higher than what was required to operate it as a branch.

⁸ Some also argued that important agricultural centers like the San Joaquin and Imperial Valleys had seasonal demand for funds that exceeded what could be supplied by local banks. For a discussion of these points, see "Branch Banking is a Live Wire Subject," *Los Angeles Times*, July 1, 1922, p.17, "Branch Banking," *Los Angeles Times*, December 4, 1922, p.114, "California Bank Merger with \$200,000,000 in

B. California's Large Branch-Bank Networks

At the forefront of the California branching movement was A.P. Giannini, founder of the Bank of America, who through purchase and *de novo* branch creation had established the largest branching network in the state and the largest bank on the Pacific Coast by 1929 (Figure 2 shows the share of California branches owned by the Bank of America).⁹ Some competing branching networks began to emerge in 1921 when Giannini's pioneering efforts to establish branches were adopted by other leading bankers in the state: Henry Robinson, P.E. Bowles, J.F. Sartori, and Edward Elliot. However, the branching network of the Bank of America was larger in scale than those of the other institutions (Table 2). More importantly, the scope of the Bank of America's branching network was much broader, and covered almost the entire state (Figures 3-6). The next largest bank, the Security-First National, expanded around Los Angeles and into the central valley, while the American Trust Bank and the California Bank were clustered around San Francisco and Los Angeles respectively.¹⁰ The willingness of the Bank of America to enter smaller towns can also be seen by looking at the distribution of its branches by town size (Table 3).

As the Bank of America was the only institution to establish a truly statewide presence, we expect it to have the strongest influence on the state's banking environment. The anecdotal evidence suggests that the expansion of the Bank of America did indeed have a profound impact on the California banking system, introducing competition to localities that were previously geographic monopolies. James and James (1954) report that the Bank of America was able to offer lower loan rates than the smaller banks of the central valley. Bonadio (1994) indicates that the average rate of interest in towns would

Resources," *Wall Street Journal*, July 3, 1922, p.4, and "Branch Banking in California," *Wall Street Journal*, September 22, 1923, p.4.

⁹ Giannini's original bank was the Bank of Italy, founded in 1904. In the 1920s, he established other institutions, such as Bank of America and Liberty Bank. These were consolidated into Bank of America in 1927, which was in turn part of the Transamerica holding company. For ease of exposition, we use the name Bank of America to refer to all Giannini institutions collectively unless it is necessary to refer to a specific one.

¹⁰ The Security First-National and American Trust Bank were formed through the mergers of moderate-sized branch networks during the 1920s. There were a few other banks with a modest number of branches; however, these branches were almost exclusively within the city of Los Angeles.

decline following the establishment of a Bank of America branch. We expect that the impact of the other large branch banks will be noticeable, but likely not as large.

C. Response of other bankers

The growth in branching was not without its opponents. Changing attitudes of state and federal regulators toward branching and resistance from unit bankers hampered efforts by the branch bankers, especially Giannini, to establish intrastate branching networks. During the 1920s, some California bank supervisors used their discretionary authority to restrict the geographic spread of branching across the state by informally dividing it into two regions, North and South, and limiting banks to setting up branches only in the region in which they were headquartered. Such restrictions may have been implemented at the behest of California's unit bankers. In 1922, unit bankers, worried by the competitive threat of an expanding number of branching networks in the state, formed the California League of Independent Bankers (CLIB) as a lobbying organization aimed at the "preservation of unit banking." Declaring branch banking the "menace of the hour," they regularly canvassed the state legislature to abolish all non-home-office-city branches.¹¹ According to Bonadio (1994, p.86) nearly all of the state's more than 500 independent bankers had joined this group by 1922, with league members taking vows to "never sell out to Giannini." They argued that the growth of branch banking was leading to a monopoly of the moneyed interests, "Branch banking emanates from the minds of a few city bankers. It enables a few city men to control the banking assets of the state."¹²

Although CLIB did not succeed in their ultimate goal, in 1923 the state-banking department adopted several rulings aimed at limiting the growth in branching. No branch could be established outside the home-office city via consolidation or purchase unless both banks were at least three years old and the Superintendent found the branch to be for public convenience and advantage. More important for the location of branch expansion was the "*de novo* rule," which went into effect in 1921 under state bank superintendent

¹¹ The first two articles of association of CLIB stated, "We believe that branch banking is economically wrong, monopolistic in nature, and un-American in principle...We view with alarm the growth of branch banking in California as permitted under our present law." (Chapin Hall, "Daily Trade Talk," *Los Angeles Times*, November 28, 1922, p.110.

Jonathan Dodge. It limited the establishment of a new branch outside the “principal place of business,” except by discretion of the state superintendent of banks. This restricted Giannini’s plans for expansion of his San Francisco-based banks into the southern half of the state. Between 1923 and June 1925, the Superintendent issued 103 permits to Los Angeles banks for *de novo* banks in Los Angeles, but only one was granted to the Bank of Italy (headquartered in northern California), and this branch was already being processed when the ruling was announced. The *de novo* rule was favored by most of the southern California branch bankers, who wanted to keep Giannini’s network from expanding into the southern California market and competing head-to-head.¹³ Bankers like Giannini thus pursued growth through an aggressive merger and acquisition strategy. Giannini began to use the Bancitaly Corporation (headquartered in Los Angeles) and a second, newly-formed bank holding company, Americommercial, to purchase Los Angeles-based banks and build a branching empire in Southern California. After two additional applications to establish branches were denied, the Bank of Italy filed suit in 1926 to overturn the “*de novo* rule,” arguing that the California Banking Act did not permit the superintendent of banking to restrict branch location (Westerfield, 1939). Although the rule was not changed, new personnel in the California banking department after the suit was filed enforced this rule less rigidly for the rest of the decade, and Bank of Italy (along with the related companies of Transamerica and Bank of America) was able to further expand in Southern California.

III. The Decision to Establish a Branch

Although the 1909 Banking Law permitted branching, it initially grew slowly in California. Since statewide branching was without precedent, Bank of America deemed it “prudent to ‘make haste slowly’,” and had only opened 23 branches by 1919.¹⁴ Since widespread networks did not emerge until 1921 for banks other than the Bank of America, we use 1922 as the departure date for this study.

¹² Quote of Carlos Hardy, Los Angeles attorney, appearing in *Coast Banker*, Nov. 1922, p. 501.

¹³ See “Giannini Arouses Bankers,” Earle E. Crowe, *Los Angeles Times*, March 14, 1925, p.15.

¹⁴ House of Representatives (1930, Volume 2, Part 2, p.1342).

During the 1920s there was a massive consolidation of California banks through merger and acquisition. As noted earlier, roughly one-half of the banks in existence in 1922 had been purchased or had merged with another bank by the end of 1929. Moreover, most of the expansion of branching networks outside the city of the bank's home office (typically San Francisco or Los Angeles) was done through acquisition (Table 4). The number of mergers was spread relatively evenly over time, although there was a spike in mergers during 1927. Acquisitions of banks by town size also tended to reflect the distribution of banks at the start of the period (Table 5).

This section investigates the characteristics that made banks more likely to be targets for acquisition by examining all the purchases of banks during the period 1922-1929. We focus on the banks that were in existence in 1922. Since we are interested in the targets for acquisition, we test how bank balance-sheet information and locational characteristics are related to the time until the bank was taken over. Before carrying out our empirical analysis of acquisitions, however, we relate this to the issue of branching by briefly discussing the relative merits of expanding through acquisition rather than *de novo* branching.

A. Acquisition versus de novo expansion

Legal restrictions on *de novo* branching played a significant role in pushing banks to expand through merger and acquisition. Even though these restrictions could sometimes be circumvented, there were additional reasons why banks may have preferred to expand through a strategy of merger and acquisition. First, it was cheaper (in terms of fixed costs) to acquire an existing facility than to build a branch from scratch. Second, by taking over a previously existing bank, the acquiring bank was able to draw on the managerial experience and long-term lending of the existing bank and their specialized lending relationships. The Bank of America recognized these advantages and explicitly based its branch-expansion strategy on acquisition rather than establishing *de novo* branches. Giannini believed that rural communities would be more willing to accept an outside bank if it took over the operations of an existing bank. Explaining the strategy of

Bank of America to Congress in 1930, James Bacigalupi, Vice Chairman of the holding company, stated:

It was reasoned that the prudent way to enter an outside community was to purchase an established bank, because otherwise it could only be hoped, at the outset, to attract a few disgruntled depositors and before sufficient good business could be worked into, principally that which theretofore could find no accommodation there on account of the smaller capital and limited resources of the local banks, it would be years. Then, again, the bank would inevitably be confronted with the necessity of building a brand new local staff for the branch office – not the easiest thing in modern banking. Subsequent experience of the Bank of Italy demonstrated the soundness of this reasoning. By purchasing a good bank – and, almost without exception, such have been the banks which it has purchased – it acquired a staff, an advisory board, and local stockholders who were interested in the locality and familiar with local people, values, and conditions.¹⁵

Bacigalupi further testified that Bank of America consistently established branches through the purchase of *existing* banks in every community it entered, with only one notable exception, Sacramento, where “it was found impossible to purchase a bank and, as result of popular petition, led by the chamber of commerce of that city, the then superintendent of banks granted Bank of Italy a permit to open a brand new office, a so-called *de novo* branch.”¹⁶ The Bank of America’s decision to purchase banks rather than create *de novo* branches and its policy of retaining the existing management to run the newly formed branch may have been aimed at ensuring better-quality local lending.¹⁷ As Berger and Udell (2002) emphasize, small local banks may be inherently better at resolving agency problems associated with relationship lending. Relationship lending requires that banks gather information beyond what is readily available in financial statements of firms; such information is gathered through repeated contact with the firm and by observing its behavior on past loans and business with the bank. By employing the key executives of the former independent unit bank as branch managers and loan

¹⁵ House of Representatives (1930, Volume 2, Part 2, p.1341).

¹⁶ House of Representatives (1930, Volume 2, Part 2, p.1341).

