**DO "VULNERABLE" ECONOMIES NEED DEPOSIT
INSURANCE?: LESSONS FROM THE U.S.
AGRICULTURAL BOOM AND BUST OF 1920s**
Charles W. Calomiris

Do "Vulnerable" Economies Need Deposit Insurance?:

Lessons from the U.S. Agricultural Boom and Bust of the 1920s

Charles W. Calomiris

Department of Economics
Northwestern University

and

Research Department
Federal Reserve Bank of Chicago

October 1989

I. INTRODUCTION

To justify the substantial protection that governments offer banks, regulators frequently refer to banks' unique position as the channel through which payments clear, and through which essential short-term commercial and working-capital credit are provided to parties whose access to other sources of funds is limited. Banks are "special" because all other industries rely on them to maintain their operations and execute their transactions in a timely, convenient way. In particular, whether one defines the payments system narrowly to include only check clearing, or more broadly to include lines of short-term credit to "information-intensive" borrowers, it would be hard to conceive of a payments system without banks.

Thus shocks that threaten the viability of banks, encourage financial disintermediation, and cause disruptive bank failures or suspensions of deposit convertibility can be very costly to society, and these costs may be far greater than the reduced profits, or bankruptcy costs, incurred by banks. Recent research on the peculiar severity of the Great Depression and the vulnerability of agricultural producers to banking disturbances in the 1980s have received particular emphasis as examples of socially costly financial disruption (see Bernanke, 1983; and Calomiris, Hubbard, and Stock, 1986). The externalities generated by banks' special role as check clearing agents and commercial credit suppliers, therefore, may provide a rationale for regulation of banks.

Notwithstanding this presumed vulnerability of the

payments system and the essential role of banks, critics of current government interventions into banking have argued that the government has gone too far in guaranteeing bank liabilities and consequently has promoted an unacceptable degree of socially undesirable risk taking by banks. For example, from a theoretical perspective, Calomiris and Kahn (1988) argue that demandable-debt banking, and the first-come first-served rule of bank repayment to depositors, were part of an incentive-compatible equilibrium in which informed depositors (often other banks) were rewarded for investing resources in monitoring banks. Insurance removes the reward, and hence the incentive, that encourages such monitoring. Insured banks' incentives to undertake excessively risky projects are magnified by shocks that reduce bank capital. Such shocks increase the banker's potential gain from pursuing long shots (see Calomiris and Kahn, 1989) by increasing the implicit value of the put option inherent in deposit insurance (see also, Karaken and Wallace, 1978). Empirical evidence of excessive risk taking by insured financial intermediaries, especially in response to adverse shocks that reduce bank capital, has been provided by Kane (1988) and Calomiris (1989), among others.

Furthermore, critics argue that regulators underestimate the extent to which the financial "safety net" could be provided with little or no government insurance of banks. For example, private clearinghouses historically provided

coinsurance among member banks that reduced the incentive for depositors to remove funds from banks during periods of financial uncertainty. Mutual regulation and monitoring ensured that members would not free ride on the group protection (see Cannon, 1910; and Gorton, 1985). Coordination among banks, sometimes even across state lines, was enhanced in and among states that permitted branch banking -- in particular, in the antebellum American South (see Calomiris, 1989).[1] With fewer, and better diversified, banks it was easier for banks to respond to crises as a group, again effectively coinsuring by continuing to "make markets" in other banks' deposits and notes.

Similarly, in three unit-banking states of the antebellum North, statewide bank liability insurance plans modeled on private clearinghouse coinsurance arrangements managed to protect the payments system and limit (or eliminate) bank failures and suspensions of convertibility without encouraging excessive risk taking by members. These plans gave member banks authority to enact and enforce regulations, and provided the incentive for effective self regulation and monitoring by making member banks fully and mutually liable for the liabilities of any failing banks. These systems managed to maintain the smooth functioning of the payments system within and across states, and saw few, if any, bank failures relative to states that lacked an effective means of bank coordination. A review of the experiences of these antebellum bank insurance

3

success stories, and the very different experiences of other state bank insurance schemes, is provided in Calomiris (1989).