¹⁷ For example, *BankItaly Life* (1921, volume 5, p.11), the magazine of the Bank of Italy, wrote, “In mapping out his campaign he [Giannini] determined to depart sharply in one particular area from foreign precedent. Instead of starting a new bank in any given community, he planned always to purchase a going concern – a bank that had won the reputation as a moneymaker and that enjoyed the confidence of the community. The most important change would be the change in name. He would retain all the old officers;

directors, Bank of America and other branching networks that pursued a similar strategy may have been attempting to reduce the oversight problems a large bank would otherwise face in relationship lending and better manage the “soft” data associated with the character and reliability of its borrowers.¹⁸

Banks were purchased either by acquiring their assets or by establishing holding companies that were organized with the explicit purpose of buying other banks. Bank of America frequently employed the latter method and created the Stockholders Auxiliary Corporation (a holding company wholly owned by the shareholders of the bank) to acquire banks for its branching system.¹⁹

As Table 4 further elucidates, the growth in branches outside the home-office city took place largely by purchasing existing banks. *De novo* branches were largely confined to the largest cities of the state, especially San Francisco and Los Angeles, where the large branch networks already had substantial operations and merely expanded into areas where they recognized new business activities.²⁰ Over two-thirds of the new branches in small towns were created through acquisition of an existing bank rather than by constructing new branch offices. The remainder of this section thus focuses on understanding the decisions related to bank acquisition rather than the establishment of *de novo* branches.

and the former board of directors, augmented by new blood, would function as a local advisory board.” See also the comments by Giannini (House of Representatives 1930, Volume 2, Part 2, p.1544).

¹⁸ For evidence that large banks typically face a disadvantage in relationship lending aimed at small, opaque firms, see Berger, Kashyap, and Scalise (1995). For evidence that non-BofA branching networks also retained management, see “New Bank Merger is Announced,” *Los Angeles Times*, March 11, 1922, p.113 and “Porterville Bank Merger Effective,” *Los Angeles Times*, January 5, 1924, p.16, and “California Bank Merger,” *Wall Street Journal*, September 11, 1926.

¹⁹ The banking act of California did not permit banks to purchase the stock of another bank directly, but Section 31 permitted banks to purchase the assets of another bank. This was the method of direct consolidation employed by Bank of America and other branching networks in California. The bank holding company was a convenient corporate entity used to maneuver around regulatory restrictions on banking activities; for example, the Stockholders Auxiliary Corporation was used as an insurance agent and broker and to dispense of “problem” assets of banks (House of Representatives (1930, Volume 2, Part 2, p.1343).

²⁰ During our sample period, 65% of *de novo* branching was in San Francisco and Los Angeles and 85% of it was in cities with populations greater than or equal to 20,000. See House of Representatives (1930, Volume 2, Part 2, p.1361) for a further discussion of this point.

B. Analysis of City and County Characteristics

We first examine which city and county characteristics were important in a bank's decision to establish a branch. All else equal, banks likely preferred to establish branches in areas where business opportunities were plentiful. For example, studies examining entry into foreign markets have found that banks prefer to enter markets in countries with higher economic growth prospects (Focarelli and Pozzolo 2002). With the boom in California agriculture during this period, banks may have sought out locations that would facilitate loans to farms and growing agro-businesses. Competition from other banks may also have affected expansion decisions. Proximity to a major city may have been preferred, as it would have facilitated close contact with the bank's headquarters, or banks may have sought to diversify their activities geographically by expanding away from the large cities.

In order to examine the factors that led one city to be preferred over another, we test whether different city and county characteristics affected the likelihood that a branching presence would be first established in the town between June 30, 1922 and June 30, 1929 either by purchasing a bank or by establishing a *de novo* branch.²¹ We consider three different specifications: (1) whether the Bank of America established a branch in the town; (2) whether a large branching network other than the Bank of America established a branch (those shown in Figures 4-6); and (3) whether a small branching bank established a branch (any other branching network). Since the decision to establish a branch has only two outcomes, we use logistic analysis.

The cities used in this analysis are those that were incorporated as of 1920 and had population information reported in the 1920 Census. We construct measures of the city's size, importance, and proximity to a large city (either San Francisco or Los Angeles). We include several measures of the level of bank competition at the city or town level, including whether there was a national bank established there, whether the town was served by only a single bank, and the number of financial institutions per capita. We also examine a variety of county-level factors. These include items related to

²¹ Note that our sample therefore does not include cities in which a branch existed in on June 30, 1922. Alternatively, we examined whether the bank purchased a bank in the town. The results were almost identical. We also conducted the regressions using duration analysis with comparable results.

income and population density as well as the importance of agriculture in the county. We include a dummy for whether the county was in the Northern half of the state as the banking authorities had been reluctant to let banks establish branches outside their home “region” and as Secrist (1930) suggests that banking practices differed between the Northern and Southern parts of the state.²²

Data on branch location were primarily collected from Comptroller of Currency *Annual Report and Statements of Conditions* and the *Annual Report* of the Superintendent of Banks of the State of California; however, we supplemented this information with data from Rand McNally (various years) as well as with internal records from the Bank of America’s archives. Data on city attributes, such as size and county seat status, were collected from Rand McNally (1922), U.S. Department of Commerce (1920), and California State Department of Finance (2004). Proximity to a major metropolitan area might affect decisions regarding branching as well as the competitive environment, so we collected the distances from principal California cities (Los Angeles or San Francisco), using “as the crow flies” distances based on programming and data from the U.S. Geological Survey.²³ Other county characteristics (such as population, farm size, industry mix) are from U.S. Department of Commerce (1910, 1920). We use the June 30, 1922 values of the city variables and the 1920 values of the county variables. For municipality m , we estimate the following equation:

$$(1) \text{ Whether a branch is established}_m = f\{ \beta_1 \text{ Banking institutions per capita} + \beta_2 \text{ One banking institution} \\ \beta_3 \text{ National bank in city} + \beta_4 \text{ Log population} + \beta_5 \text{ Distance to nearest large city} + \\ \beta_6 \text{ Distance to nearest large city squared} + \beta_7 \text{ County seat} + \\ \beta_8 \text{ Share of county income from agriculture} + \beta_9 \text{ County income per capita} + \\ \beta_{10} \text{ Share county population that are immigrants} + \\ \beta_{11} \text{ County population growth rate (1910-1920)} + \beta_{12} \text{ County in the Northern part of the state} \}.$$

As table 6 shows, we find that large towns were more desirable locations for establishing branches than smaller towns, possibly because these locations offered more

²² Secrist notes that, on average, banks in the Northern part of the state had fewer loans as a share of assets and a lower ratio of demand deposits to total deposits. The reason for these differences is not discussed.

²³ We use information from <http://www.indo.com/distance/>, which is based on the “geod” program – a part of the “PROJ” system available from the U.S. Geological Survey.

business opportunities.²⁴ (This is true even if the sample is restricted to cities with less than 20,000 people.) Similarly, towns with more banks per capita were also attractive places to establish branches while towns with only one bank were less attractive. Distance from the major population centers appears to have played little role in location decisions made by the Bank of America while other large banks appeared to find towns farther away from the major cities to be less attractive.²⁵ We find modest evidence that towns in counties with a higher income per capita were preferred by some banks. Somewhat surprisingly, fast growing counties do not seem to have been particularly successful at attracting branch banks. Consistent with the historical record (and Figures 4-6), branch banks other than the Bank of America preferred to branch in the southern part of the state.²⁶ Trade publications from the 1920s suggest that, as a result, there was a considerable amount of branching competition in the southern part of the state.²⁷ Finally, small branch banking networks appear to have had a preference for establishing branches in larger agricultural communities.

²⁴ In Table 6, we report transformed regression coefficients to ease interpretation (although standard errors refer to non-transformed coefficients). For a given coefficient β , we report the value $100*(\exp(\beta) - 1)$, which indicates the percentage change in the probability of an event for each one-unit increase in the independent variable. Thus, a regression coefficient of 0.53 would be reported in the table as 70.4, which implies that a one-unit increase in this independent variable increases the likelihood of the event by 70 percent. Note that negatively-signed coefficients indicate a reduction in the likelihood of an event.

²⁵ The *Coast Banker*, February 1925, p.202, suggests that branch banks in Los Angeles were purchasing banks in order to further “consolidate the banking resources of large institutions in Los Angeles with those of outlying communities in Southern California.” And the Los Angeles times reported in 1922 that branch bank expansion was now “at a flood tide,” with seventeen new branches being added by Los Angeles Trust & Savings Bank, Citizens Trust and Savings Bank, and Security Trust and Savings Bank (“Extension of Branch Bank Idea,” *Los Angeles Times*, May 7, 1922, p.112.) The American Bank and Mercantile Trust Company first expanded outside San Francisco by acquiring banks in the Bay Area. For example, the consolidation with the American bank of Oakland was seen as “another step in the plan of the American Bank of San Francisco to establish a series of branches throughout the bay district.” (Newspaper Article, Wells Fargo Archives, Daily Notification Sheet, October 9, 1923.) It then expanded into outlying Bay communities by purchasing banks in San Leandro and Concord in 1924 – other East Bay communities (Newspaper Article, Wells Fargo Archives, Daily Notification Sheet, October 9, 1923 and February, 1924.)

²⁶ For example, many bankers believed that Southern California in the 1920s was particularly well suited to branch banking because there were new crops that matured every month, which necessitated elastic provision of working capital and currency provision. See Chapin Hall, “Business, Financial Markets, Investment – Daily trade talk,” *Los Angeles Times*, August 5, 1922, p.16.

²⁷ For example, see “Branch Banking in Action: A Practical View,” by J. Dabney Day, President, Citizens National Trust and Savings Bank, Los Angeles in *Coast Banker*, February 20, 1929, vol.42, p.173 and “The Branching Expansion Slows Down,” Howard Whipple, President, CLIB, June 1925, p.104.

C. Analysis of Bank Characteristics

Our empirical analysis begins by examining which characteristics of banks made them more or less attractive for acquisition by branching networks. We start with this question because it helps distinguish between competing hypotheses better explains how competition might have influenced systemic stability. Branch banking networks, on average, may have purchased high-performing banks, average banks, or "lemons" in the 1920s. If they purchased lemons, this might indicate that banking stability improved in California because weak banks were removed from the system (assuming the weak banks could be absorbed without indigestion by the branching networks). On the other hand, if they purchased average or high-performing banks, then a theory about why competition from branch banks improved stability would instead need to focus on the behavior of the remaining unit banks that competed head-to-head with the branching networks. For example, the introduction of branches into local markets might have induced changes in the performance or behavior of the incumbent, unit banks. We therefore pay particular attention to balance sheet characteristics to see if branch banking systems acquired lemons. If they did not, then we will proceed by considering the effects that competition, induced by branch banking, had on the remaining unit banks.

We collected balance sheet data on all California commercial banks in 1922, 1924, and 1926 using information for National banks contained in the Comptroller of Currency *Annual Report* and *Statements of Conditions* and information on State banks from the *Annual Report* of the Superintendent of Banks of the State of California. The data are similar to those used in other studies examining bank failures in the 1930s (i.e., Calomiris and Mason 1997, Carlson 2004). From these sources and the Bank of America's archives, we also gathered data on all changes in the competitive environment for California banks between 1922 and 1933 – bank openings, mergers, acquisitions, *de novo* branches, voluntary liquidations, and bank failures. These data enable us to examine the effects of branching in towns, cities, counties, and across the state, and to draw inferences on how its growth reshaped the competitive landscape and the stability of California banks during the Great Depression.