The apparent lesson of historical bank clearinghouses, early Southern branch banking, and mutual-guarantee self-regulating insurance plans under government sponsonship is that banking coalitions can act to coinsure effectively against many threats to the payments system. The successful operation of private clearinghouses in today's financial markets -- for example, the CHIPS network, or the futures and options clearinghouses -- indicate that these lessons can be applied successfully in the modern context, as well.

Private coinsurance schemes, however, cannot offer unlimited protection against financial collapse in all circumstances. Private insurance is not effective in preventing disintermediation by depositors who question the ability of the coalition to guarantee the losses of its members. Once a shock becomes large enough to threaten the capital of the group of banks as a whole -- rather than simply a small subset of its members -- coinsurance ceases to be credible.

Furthermore, the geographic range of privately coinsuring groups -- and consequently the potential for coinsurance -- may be restricted by laws that limit branch banking, and thus impair the ability of bankers in different locations to communicate, monitor one another, and coordinate their behavior. Most financial crises in U.S. history began as small

4

disturbances, relative to aggregate bank capital, which were insurable, in principle, by mutual protection among banks. Reasonable fears of insolvency of a subset of banks, confusion as to which banks had suffered most from the shock, and the absence of a mechanism for mutual protection at the state or national level, however, provided incentives to depositors, who were unable to determine the precise incidence of the disturbance, to withdraw their funds (see Gorton, 1989; and Calomiris, 1989). Lacking effective means to coinsure against such disturbances, the thousands of independent and geographically distant unit banks sometimes were forced to suspend convertibility as a defensive reaction during such economy-wide bank runs. Suspensions of convertibility limited depositors' and noteholders' liquidity, and reduced the desirability of placing funds in banks, reducing the supply of loans and forcing banks to adopt more conservative lending practices than under normal circumstances. Other banks failed due to losses incurred as the result of "fire sales" of assets to meet withdrawal requests (see Calomiris and Schweikart, 1988; and Calomiris, 1989).

The relative success of statewide systems of branching banks, or mutual-liability banks, in meeting such crises as the Panic of 1857 suggests that, for an economy as diverse nationally as the United States, a combination of full nationwide branch banking and government-sponsored, privately-managed mutual-liability insurance may be sufficient to prevent

5

large sector- or region-specific shocks to bank capital from
becoming a threat to aggregate bank capital, and therefore, the
payments system.[2]

One could argue, however, that this approach might not be
sufficient for economies with intrinsic vulnerability to large
sector-specific shocks that threaten aggregate bank solvency.
In the case of the United States, full interstate branching
virtually could eliminate the risk to banks from regionally
concentrated shocks to the terms-of-trade, which have proved
particularly important for the agricultural and oil-producing
sectors (see Alston, 1983; Stock, 1985; and Calomiris, Hubbard,
and Stock, 1986). In smaller countries with less diversified
economies, however, the risk from terms-of-trade shocks is
large (see Brock, 1988), but the potential for reducing
payments system risk through diversification is more limited
because national sovereignty limits the development of full
international branch banking. The limitations due to national
sovereignty can be viewed as an example of the "time-
inconsistency" problem. Banks chartered in country X may
decide to leave their local branches in country Y stranded
rather than pay for their losses during bad times, and there
may be no way for country Y to force them to do so.
Furthermore, governments may find it optimal to limit the
repatriation of bank profits to support bank branches in other
countries.

The central question I will address in this paper is

6

whether the governments of such intrinsically risky economies stand ready to bail out banks in the event of a large adverse shock to the country's economic base? The question may be posed in two parts: How great are the advantages of a government's insuring the payments system (whether narrowly or broadly defined) from the strains of such shocks, rather than relying on a privately administered, mutual-guarantee system?; Are the social costs of excessive risk taking by banks, which result from the existence of bank deposit insurance, greater or less than the supposed benefits of insurance?[3]

The specific historical cases I will discuss are the experiences of agricultural areas of the United States in the 1920s -- a period that witnessed a rapid, sharp terms-of-trade reduction for agricultural producers and an unprecedented rate of farm, business, and bank failures in the most affected regions. The 1920s provide a particularly useful context to investigate the role of different regulatory regimes in reducing or magnifying the effects of the shock on the viability of financial intermediaries. Interstate branch banking was not permitted, though some states allowed full, or limited, intra-state branching. Furthermore, some states had enacted deposit insurance prior to the crisis. Finally, the existence in each state of nationally chartered banks (under a common regulatory regime across states) provides a point of comparison across states of the magnitude of the shock to banks in each state, which can provide insight into the comparative

7

performance of the various state-chartered banking regimes, and
the contribution of deposit insurance or branch banking in
magnifying or lessening the impact on banks.

In Calomiris (1989) I presented evidence from the 1920s of
much higher initial growth, and subsequent failure rates, for
four state-chartered, insured banking systems relative to
national banks operating in the same state, which were
prohibited by the U.S. Comptroller of the Currency from joining
state deposit insurance funds. While this comparison was a
useful first step, it is important to establish that the
differences between insured state-chartered and uninsured
national-chartered bank failure rates are not merely an
artefact of different exposure to agricultural risk, due to
different locational patterns (rural vs. urban) for state- and
national-chartered banks, or more restrictive regulations on
national-chartered banks -- in particular, stricter limitations
on real estate loans.[4] Here I look at all eight of the insured
systems, and compare the performance of national- and state-
chartered banks within and across states, taking account of
differences in economic and regulatory environment (e.g., the
existence of branching and deposit insurance), and using
additional indicators of bank performance.

No single historical example can provide a conclusive
"answer" to the broad question of whether banking system bail-
outs are socially desirable in price-sensitive economies; but
it is only through the accumulation of evidence from examples

8

of the costs of such crises, and the consequences of the
decisions to provide insurance or allow branching, that policy
makers will be able to make the difficult choices of bank
regulatory policy in an informed manner.

Section II provides cross-sectional evidence on price,
income, and wealth movements, and indicators of financial
distress experienced by the various states in the 1920s.
Section III measures changes in the size, number, and portfolio
structure of national- and state-chartered banks prior to and
during the crisis. Section IV evaluates differences in the
performance of the state-chartered banking systems in response
to the crisis -- specifically, the rates of bank suspension and
bank failure, the costs to depositors of failures, and the
ability of the banking systems to recover from the crises,
under different state regulatory regimes. Section V returns to
the central question of whether deposit insurance is desirable
for economies with intrinsic vulnerability to large income
disturbances.

II. THE POST-WORLD WAR I AGRICULTURAL CRISIS

Typically, wars have been good times for farmers. World
War I, like the Napoleonic Wars, and the Crimean War of the
1850s, witnessed a rapid expansion of agricultural income. As
for previous wartime booms, however, the end of war brought
with it a severe decline in the agricultural terms of trade.
Declines in price and income became translated into declines in

9

farm land values, and farmers who had expanded operations with debt financing during the boom found their incomes slipping as their leverage ratios rose, often to levels that were unsustainable.

The crisis was quite sector- and region-specific. Indeed, for most sectors (and consequently, the "non-agricultural" states) in the U.S. the 1920s were a "new age" of unprecedented stability and growth. In many states with a heavy reliance on agricultural earnings, however, the period was one of sustained declining income and financial collapse.[5] Differences across the states in the degree of agricultural stress reflected different movements in earnings and wealth, as well as differences in farmers' financial vulnerability to those declines.

Table 1 provides an index of real gross farm income and its components for 1910-1930. These figures show that the decline in agricultural income affected virtually all producers, though the timing and severity of decline varied across activities, with staple foodstuffs and textile raw materials suffering the worst percentage declines from 1919 to 1921.

The uneven sectoral decline within agriculture produced different responses of income and wealth across states. Furthermore, Alston (1983) finds that similar farm wealth and earnings reductions produced far greater rates of farm foreclosure in some states than in others. States that had

10

expanded farm acreage, and farm leverage, during the wartime boom, suffered much higher rates of farm foreclosure, holding declines in wealth and income constant.