Some of the balance sheet characteristics we use reflect bank profitability, such as ratios of interest-earning assets to total assets (indicative of earning potential) or demand deposits to total deposits (indicative of cost structure), while others reflect the soundness of the bank, such as ratios of capital or surplus to assets and measures of excess capital and excess surplus,²⁸ or the liquidity of the bank, such as the cash-to-deposit ratio. All else equal, one might expect acquiring banks to prefer to take over sound and profitable banks. However, some historians (Bonadio 1994) writing on California's consolidation in the 1920s have suggested that regulators may have encouraged the large branch networks to take over *failing* banks. We also include a variety of other attributes that might affect whether a bank was a desirable target for acquisition. These attributes include the age of the bank (as older banks might be more loathe to give up an established reputation or may have developed better relationship-banking skills) and the bank's charter status (which might affect the ease of regulatory approval).²⁹ We also include some of the geographical factors that we found in the previous section to have influenced the desirability of the bank's location. Because we are ultimately interested in how competition from branch banks affected other banks, our analysis focuses on the factors that influenced the acquisition of unit banks. To fully utilize information about the order banks were acquired, we use duration analysis. This framework also allows us to update information about banks' balance sheets in 1924 and 1926 and changes in the competitive environment of the town as they occur. Our estimation procedure parallels recent work analyzing the factors that contributed to the failure of banks during the Depression (Calomiris and Mason 2003, Carlson 2004), which also uses duration analysis. Thus, for bank i , we estimate the equation:

²⁸ Excess capital is capital held by the bank beyond what it is legally required to hold and, similarly, excess surplus is the amount of the bank's surplus fund exceeding the legal requirement. For these measures, we look at the share of the total capital/surplus consisting of excess capital/surplus.

²⁹ Further, there were regulatory differences that affected the attributes of the banks beyond what is immediately obvious from the top line balance sheet numbers. For instance, California's banking law was also relatively unique in that it required state banks to completely segregate commercial, savings, and trust departments. State bankers aggressively advertised this difference in organizational structure in an attempt to gain a competitive advantage over national banks in the state and attract more deposits. They publicized the idea that savings depositors would be safer in their banking system if runs occurred because they would not have to line up alongside commercial depositors to withdraw their deposited funds. Consequently, California had a higher percentage of savings deposits relative to total deposits than the nation as a whole: 64% versus 44% in 1925 (Westerfield, 1939).

$$(2) \text{ Time until merger}_i = f\{ \beta_1 \text{Log assets}_{it} + \beta_2 \text{Interest bearing assets to total assets}_{it} + \beta_3 \text{Capital to assets}_{it} + \beta_4 \text{Surplus to assets}_{it} + \beta_5 \text{Excess capital ratio}_{it} + \beta_6 \text{Excess surplus ratio}_{it} + \beta_7 \text{Cash to deposits}_{it} + \beta_8 \text{Demand deposits to total deposits}_{it} + \beta_9 \text{State bank indicator}_{it} + \beta_{10} \text{Log age of bank}_{it} + \beta_{11} \text{Trust Dept}_{it} + \beta_{12} \text{Log town population}_c + \beta_{13} \text{One bank in town}_{ct} + \beta_{14} \text{Banks in town per capita}_{ct} \},$$

where t denotes an independent variable that changes over time. We estimate equation (2) using three different definitions of the righthand-side variable: (1) the time until the Bank of America acquired a bank, (2) the time until a large branching network other than the Bank of America acquired a bank, and (3) the time until a small branching network made an acquisition.³⁰

Table 7 indicates several factors were important in determining which banks were targeted for acquisition during the 1920s. (In reporting our coefficients, a negative sign indicates that an increase in the independent variable is associated with reduced time until merger and is thus a more desirable bank attribute).³¹ First, the results show that Bank of America preferred to take over banks with more interest-earning assets as a share of total assets. This finding is consistent with the notion that more profitable banks were preferred targets of acquisition, since interest income is one of the principal sources of bank income. The Bank of America also acquired banks with a higher capital-asset ratio, which is consistent with a preference for acquiring more solvent banks. Large banks, other than the Bank of America, appear to have sought banks with a lower cost structure (and thus potentially more profitable banks) as suggested by the coefficient on the ratio of demand deposits to total deposits. The importance of a bank's capital position to other large branch banks is more difficult to ascertain as the higher surplus to asset ratios made the bank less attractive while higher ratios of surplus beyond the legal requirements appear to have been more attractive. All large branching networks appear to have been

³⁰ In the estimation, we assume a log-logistic distribution. Likelihood ratio tests suggest that this distribution provides the best fit. Similar tests are used to determine the best distribution each time duration analysis is used.

³¹ In our tables using duration analysis, we report transformed regression coefficients to ease interpretation (although standard errors refer to non-transformed coefficients). For a given coefficient β , we report the value $100 * (\exp(\beta) - 1)$, which indicates the percentage change in the expected time until the event occurs for each one-unit increase in the independent variable. Thus, a regression coefficient of 0.112 would be reported in the table as 11.8, implying that a one-unit increase in this independent variable increases the expected time until the event occurs by roughly 12 percent. Note that a negatively-signed coefficient indicates a reduction in the expected time to the event.

more interested in taking over state banks. Smaller branch banks avoided taking over unit banks with higher shares of interest earning assets, but did purchase banks with higher capital ratios.

That there may have been a preference for taking over banks that displayed indicators of financial strength is not surprising as these would be the easiest to digest and absorb into an existing network of branches. Our findings are consistent with the conclusions of contemporaneous policymakers and analysts examining California's experience. As Ostrolenk (1930, p.177) explained, "Branch bank organizations, however, sought for purchase mostly stronger banks, nor were they so improvident of the welfare of their own depositors as to incorporate into their own totals the slow loans and forfeited real estate of the selling institutions." In its examination of branching in the 1920s, the Federal Reserve concluded that, "There is, of course, every reason to believe that the great majority of the unit banks absorbed by the branch operating banks of California were in sound condition when taken over. Those in financial difficulty were undoubtedly the exception rather than the rule (1931, Vol. 8, p.103)." Although newspaper accounts often played on the drama of taking over troubled banks during the 1920s (for example, Bank of Italy and Pacific Southwest Trust and Saving's bank purchase of troubled Valley Bank of Fresno), there are nevertheless many accounts from the period suggesting that, in general, branching networks preferred strong banks.³²

Our findings regarding the takeover behavior of expanding banks during the 1920s are similar to those of studies of more recent times. While we do not observe profits directly, our results are consistent with those of Stiroh and Strahan (2003), which find that banks enter markets by buying good banks. However, our results appear to differ from Wheelock and Wilson (2000), which finds that banks being purchased tended to have lower earnings.

As a sensitivity test, we examined whether the acquiring banks sought out different characteristics of banks in communities of different sizes. For example, the

³² For example, when the Bank of America moved into the Imperial Valley, the *Los Angeles Times* reported that its first acquisition was the First Bank of El Centro, "one of the strongest financial institutions in the rapidly developing Imperial Valley." ("Business News of Busy Marts," *Los Angeles Times*, February 25, 1923, p.II10). BofA's expansion into Kern county took place by acquiring "one of the substantial institutions of San Joaquin Valley." ("Bank of Italy Invades Kern," *Los Angeles Times*, August 26, 1921, p.II18)

branching networks making acquisitions may have been more focused on the balance sheet characteristics of banks in large cities, but more interested in the community characteristics of banks acquired in small towns. As Tables 8 and 9 show, we instead find that many of the same factors that mattered across the entire sample of communities also mattered in small towns; perhaps this is not surprising since these make up a vast majority of the acquired banks. (Our econometric specification was unable to identify too many factors that mattered for taking over banks in larger cities.) Overall, our results suggest that branching networks did not specifically target troubled banks for acquisition.³³

IV. Changes in Bank Behavior Resulting from Consolidation

We now turn to examining the effects that consolidation had on competition in local banking markets, an issue that has been of interest to economists analyzing the recent transformation of the U.S. banking industry and those examining how banking markets in developing countries are affected by foreign bank entry.³⁴ In particular, we examine whether banks in towns where a branch was established changed their behavior in response to the fact that they now faced competition from a branch-banking institution – what is sometimes called the external-market effect. The banking literature suggests that the dynamics of banking ought to change with the introduction of branching as it increases competition and breaks down local monopolies. The increase in competition generated by branching networks occurs over both quantity (customers) and price: a bank with many branches offers a bundle of services to its customers, including different types of accounts, different lending products, and additional services. The remaining unit banks may respond by changing their behavior and improving the efficiency of their operations.

³³ Although the sample is much smaller (49 bank purchases), we also examined whether a different pattern was observed for acquisitions occurring during the Great Depression. The only balance sheet characteristic that mattered for 1929-33 was the capital-asset ratio; higher values reduced the time it took to be acquired.

³⁴ In this section, our approach is similar to Evanoff and Ors (2002) in that we focus on how entry affects the behavior of incumbent banks rather than the condition of the acquiring bank. For literature on how incumbents in developing countries responded to foreign competition see, for example, Claessens, Demigurre-Kunt, and Huizinga (2001), Denizler (2000), and Martinez, Soledad, and Mody (2004).

Branching networks had a number of advantages that allowed them to compete on price and offer loans at lower rates than the previously extant unit banks. As noted earlier, branch networks generally combined the advantages of small banks (retaining local management and maintaining lending relationships) with the scale economies of larger banks (additional expertise from the central office, standardization of accounting and auditing methods, and reduced overhead costs). Further, branch networks could shift deposits between branches to take advantage of favorable lending opportunities.

Newspaper accounts from the period indicate that large branching institutions, especially the Bank of America, actively competed on price by offering lower loan rates than competing unit banks; Giannini argued that he had reduced loan rates in small towns to 7 percent, which was anywhere from two to five percentage points lower than what had previously prevailed.³⁵ James and James (1954) provide specific examples of agricultural communities in the San Joaquin Valley where Giannini lowered interest rates. “You are putting the borrower out of business if you charge 10 or 12 percent. The man who will fight hard to get cheaper interest rates is the one we want to loan money to, and if he is willing to pay the old price, look out,” Giannini stated.³⁶ Analysts writing in the 1920s also argued that entry by branching networks reduced rates. Preston (1922) stated that, in California, the “immediate effect of the establishment of branch has been to reduce interest rates for the better class of loans.” Somewhat more recently, Martin (1952) has suggested that, in addition to lowering interest rates on loans, the Bank of America paid higher rates of interest to depositors. These practices are similar to recent bank behavior as noted by Berger, Rosen, and Udell (2001), which finds lower loan rates in markets dominated by large banks.

Branching networks also competed on quantity. The legal limits of the 1920s, which were based on capital and surplus, likely restricted the ability of smaller banks to lend to larger customers. All else equal, since branched banks were generally much larger in size than unit banks, they could move into a location and capture the business of large customers who may have otherwise gone to a bank outside of the municipality to borrow.

³⁵ House of Representatives (1930, Volume 2, Part 2, pp.1547, 1556). See also “Future Fields of Branch Banking,” *Coast Banker*, February 1924, p.153.

³⁶ James and James (1954, p.83).

This advantage was well known by regulators and bankers during the period.³⁷ Finally, branch banks also carried out campaigns to lure depositors from other institution; one way of luring customers was by offering services, such as selling securities and trust services that smaller banks did not necessarily provide.³⁸

Competition over price, quantity, and products may have elicited rival firms to change their management or organizational practices, reduce costs, increase revenues, or improve their product mix in response to the presence of branching networks. We analyze the external effects of consolidation and branch expansion by testing whether various balance sheet ratios changed more between 1922 and 1929 for banks that began competing with branch banks than for banks that either did not face such competition or that already faced it at the beginning of the sample period (and thus had already altered their behavior). We also control for initial bank characteristics and changes in town characteristics. We examine the effects of competing with the Bank of America, other large branch bank networks, and small branch banks. For non-branching bank i , we estimate the following equation using ordinary least squares:

$$(3) \text{ Change in the balance sheet ratio}_i = f\{ \beta_1 \text{Bank of America established a branch}_i + \beta_2 \text{Other large branch bank established a branch}_i + \beta_3 \text{Small bank established a branch}_i + \beta_4 \text{State bank}_i + \beta_5 \text{Log Age of bank}_i + \beta_6 \text{Trust Dept}_i + \beta_7 \text{Population growth rate in town 1922-1929}_i + \beta_8 \text{Distance to large city}_i + \beta_9 \text{Distance to large city squared}_i + \beta_{10} \text{Share of county income from agriculture}_i \}.$$

The results shown in Table 10 present some modest evidence that incumbent banks facing competition from branch banks took steps to increase their profitability. In particular, banks competing with the Bank of America increased loans relative to assets (loans typically earned a higher rate of return than other assets). This change may not be surprising if the interest rate banks were able to charge on loans decreased following the

³⁷ For example, see the comments of Will C. Wood, Superintendent of California State Banking, *Coast Banker*, August 20, 1927, “Mr. Wood Analyzes McFadden Act” and comments and data from James Balcigalupi’s testimony to the House of Representatives (1930, Volume 2, Part 2, p.1392).

³⁸ Bankers from the 1920s referred to the additional services a parent institution could provide through its branch banks as “equipment services.” These included the purchase and sale of exchange, bonds and commercial paper, acceptances, credit departments, letters of credit, collection of drafts, and research and specialists for advising on real estate and commodity markets. See John E. Barber, “Branch Banking in California,” *Los Angeles Times*, October 5, 1922, p.IV7.

entrance of a branch bank, as reported in contemporary accounts from the 1920s. To support their earnings, banks might respond by rebalancing their portfolios to increase loans.³⁹ Banks competing with a branch network other than the Bank of America decreased securities relative to assets. Since the growth rate of interest-earning assets does not appear to have been significantly affected by changes in competition, the increase in loans and decrease in securities appear to be consistent with a rebalancing of unit bank portfolios.

Table 11 examines whether entering into competition with multiple branch banks had an impact on the changes made by incumbent banks to their balance sheets. The effects of competing with multiple branch networks are particularly pronounced. As before, banks responded to competition by increasing the share of loans relative to other assets. We find that banks entering into competition with multiple large branch banks also decreased securities relative to other assets and increased the share of demand deposits relative to total deposits. Demand deposits were generally lower cost deposits (Secrist 1930), so this change in behavior is also consistent with efforts to increase efficiency and profitability.⁴⁰

³⁹ Another possible explanation is that the growth in loans at banks starting to face competition from large branch banks occurred as the remaining unit banks hired former loan officers of purchased banks. However, as we indicated earlier, historical evidence from the period indicates that the large branching networks were adept at maintaining the management of banks they purchased in order to continue lending relationships. We verified this by examining detailed records of Security Trust and Savings Bank and the Bank of America reported in the *Annual Reports of the Superintendent of Banks of California*, the *Federal Reserve Reports of Condition* (call reports) and court documents (*United States Court of Appeals for the Third Circuit No. 10768 Transamerica Corporation v. Board of Governors of the Federal Reserve System* 1952, Volume 10, Board Exhibit 27). These documents provided information on whether management was retained at banks purchased between the years 1922-1926. Security Trust and Savings Bank, which also provided information on advisory board participation, had an extremely high retention rate; it retained key management (officers or directors) of the formerly independent unit bank to run branches or serve on the advisory board of the newly created branch office in 85 percent of the banks it acquired. For Bank of America, we can only examine whether management was retained to actively run the bank rather than serve on the advisory board. Even in this more limited capacity, we find that roughly 25 percent of Bank of America's bank purchases during this period employed former key management as either branch managers or vice presidents of the branch. Additional officers of the purchased bank were often transferred within the larger Bank of America organization to achieve cost savings at the bank while retaining local expertise (Martin, 1952, p.184). On the other hand, according to calculations based on data from the *Annual Reports of the Superintendent of Banks of California* of 1922-28, unit banks competing with these newly opened branches were much less successful at luring away the management of formerly independent banks. Only 11 percent of rival unit banks succeeded in hiring the former management of an independent bank located in their town in the three years following the purchase of a unit bank by one of the branching networks. (This calculation excludes those bank purchased in the very largest California cities.)

⁴⁰ We were also able to examine earnings and expense data for Federal Reserve member banks from the 1929 call reports. (We thank Charles Calomiris and Joseph Mason for providing these data.) Consistent

Our findings that banks took steps to increase profitability mirror reports published at that time. The *Coast Banker*, a newspaper covering banking on the Pacific Coast reported that:

Cooperation is strengthening the independent banks in their competition with chain and branch banking systems was the view expressed by T.C. Scroggs, vice president, National Bank of Commerce, Los Angeles...speakers stressed the point that the rivalry between the two systems was resulting in more efficient management of independent banks (Vol. 44, Feb 20, 1930, p.97).

These results are also similar to findings of research analyzing recent changes in the banking system following consolidation. Some studies, such as Berger and Hannan 1998; Dick 2004; Deyoung, Hasan, and Kirschoff 1998, find that in the 1990s, banks facing less competition were less efficient, and that when competition was introduced, efficiency eventually improved. Berger, Dick, Goldberg, and White (2005) find that competing with a large multi-market bank boosted small bank profitability in the 1980s, but reduced it during the 1990s. Our results are also qualitatively similar to literature on foreign bank penetration into developing country banking markets; several studies (Claessens, Demigurc-Kunt, and Huizinga 2001; Claessens and Laeven 2003; and Sturm and Williams 2002) find that greater foreign bank entry and fewer restrictions on entry are associated with more competitive national banking markets.

V. How did Competition with Branches Affect the Stability of the Banking System?

We have thus far verified that the 1920s were broadly similar with studies examining the more recent wave of consolidation. We now turn to analyzing the long-run effects of bank stability and assessing how competition from a branching institution affected the survival of banks following the onset of the Great Depression. The relation between competition and stability is theoretically ambiguous. Competition could decrease stability by depriving banks of monopoly profits that might support them during difficult times. Alternatively, and consistent with the evidence from Section IV, the increased efficiency brought about by competition could better enable smaller banks to deal with

with the idea that the introduction of a branch nearby increased competition and pushed banks to be more efficient, we find that banks that began competing with large branch banks had lower net interest margins

economic difficulties and thereby increase stability. We test these competing hypotheses by examining whether the establishment of a branch in the town is associated with an increase or decrease in the expected survival time of a bank. Since there were few bank failures in California before 1930, we focus on bank failures in the interval from June 30, 1929 and March 1, 1933 (prior to the government-mandated bank holiday).

We test our hypothesis using duration analysis. This framework allows us to update our competition variables as they change. We consider how time to failure was affected by (1) the presence of a Bank of America branch, (2) the presence of other large branch banks, (3) or the presence of small branch banks. We also add a variety of balance sheet and location characteristics that previous research has found to affect survival time of banks. The location-specific variables include the county unemployment rate in 1930 to control for the severity of economic distress at the start of the period. Other location characteristics are similar to the ones used previously, except here they are the 1929 values rather than the 1922 values. For each non-branch bank i , we estimate the equation:

$$(4) \text{ Time until failure}_i = f \{ \beta_1 \text{Branch of the Bank of America in town}_{it} + \beta_2 \text{Branch of other large branch banks in town}_{it} + \beta_3 \text{Branch of a small bank in town}_{it} + \beta_4 \text{Log assets}_i + \beta_5 \text{Loans to assets}_i + \beta_6 \text{Securities to assets}_i + \beta_7 \text{Capital to assets}_i + \beta_8 \text{Surplus to assets}_i + \beta_9 \text{Excess capital ratio}_i + \beta_{10} \text{Excess surplus ratio}_i + \beta_{11} \text{Cash to deposits}_i + \beta_{12} \text{Demand deposits to total deposits}_i + \beta_{12} \text{State bank indicator}_i + \beta_{13} \text{Log age of bank}_i + \beta_{15} \text{Trust Dept}_i + \beta_{16} \text{Log city population}_i + \beta_{17} \text{Distance to large city}_i + \beta_{18} \text{Distance to large city squared}_i + \beta_{19} \text{Banks per capita}_{it} + \beta_{20} \text{One bank in town}_{it} + \beta_{21} \text{Share of county income from agriculture}_i + \beta_{22} \text{County unemployment rate}_i \},$$

where t indicates that the characteristic changes over time.

The results shown in Table 12 are consistent with the notion that competition increases stability. We find that banks facing competition from the Bank of America had an expected survival time about 75 percent longer than banks not facing similar competition. For banks that failed, the average time until failure was 632 days, so the impact of competing with the Bank of America would seem quite notable. Thus, it appears that the benefits of increased efficiency exceeded any loss of monopoly profits.

and lower administrative costs as a share of total expenses than banks not competing with the branch banks.

Somewhat surprisingly, we do not find a similar effect from competition from other banks. This may reflect the impact of the Bank of America on more banks, as its branching network was larger and had greater geographical coverage than those of other banks. We also examined the effects of competing with multiple large banks by replacing the previous branching variables with indicators for whether the bank competed with one or more large branching networks. Banks competing with multiple large branching networks had an expected survival time almost double that of banks not competing with any large branch bank while those competing with a single large branch bank increased their expected survival time by 50 percent (the coefficients for competing with one large branch network and multiple branch networks are not statistically different). As one banking analyst writing in 1930 concluded, “It is not meant to imply here that branch banks loaned wisely and unit banks unwisely. As in any other economic situation, there were sheep and goats on both sides. Yet the sounder policies of branch banks had wider influence and frequently affected the unit banks (Ostrolenk, 1930, p.177).”

We find effects for other only a few factors included in our model. State banks had a higher failure rate than national banks (their expected survival time was only 70 percent as long), and banks with a larger surplus survived longer.⁴¹ (Curiously, we find reduced survivability for banks with higher capital-to-asset ratios.) There is also some evidence that banks in areas with more unemployment failed sooner.

Our finding that competition from branch banks is associated with increased survivorship has some parallels in the literature on the effect of foreign entry on the banking systems in developing economies. For instance, Demigurc-Kunt, Levine, and Min (1998) find that greater foreign participation in a country’s banking system reduced the probability of a crisis in that country.

VI. Accounting for Endogeneity

One potential concern with the results presented in Sections IV and V is that they do not allow for selection bias. It is possible that branching networks only chose to

⁴¹ We also tried including a dummy for whether the bank was a Federal Reserve member; however, there were too few state member banks in the sample to get an accurate assessment of the effect of Federal Reserve membership.

expand into areas or towns that were more stable or profitable. If this were the case, we would be attributing the changes in balance sheets and the greater survivorship in unit banks in these areas to changes induced by competition rather than the branching network's ability to enter markets in a selective fashion. To address this issue, we provide evidence from the historical record and additional econometric tests.

Evidence from the historical record suggests that branch-banking systems were not particularly selective with respect to location. For example, Giannini commented in 1927 that he wanted a truly comprehensive branching network, and "he set himself the goal of having at least one of his branches in every California town" (Nash, 1992, p.72). According to the official biographers of Bank of America, to fulfill this goal, Giannini pushed his branching empire into "the remote high country of California – the timberlands, the cattle domains, the fishing and hunting areas, the mining centers" (James and James, 1954, p.225). They describe his efforts to establish branches in the remote mountain regions of the state, including at the base of Mt. Shasta in Dunsmuir and in the Sierras, as well as in desert communities, such as Owens Valley, which had been left without a bank after a prominent bank failure (James and James, 1954, p.226-8).

To deal with this selection effect statistically, we estimate a two-stage treatment-effect model similar to Maddala (1983). In the first stage, we estimate a logit model examining whether a variety of city and county characteristics affected whether any large branch bank network established a branch in the town between 1922 and 1929, similar to the regression from equation (1). Using the coefficients from the first stage, we determine a treatment effect, which is related to the latent desirability of the municipality as a branch location. We estimate the second stage with this treatment effect. Standard errors of this procedure are determined by bootstrapping the entire procedure. In our first stage regression, we also include the growth of deposits between 1924 and 1928.⁴² Including deposit growth allows us to capture to some extent whether the growth potential of the city is influenced the branch decision.

Tables 13 and 14 show results when the two-stage treatment model is used to analyze how new branching competition affects incumbent, unit bank balance sheets. The

⁴² Data on branch deposits by city are from *United States Court of Appeals for the Third Circuit No. 10768 Transamerica Corporation v. Board of Governors of the Federal Reserve System* 1952.

impacts on the incumbent bank portfolios are similar to those presented in section IV. We again find evidence that banks competing with large branch banks took steps to increase their efficiency and potential profitability. Indeed, the evidence regarding adjustments of loan and securities portfolios when we look at the Bank of America and other large branch banking networks separately is stronger than before. Unit banks competing against multiple large branch bank organizations made the most dramatic changes.

Estimates of the effect of competition from branch banks on survival after controlling for the treatment effect appear in Table 15. As before, competing with either the Bank of America or with multiple large branch banks increases the expected survival time; however, the statistical significance for competing with a single branch bank is weaker compared to the results presented in section V.

VII. Conclusions

In this paper, we examine the 20th century's first episode of the development of large-scale branch banking networks in the United States and show how they transformed the banking system in California. We provide a thorough assessment of the relationship between competition and stability since our sample tracks a large number of banks over time as they are exposed to increased competition and then to a large macroeconomic shock. Our empirical approach enables us to show that the unit banks competing with large branch banking networks were the ones that became more efficient and were also the ones that were subsequently more resistant to the shock of the Great Depression.

Similar to the recent wave of bank mergers in the United States, we show that consolidation in California in the 1920s occurred as branching networks expanded. Moreover, we find evidence of an external effect: remaining banks changed their behavior in response to large branching networks in ways that are consistent with increased efficiency. We then find that branching affects stability. Banks competing with these large branch banks, especially the Bank of America, were better able to survive the economic shock of the Great Depression, likely because they had been forced to become more efficient. These results provide a coherent story about why U.S. states that allowed branching in the 1930s fared better during the Great Depression. In doing so, we confirm

the hypothesis of Carlson and Mitchener (2005) – that an important benefit of branch banking and an important reason why states permitting it fared better in the 1930s was that the expansion of branch banking unleashes the disciplinary powers of competition. This helps to reconcile the seemingly disparate empirical findings regarding the effects of branching at the state level (Mitchener 2005 and Wheelock 1995) and at the bank level (Calomiris and Mason 2003 and Carlson 2004).

The results also shed light on contemporary policy debates. First, our results concerning the entry of branch banks into new markets parallels discussions concerning the banking systems in developing economies, and provide a link between the hypotheses that increased foreign entry improves efficiency (Claessens, Demiguc-Kunt, and Huizinga 2001 and Claessens and Laeven 2003) and that increased foreign bank entry is associated with a decreased probability of a crisis (Demiguc-Kunt, Levine, and Min 1998). Second, our results allow us to speculate that the removal of branching restrictions and the wave of consolidation in the U.S. today may lead to a banking system that is more resistant to financial shocks.

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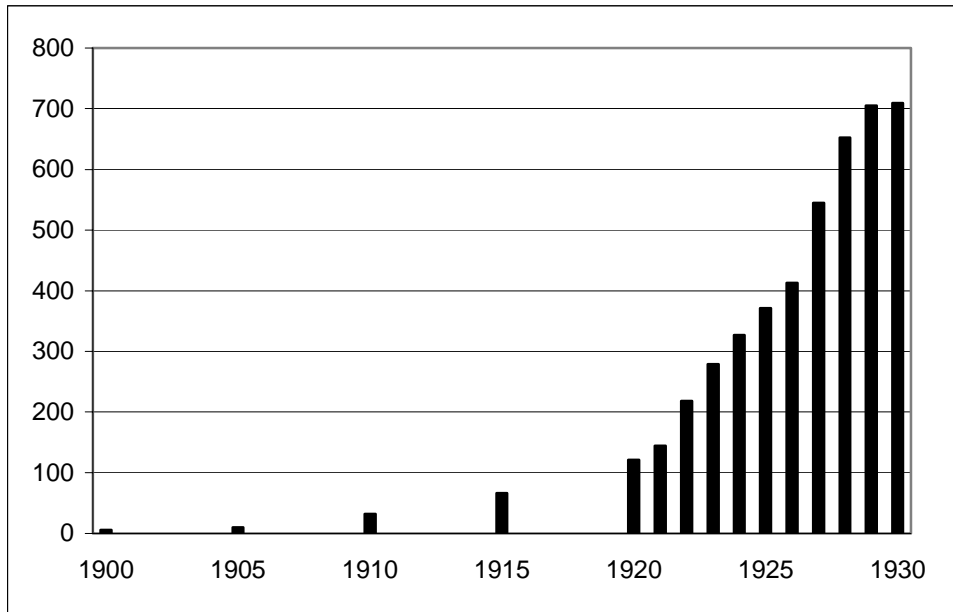
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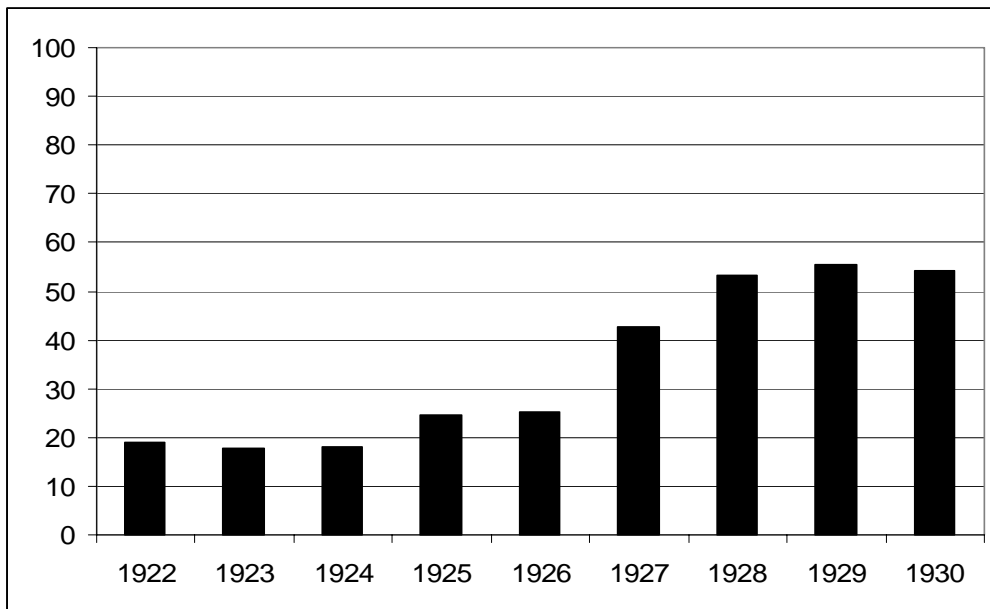
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Figure 1
Number of Branches in California



Source: Federal Reserve (1931).

Figure 2
Percentage of California Branches Controlled by the Bank of America



Source: *Annual Report of the Superintendent of Banks of the State of California* (various years), Rand McNally (various years), *Comptroller of Currency Annual Report and Statements of Conditions* (various years), and internal records of the Bank of America.

Figure 3
Extent of Branching by Bank of America in 1929



Source: *Annual Report* of the Superintendent of Banks of the State of California (various years), Rand McNally (various years), Comptroller of Currency *Annual Report and Statements of Conditions* (various years), and internal records of the Bank of America.

Figure 4
Extent of Branching by Security-First National Bank in 1929



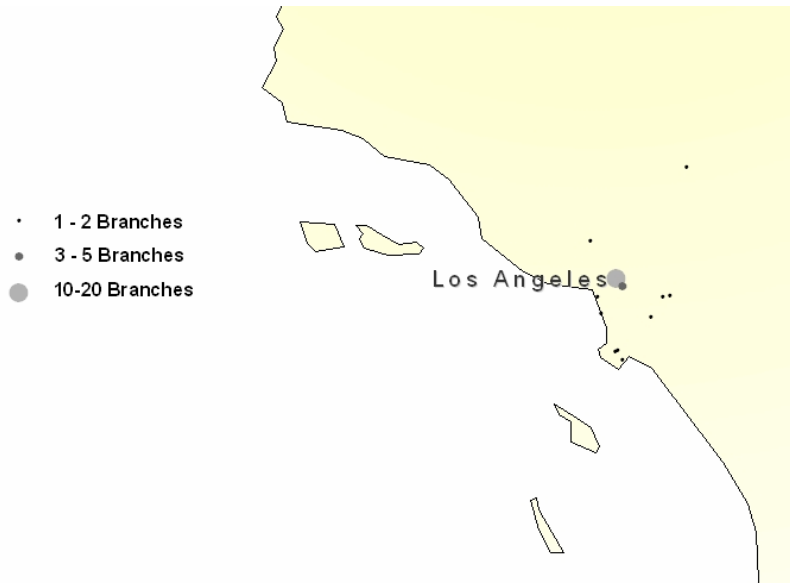
Source: *Annual Report* of the Superintendent of Banks of the State of CA (various years), Rand McNally (various years), Comptroller of Currency *Annual Report and Statements of Conditions* (various years).

Figure 5
Extent of Branching by American Trust Bank in 1929



Source: *Annual Report* of the Superintendent of Banks of the State of CA (various years), Rand McNally (various years), Comptroller of Currency *Annual Report and Statements of Conditions* (various years).

Figure 6
Extent of Branching by California Bank in 1929



Source: *Annual Report* of the Superintendent of Banks of the State of CA (various years), Rand McNally (various years), Comptroller of Currency *Annual Report and Statements of Conditions* (various years).

Table 1
Branches in the United States in 1929

	California	New York	Michigan	North Carolina	Rest of the United States	United States Total
Branches in the bank's home office city	314	662	434	11	872	2293
Branches outside the bank's home office city	538	0	0	66	452	1056
Total branches	852	662	434	77	1324	3349

Notes and sources: New York and Michigan have the most total branches after California. North Carolina has the most branches outside the city of the bank's home office after California. Federal Reserve (1931).

Table 2
Branches in California in 1929

	Bank of America	Security Trust	American Bank	California Bank	All other banks	Total California
Home Office	56	58	34	32	78	258
Outside	387	79	63	13	53	595
Total Branches	443	137	97	45	131	853

Notes and sources: *Annual Report* of the Superintendent of Banks of the State of California (various years), Rand McNally (various years), Comptroller of Currency *Annual Report* and *Statements of Conditions* (various years), and internal records of the Bank of America. The Bank of America had head offices in two cities; the nationally chartered Bank of Italy was headquartered in San Francisco and the state-chartered Bank of America was headquartered in Los Angeles.

Table 3
Branches by Size of Municipality for the Four Largest Branching Banks in 1929

Town Population	Bank of America		Security Trust		American Bank		California Bank	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Under 500	22	5.0	2	1.5	2	2.1	1	2.2
500-1,000	31	7.0	4	3.0	2	2.1	1	2.2
1,000-2,500	52	11.8	14	10.4	7	7.4	2	4.4
2,500-5,000	45	10.2	4	3.0	8	8.4	1	2.2
5,000-10,000	50	11.4	16	11.9	10	10.5	3	6.7
10,000-25,000	24	5.5	15	11.2	5	5.3	1	2.2
25,000-50,000	28	6.4	5	3.7	3	3.2	2	4.4
50,000-100,000	24	5.5	11	8.2	9	9.5	2	4.4
100,000+	164	37.3	63	47.0	49	51.6	32	71.1
Total	440	100	134	100	95	100	45	100

Sources: *Annual Report* of the Superintendent of Banks of the State of California (various years), Rand McNally (various years), Comptroller of Currency *Annual Report* and *Statements of Conditions* (various years), and internal records of the Bank of America. The four largest branching networks are those shown in table 2.

Table 4
Branch Establishment: *De Novo* versus Merger or Acquisition (M&A)

Year	Los Angeles		San Francisco		Other Large City		Other Small City		California	
	De Novo	Merger	De Novo	Merger	De Novo	Merger	De Novo	Merger	De Novo	Merger
1923	27	2	6	3	16	6	19	29	68	40
1924	30	2	6	1	10	3	10	21	56	27
1925	17	3	7	0	2	5	7	32	33	40
1926	21	4	4	0	6	2	2	14	33	20
1927	24	6	21	3	21	13	24	59	90	81
1928	4	2	5	3	10	4	18	22	37	31
1929	5	5	2	1	2	1	3	12	12	19
1930	2	0	0	0	0	0	7	6	9	6
1931	2	0	0	0	3	0	1	1	6	1
1932	1	1	0	0	0	0	2	0	3	1
Total	133	25	51	11	70	34	93	196	347	266

Notes and sources: Large cities are defined a population greater than or equal to 20,000 in 1922. *Annual Report* of the Superintendent of Banks of the State of California (various years), Rand McNally (various years), Comptroller of Currency *Annual Report* and *Statements of Conditions* (various years), internal records of the Bank of America, and California State Department of Finance (2004).

Table 5
Distribution of Banks by Town Size (1922) and M&A Activity from 1922 to 1929

Town Population	Banks		Mergers	
	Number	Percent of Total	Number	Percent of Total
Under 500	59	8.5	26	5.8
500-1,000	88	12.7	40	8.9
1,000-2,500	163	23.6	83	18.6
2,500-5,000	118	17.1	62	13.9
5,000-10,000	72	10.4	69	15.4
10,000-25,000	55	8.0	40	8.9
25,000-50,000	37	5.4	25	5.6
50,000-100,000	32	4.6	28	6.3
100,000+	67	9.7	74	16.6
Total	691	100	447	100

Sources: *Annual Report* of the Superintendent of Banks of the State of California (various years), Rand McNally (various years), Comptroller of Currency *Annual Report* and *Statements of Conditions* (various years), and internal records of the Bank of America, and California State Department of Finance (2004).

Table 6
City and County Characteristics and the Selection of Branch Location
(Logistic analysis)

Dependent Variable: Whether a branch was established in the municipality between June 30, 1922 and June 30, 1929 by:

	Bank of America	Other Large Bank Branch Network	Small Bank Branch Network
Constant	-56.0 (89.38)	94.6 (86.41)	-533.5* (275.30)
Town banking institutions per capita	13.3 *** (0.04)	17.2 *** (0.06)	4.0 (0.12)
One institution in town	-76.8 *** (0.40)	-57.6* (0.51)	-27.6 (0.62)
National bank in town	-50.7* (0.41)	-14.2 (0.52)	-76.1 ** (0.57)
Log town population	205.2 *** (0.24)	140.1 *** (0.22)	108.5 ** (0.31)
Distance to a large city	-14.2 (0.83)	-83.0* (1.10)	-71.3 (1.07)
Distance to a large city squared	-5.2 (0.32)	101.8 (0.45)	61.4 (0.38)
County seat	64.3 (0.56)	-37.6 (0.53)	-14.4 (0.59)
Share county income from agriculture	61.7 (0.89)	-64.6 (0.87)	886.2* (2.76)
County income per capita	-0.7 (0.08)	19.6* (0.10)	-1.1 (0.11)
Share county population from immigrants	6.2 (0.04)	9.5* (0.05)	-2.7 (0.06)
County population growth rate (1910-1920)	-0.7* (0.00)	0.4 (0.00)	-0.4 (0.01)
County in the north of the state	70.4 (0.4)	-66.4** (0.5)	-15.3 (0.5)
Observations	301	314	281
Events	124	58	40
Log-likelihood	-298.1	-218.7	-209.2
Likelihood Ratio Chi2	109.8	81.7	20.8

Notes and Sources: Estimated using logistic analysis. Reported values are transformed coefficients (see footnote 24). The symbols (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 percent level, respectively. Standard errors of original coefficients are in parentheses. Data on mergers as well as branch and bank activity are from *Annual Report* of the Superintendent of Banks of the State of CA (various years), *Rand McNally* (various years), *Comptroller of Currency Annual Report* and *Statements of Conditions* (various years). Banking competition variables are for 1922. City populations are from the California State Department of Finance (2004) County-level information is from U.S. Department of Commerce (1920). Large city is defined as either San Francisco or Los Angeles, whichever is nearer. Large branch bank network refers to Security-First National Bank, American Trust Bank, and California Bank. Observations are all cities or towns in California without a branch of the bank group being investigated as of June 30, 1922.

Table 7
Factors Affecting the Desirability of Individual Banks as Acquisition Targets
(Duration analysis)

Dependent Variable: Time from June 30, 1922 until the bank is taken over by:

	Bank of America	Other Large Bank	Small Bank
Log assets _t	-3.0 (0.13)	140.1 (0.55)	-30.2 (0.27)
Interest-bearing assets to total assets _t	-1.7* (0.01)	-2.5 (0.05)	4.2*** (0.02)
Capital to assets _t	-3.4** (0.01)	20.9** (0.09)	-6.0** (0.03)
Surplus to assets _t	-0.8 (0.02)	99.4*** (0.21)	-4.1 (0.04)
Excess capital ratio _t	-0.1 (0.00)	-0.1 (0.01)	0.6 (0.01)
Excess surplus ratio _t	-0.3 (0.00)	-3.2* (0.02)	0.4 (0.01)
Cash to deposits _t	-0.4 (0.00)	4.6 (0.04)	0.4 (0.00)
Demand deposits to total deposits _t	-0.1 (0.00)	-5.2*** (0.01)	0.5 (0.01)
State bank _t	-26.5** (0.13)	-81.2** (0.70)	-21.3 (0.30)
Log age of bank _t	11.8 (0.09)	1.3 (0.42)	-7.3 (0.20)
Trust _t	1.4 (0.30)	39.9 (1.89)	123.7 (0.84)
Log town population	-3.4 (0.06)	-42.8** (0.24)	-0.8 (0.13)
One bank in town _t	12.5 (0.14)	148.7 (0.76)	21.6 (0.36)
Banks in town per capita _t	0.5 (0.02)	-10.1** (0)	-3.5 (0.03)
Constant	10.9*** (1.69)	6.2 (7.24)	11.2*** (3.25)
Observations	488	488	488
Events	124	51	47
Log-likelihood	-289.1	-216.9	-178.3
Likelihood Ratio Chi2	33.9	53.2	19.0

Notes and Sources: Estimated using survival analysis and employing a log-logistic distribution. Reported values are transformed coefficients (see footnote 31). The symbols (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 percent level, respectively. Standard errors of original coefficients are in parentheses. Variables denoted with a subscript t are updated over the sample period if they change. Balance sheet and banks characteristics are updated from their 1922 values in 1924 and 1926. Town characteristics are updated as they change. Data on mergers, branches, bank activity, and balance sheet characteristics are from the *Annual Report* of the Superintendent of Banks of the State of CA (various years), *Rand McNally* (various years), *Comptroller of Currency Annual Report* and *Statements of Conditions* (various years). City populations are from the California State Department of Finance (2004). Large branch bank network refers to Security-First National Bank, American Trust Bank, and California Bank. Observations are the number of unit banks in existence as of June 30, 1922. Events are acquisitions that took place between June 30, 1922 and June 30, 1929.

Table 8 – Characteristics of Bank Acquisitions in Small Municipalities (Population 20,000 or less)
(Duration analysis)

Dependent Variable: Time from June 30, 1922 until the bank is taken over by:

	Bank of America	Other Large Bank	Small Bank
Log assets _t	8.3 (0.18)	154.7 (0.85)	12.4 (0.39)
Interest bearing to total assets _t	-1.2 (0.01)	-3.1 (0.05)	3.1* (0.02)
Capital to assets _t	-2.7* (0.02)	17.6 (0.10)	-4.5* (0.03)
Surplus to assets _t	-1.1 (0.02)	93.2*** (0.21)	-3.3 (0.05)
Excess capital ratio _t	-0.6* (0.00)	-0.2 (0.02)	0.5 (0.01)
Excess surplus ratio _t	-0.3 (0.00)	-3.8* (0.02)	0.1 (0.01)
Cash to deposits _t	-0.6 (0.01)	2.5 (0.04)	0.1 (0.00)
Demand to total deposits _t	0.0 (0.00)	-4.8*** (0.01)	0.3 (0.01)
State bank _t	-20.0* (0.14)	-66.0 (0.71)	-28.7 (0.32)
Log age of bank _t	12.4 (0.09)	37.1 (0.44)	-11.1 (0.21)
Trust _t	10.6 (0.41)	41.3 (1.99)	144.7 (0.94)
Log town population	-21.1** (0.10)	-70.6** (0.50)	-15.3 (0.22)
One bank in town _t	-12.8 (0.15)	-3.9 (0.78)	36.6 (0.39)
Banks in town per capita _t	-2.5 (0.02)	-15.5*** (0)	-3.8 (0.03)
Constant	10.6*** (2.22)	10.8 (9.98)	7.0 (4.43)
Observations	405	405	405
Events	102	42	36
Log-likelihood	-231.0	-173.5	-134.9
Likelihood Ratio Chi2	44.8	51.6	20.5

Notes and Sources: Estimated using survival analysis and employing a log-logistic distribution. Reported values are transformed coefficients (see footnote 31). The symbols (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 percent level, respectively. Standard errors of original coefficients are in parentheses. Variables denoted with a subscript t are updated over the sample period if they change. Balance sheet and banks characteristics are updated from their 1922 values in 1924 and 1926. Town characteristics are updated as they change. Data on mergers, branches, bank activity, and balance sheet characteristics are from the *Annual Report* of the Superintendent of Banks of the State of CA (various years), *Rand McNally* (various years), *Comptroller of Currency Annual Report* and *Statements of Conditions* (various years). City populations are from the California State Department of Finance (2004). Large branch bank network refers to Security-First National Bank, American Trust Bank, and California Bank. Observations are the number of unit banks in existence as of June 30, 1922. Events are acquisitions that took place between June 30, 1922 and June 30, 1929.

Table 9 – Characteristics of Bank Acquisitions in Large Municipalities (Population 20,000 or more)
(Duration analysis)

Dependent Variable: Time from June 30, 1922 until the bank is taken over by:

	Bank of America	Other Large Bank	Small Bank
Log assets _t	-23.9 (0.28)	80.4 (1.62)	-46.3 (0.52)
Interest bearing to total assets _t	-3.7 (0.04)	6.3 (0.20)	7.1 (0.07)
Capital to assets _t	-6.2 (0.05)	33.4 (0.30)	-2.2 (0.10)
Surplus to assets _t	-3.3 (0.06)	238.9 (0.99)	-5.6 (0.11)
Excess capital ratio _t	1.3 (0.01)	-1.5 (0.06)	0.1 (0.02)
Excess surplus ratio _t	0.2 (0.01)	3.0 (0.05)	1.3 (0.02)
Cash to deposits _t	3.5 (0.02)	0.7 (0.13)	-0.5 (0.04)
Demand to total deposits _t	-0.6 (0.01)	-8.6 (0.07)	2.2 (0.02)
State bank _t	-25.8 (0.35)	-99.7* (3.62)	5.0 (0.89)
Log age of bank _t	-12.2 (0.23)	-85.2 (1.73)	10.2 (0.41)
Trust _t	7.1 (0.60)	-80.7 (3.52)	206.5 (1.19)
Constant	15.7*** (5.4)	3.73 (26.7)	11.39 (9.7)
Observations	83	83	83
Events	22	9	11
Log-likelihood	-51.3	-35.5	-38.4
Likelihood Ratio Chi2	8.7	17.3	6.7

Notes and Sources: Estimated using survival analysis and employing a log-logistic distribution. Reported values are transformed coefficients (see footnote 31). The symbols (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 percent level, respectively. Standard errors of original coefficients are in parentheses. Variables denoted with a subscript t are updated over the sample period if they change. Balance sheet and banks characteristics are updated from their 1922 values in 1924 and 1926. Data on mergers, branches, bank activity, and balance sheet characteristics are from the *Annual Report* of the Superintendent of Banks of the State of CA (various years), *Rand McNally* (various years), Comptroller of Currency *Annual Report* and *Statements of Conditions* (various years). Observations are the number of unit banks in existence as of June 30, 1922. Events are acquisitions that took place between June 30, 1922 and June 30, 1929.

Table 10
The Effects of Branch-Bank Entry on Rival Bank Behavior
(Ordinary Least Squares)

Dependent Variable: Balance-sheet characteristics listed in column heading

	Loans to assets	Securities to assets	Demand deposits to total deposits	Growth in interest-earning assets
Intercept	0.21 (0.14)	0.03 (0.13)	-0.10 (0.16)	556.7 (449.7)
B of A adds a branch	0.05 ** (0.02)	-0.02 (0.02)	0.03 (0.02)	12.6 (66.0)
Other large bank adds a branch	0.05 (0.03)	-0.08 *** (0.03)	0.05 (0.04)	-64.4 (103.8)
Small bank adds a branch	0.07 * (0.04)	-0.02 (0.04)	0.07 (0.05)	73.3 (129.9)
State bank	0.05 ** (0.02)	0.01 (0.02)	0.04 * (0.02)	100.1 * (56.9)
Log age of bank	-0.03 *** (0.01)	-0.01 (0.01)	0.02 (0.01)	-155.7 (31.3)
Trust	0.03 (0.06)	0.01 (0.06)	-0.04 (0.07)	155.9 (196.0)
Population growth rate 1922-1929 (city)	-0.02 ** (0.01)	0.03 *** (0.01)	-0.02 * (0.01)	27.4 (32.5)
Distance to large city	-0.07 (0.05)	0.03 (0.04)	0.13 ** (0.05)	-245.2 * (147.9)
Distance to large city squared	0.00 (0.02)	0.01 (0.02)	-0.06 *** (0.02)	82.6 (61.0)
Share county income from agriculture	-0.15 (0.14)	0.01 (0.13)	-0.11 (0.16)	-3.5 (451.2)
Observations	244	244	244	244
F-Stat	4.98	3.7	2.75	3.86
Adj R2	0.14	0.10	0.07	0.11

Notes and Sources: The symbols (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 percent level, respectively. Standard errors are in parentheses. Data on balance sheets, trust status, and branching activity are from the *Annual Report* of the Superintendent of Banks of the State of California (various years) and Comptroller of Currency *Annual Report* and *Statements of Conditions* (various years), with information on branching activity supplemented using internal records of the Bank of America. Age of bank is from Rand McNally (1922). City population is from the California State Department of Finance (2004) supplemented by data from Rand-McNally. Income shares are from U.S. Department of Commerce (1920). Observations are California unit banks in existence in 1922 and 1929.

Table 11
The Effects of Multiple Branch Networks on Rival Bank Behavior
(Ordinary Least Squares)

Dependent Variable: Balance-sheet characteristics listed in column heading

	Loans to assets	Securities to assets	Demand deposits to total deposits	Growth in interest-earning assets
Intercept	0.21 (0.14)	0.03 (0.13)	-0.12 (0.16)	560.3 (448.8)
One large bank has a branch	0.05*** (0.02)	-0.03 (0.02)	0.02 (0.02)	34.9 (63.6)
More than one large bank has a branch	0.05* (0.03)	-0.06*** (0.02)	0.06* (0.03)	-57.3 (83.2)
State bank	0.05** (0.02)	0.01 (0.02)	0.04* (0.02)	100.4* (56.8)
Log age of bank	-0.03*** (0.01)	-0.01 (0.01)	0.02* (0.01)	-156.9 (31.4)
Trust	0.02 (0.06)	0.01 (0.06)	-0.05 (0.07)	136.0 (195.7)
Population growth rate 1922-1929 (city)	-0.02** (0.01)	0.03*** (0.01)	-0.02* (0.01)	28.4 (32.4)
Distance to large city	-0.08* (0.05)	0.03 (0.04)	0.14** (0.05)	-254.4* (148.7)
Distance to large city squared	0.01 (0.02)	0.01 (0.02)	-0.06*** (0.02)	86.7 (61.3)
Share county income from agriculture	-0.15 (0.14)	0.01 (0.13)	-0.10 (0.16)	-4.4 (450.2)
Observations	244	244	244	244
F-Stat	5.03	3.91	9.21	4.31
Adj R2	0.13	0.10	0.27	0.11

Notes and Sources: The symbols (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 percent level, respectively. Standard errors are in parentheses. Data on balance sheets, trust status, and branching activity are from the *Annual Report* of the Superintendent of Banks of the State of California (various years) and *Comptroller of Currency Annual Report* and *Statements of Conditions* (various years), with information on branching activity supplemented using internal records of the Bank of America. Age of bank is from Rand McNally (1922). City population is from the California State Department of Finance (2004) supplemented by data from Rand-McNally. Income shares are from U.S. Department of Commerce (1920). Observations are California unit banks in existence in 1922 and 1929.

Table 12
The Effect of the Branch Banks on Bank Failures, 1929-33
(Duration Analysis)

Dependent variable: Time from June 30, 1929 until failure.

	By branch bank group		By number of branch banks	
Bank of America in city _t	75.29 **	(0.24)		
Other large bank in city _t	8.29	(0.26)		
Small bank branch in city _t	2.33	(0.28)		
Branch of one large network _t			50.27 *	(0.25)
Branch of multiple large networks _t			94.34 *	(0.40)
Log assets	-20.23	(0.17)	-17.76	(0.18)
Loans to assets	-2.05	(0.02)	-2.22	(0.02)
Securities to assets	-2.65	(0.02)	-2.72	(0.02)
Capital to assets	-4.95 *	(0.03)	-4.91 *	(0.03)
Surplus to assets	9.46 **	(0.04)	9.03 **	(0.04)
Excess capital	0.66	(0.00)	0.63	(0.00)
Excess surplus	0.32	(0.00)	0.33	(0.00)
Cash to deposits	-1.19	(0.02)	-1.25	(0.02)
Demand to total deposits	0.00	(0.00)	-0.01	(0.00)
State bank	-32.09 **	(0.19)	-31.10 *	(0.19)
Log age of bank	-9.91	(0.11)	-8.62	(0.11)
Trust	18.13	(0.60)	10.86	(0.60)
Log city population	-6.75	(0.09)	-6.28	(0.08)
Distance to large city	0.68	(0.00)	0.82 *	(0.00)
Distance to large city squared	0.00	(0.00)	0.00 *	(0.00)
Banks per capita _t	-0.42	(0.05)	-0.18	(0.05)
One bank in town _t	-17.74	(0.20)	-20.50	(0.20)
Agricultural income share	-15.45	(0.19)	-13.79	(0.19)
Unemployment rate	-7.37	(0.05)	-8.02 *	(0.05)
Constant	30.7	(19.6)	28.5	(19.5)
Observations	291		291	
Failures	60		60	
Log Likelihood	-148.6		149.7	

Notes and Sources: Estimated using survival analysis and employing a log-logistic distribution. Reported values are transformed coefficients (see footnote 31). The symbols (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 percent level, respectively. The symbol [t] indicates that the variable is updated. Standard errors of original coefficients are in parentheses. Data on balance sheets, trust status, and branching activity are from the *Annual Report* of the Superintendent of Banks of the State of California (various years) and Comptroller of Currency *Annual Report* and *Statements of Conditions* (various years), with information on branching activity supplemented using internal records of the Bank of America. Age of bank is from Rand McNally (1922). City populations are from the California State Department of Finance (2004) supplemented by data from Rand McNally's. Income shares and county-level characteristics are from U.S. Department of Commerce (1930). Observations are the number of banks in existence as of June 30, 1929. Failures indicate banks failing between June 30, 1929 and March 1, 1933.

Table 13
The Effects of Branch-Bank Entry on Rival Bank Behavior Correcting for Selection Bias
(Two-Stage OLS, Bootstrapped Results)

Dependent Variable: Balance-sheet characteristics listed in column heading

	Loans to assets	Securities to assets	Demand deposits to total deposits	Growth in interest-earning assets
Intercept	0.19 (0.98)	0.05 (0.82)	-0.25 (0.66)	421.4 (644.8)
B of A adds a branch	0.10*** (0.03)	-0.07*** (0.03)	0.06** (0.03)	45.3 (57.7)
Other large bank adds a branch	0.07* (0.04)	-0.09*** (0.03)	0.02 (0.03)	21.1 (53.0)
Small bank adds a branch	0.07*** (0.03)	-0.01 (0.02)	0.08 (0.06)	68.4 (68.3)
Treatment Factor	-0.03** (0.01)	0.03** (0.01)	-0.02 (0.02)	-34.6 (35.0)
State bank	0.05*** (0.02)	-0.01 (0.02)	0.04* (0.02)	107.9 (73.8)
Log age of bank	-0.03** (0.01)	-0.01 (0.01)	0.01 (0.01)	-164.6** (78.8)
Trust	0.00 (0.04)	0.04 (0.03)	-0.03 (0.07)	122.9 (102.9)
Population growth rate 1922-1929 (city)	-0.02*** (0.01)	0.02** (0.01)	-0.02*** (0.01)	27.3 (24.6)
Distance to large city	-0.05 (0.04)	0.01 (0.05)	0.14** (0.06)	-207.8 (133.9)
Distance to large city squared	0.00 (0.02)	0.02 (0.02)	-0.06** (0.03)	71.0 (45.3)
Share county income from agriculture	-0.17 (0.98)	0.02 (0.82)	0.03 (0.67)	118.0 (613.2)
Bootstrap Repetitions	250	250	250	250

Notes and Sources: The symbols (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 percent level, respectively. Standard errors are in parentheses. Data on balance sheets, trust status, and branching activity are from the *Annual Report* of the Superintendent of Banks of the State of California (various years) and Comptroller of Currency *Annual Report* and *Statements of Conditions* (various years), with information on branching activity supplemented using internal records of the Bank of America. Age of bank is from Rand McNally (1922). City population is from the California State Department of Finance (2004) supplemented by data from Rand-McNally. Income shares are from U.S. Department of Commerce (1920). Observations are California unit banks in existence in 1922 and 1929.

Table 14
The Effects of Multiple Branch Networks on Rival Bank Behavior Correcting for Selection Bias
(Two-Stage OLS, Bootstrapped Results)

Dependent Variable: Balance-sheet characteristics listed in column heading

	Loans to assets	Securities to assets	Demand deposits to total deposits	Growth in interest-earning assets
Intercept	0.32 (1.28)	0.02 (0.80)	-0.15 (1.04)	456.5 (718.8)
One large bank has a branch	0.06** (0.03)	-0.04 (0.03)	0.04 (0.03)	64.8 (52.8)
More than one large bank has a branch	0.06** (0.03)	-0.08*** (0.02)	0.06** (0.03)	-47.3 (46.3)
Treatment Factor	-0.01 (0.02)	0.01 (0.01)	-0.01 (0.01)	-31.4 (31.4)
State bank	0.04** (0.02)	0.00 (0.02)	0.04 (0.02)	105.5 (67.9)
Log age of bank	-0.02* (0.01)	-0.01 (0.01)	0.02 (0.02)	-162.2** (74.3)
Trust	0.01 (0.04)	0.02 (0.03)	-0.06 (0.08)	123.0 (96.2)
Population growth rate 1922-1929 (city)	-0.02*** (0.01)	0.02*** (0.01)	-0.02** (0.01)	25.4 (21.2)
Distance to large city	-0.05 (0.05)	0.01 (0.05)	0.15** (0.06)	-242.0 (149.3)
Distance to large city squared	0.00 (0.02)	0.02 (0.02)	-0.06** (0.03)	83.2 (51.6)
Share county income from agriculture	-0.29 (1.29)	0.04 (0.80)	-0.08 (1.05)	100.3 (712.5)
Bootstrap Repetitions	250	250	250	250

Notes and Sources: The symbols (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 percent level, respectively. Standard errors are in parentheses. Data on balance sheets, trust status, and branching activity are from the *Annual Report* of the Superintendent of Banks of the State of California (various years) and *Comptroller of Currency Annual Report* and *Statements of Conditions* (various years), with information on branching activity supplemented using internal records of the Bank of America. Age of bank is from Rand McNally (1922). City population is from the California State Department of Finance (2004) supplemented by data from Rand-McNally. Income shares are from U.S. Department of Commerce (1920). Observations are California unit banks in existence in 1922 and 1929.

Table 15
The Effect of the Branch Banks on Bank Failures (1929-33) Correcting for Selection Bias
(Two-Stage Duration Analysis, Bootstrapped Results)

Dependent variable: time from June 30, 1929 until failure.

	By branch bank group		By number of branch banks	
Bank of America in city _t	67.63 **	(0.45)		
Other large bank in city _t	10.77	(0.36)		
Small bank branch in city _t	-4.98	(0.43)		
Branch of one large network _t			34.65	(0.65)
Branch of multiple large networks _t			60.69 *	(0.77)
Treatment Factor	-13.08	(0.27)	-5.23	(0.35)
Log assets	-44.25 *	(0.34)	-44.11 *	(0.36)
Loans to assets	-3.19	(0.04)	-3.30	(0.04)
Securities to assets	-3.43	(0.03)	-3.70	(0.04)
Capital to assets	-5.18 *	(0.04)	-4.15 *	(0.05)
Surplus to assets	12.73	(0.08)	10.66	(0.08)
Excess capital	1.02	(0.01)	0.89	(0.01)
Excess surplus	0.78 *	(0.01)	0.99 *	(0.01)
Cash to deposits	1.15	(0.03)	1.47	(0.03)
Demand to total deposits	-0.54	(0.01)	-0.78	(0.01)
State bank	-38.86 *	(0.30)	-36.08 *	(0.31)
Log age of bank	-2.13	(0.18)	8.48	(0.18)
Trust	249.5	(36.4)	245.8	(315.2)
Log city population	8.08	(0.26)	12.05	(0.22)
Distance to large city	0.53	(0.01)	0.55	(0.01)
Distance to large city squared	0.21	(0.00)	0.45	(0.01)
Banks per capita	-14.88	(0.53)	-23.77	(0.56)
One bank in town	-38.44 *	(0.36)	-45.47 *	(0.41)
Agricultural income share	-2.41	(0.27)	-0.69	(0.27)
Unemployment rate	-0.16	(0.11)	-17.79 *	(0.12)
Constant	21.25	(27.03)	19.46	(27.83)
Bootstrap Repetitions	250		250	

Notes and Sources: Estimated using survival analysis and employing a log-logistic distribution. Reported values are transformed coefficients (see footnote 31). The symbols (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 percent level, respectively. The symbol [t] indicates that the variable is updated. Standard errors of original coefficients are in parentheses. Data on balance sheets, trust status, and branching activity are from the *Annual Report* of the Superintendent of Banks of the State of California (various years) and Comptroller of Currency *Annual Report* and *Statements of Conditions* (various years), with information on branching activity supplemented using internal records of the Bank of America. Age of bank is from Rand McNally (1922). City populations are from the California State Department of Finance (2004) supplemented by data from Rand McNally's. Income shares and county-level characteristics are from U.S. Department of Commerce (1930). Observations are the number of banks in existence as of June 30, 1929. Failures indicate banks failing between June 30, 1929 and March 1, 1933.