Foreclosure rates for farms throughout the country during the 1920s and 1930s reached historic highs that have never been exceeded. For 1921-1940 foreclosure rates averaged more than five times the highest average levels for any other decade from 1913 to 1980. While the national average was high during the interwar period, the uneven incidence of foreclosure across states made matters far worse in some states. In Montana, from 1921 to 1923, 28 percent of farmers lost farms or property.[6] From 1926 to 1930, foreclosures in Montana relative to owner-operated farms in the state averaged 52.2 per thousand, per year.[7] Other Northern and Western states with extremely high foreclosure rates (per thousand owner-operated farms) for 1926-1930 include South Dakota (70.4), North Dakota (58.0), Oklahoma (50.0), Iowa (48.3), Arizona (42.7), and Colorado (42.4). In the South, South Carolina (68.0), Georgia (56.5), Mississippi (47.7), and Louisiana (40.1) had substantially higher rates of foreclosure than the other Southern states. Arkansas (39.7), Nebraska (38.4), Idaho (37.6), and Missouri (34.1) also experienced foreclosure rates substantially above the national average of 27.1 per thousand.

Tables 2 and 3 provide a variety of measures of economic conditions for each of the 48 contiguous states during the period 1919-1930. Table 2 contains data on: gross farm income

11

growth from 1919 to 1921; growth in total net income from all sources received by the farm and non-farm populations from 1919 to 1921; the ratio of farmer to non-farmer income in 1920; the percentage difference in the value of crops sold from 1922 to 1925, and from 1925 to 1928; and the percentage change in the state-specific crop price index from 1919 to 1924.

Table 3 reports: the change in the value of farm real estate per acre over the periods 1913-1920, 1920-1925, and 1925-1930; the ratio of mortgage debt to farm real estate value in 1920; the farm-to-total population ratio for 1920; and the farm foreclosure rate for 1926 to 1930.

The choices of dates for each series in Tables 2 and 3 reflect data availability, as well as the peaks and troughs of the agricultural cycle. While the income, wealth, and price variables in Tables 2 and 3 are all expressed in nominal terms, rather than adjusted for aggregate price level movements, the GNP deflator was roughly constant for the years 1919-1929, with the exception of 1920, according to recent estimates, both by Romer (1989), and Balke and Gordon (1989). These estimates are reproduced in Table 4. Moreover, from the standpoint of the sustainability of farms and farmers' ability to repay debt to banks, it is nominal income and wealth that matter, since debt and debt service are set in nominal terms.

Tables 2 and 3 indicate that the first decade of the agricultural crisis (1920-1930) can be divided usefully into three stages: the initial shock of 1920-1921, a period of

12

partial recovery from 1922 to 1924, and a subsequent period of decline. Because of differences in crop mix, supply-side variation, and financial vulnerability, the experiences of the various states differed substantially during these three sub-periods, as the tables show.

No single indicator provides an adequate index of the experience of a particular state during one of these sub-periods. First, income and price indicators are extremely sensitive to the specific dates over which they are calculated. For example, 1924 was a relatively good year for Montana and North Dakota, and differs markedly from either 1923 or 1925 in this respect. Second, some income or price movements are perceived as transitory, while others are viewed as more permanent. Aside from the immediate cash-flow effects of such changes, the economic impact of income shocks on farmers' wealth and financial viability depended on perceptions of how permanent these disturbances were. Third, the impact of a wealth or income shock depends on the vulnerability (leverage) of farms -- that is, how severe the shock was relative to previous expectations of future income. The highest foreclosure rates occurred in states with a relatively high ratio of farm mortgage debt to farm real estate value, as indicated in Table 3. These considerations suggest that, while the changes in prices and income provide measures of the sources of disturbances, changes in the value of farms and the farm foreclosure rate are more indicative of the likely

13

(anticipated) long-run changes in farm income associated with those shocks.[8]

Finally, in evaluating the impact of agricultural shocks on statewide bank performance, the proportion of state income derived from farming, and the proportion of the labor force employed in farming, are of obvious importance. The geographical isolation of farming communities is also relevant, as it affects the abilities of merchants or bankers in these areas to diversify.

The links (explored in section IV, below) between indicators of economic condition reported in Tables 2 and 3, and the threat to banks in a given state, therefore, are subtle. Ideally, in analysing these links, one would want to take account of the perceived permanence of different income shocks, the degree of financial leverage, the rapidity and cumulation of shocks, and the link between the degree of concentration of income in agriculture and the impact on banks from agricultural shocks.

The focus of this study is on the role of regulatory regimes in limiting the incidence and costs of financial disruption in the face of a substantial challenge to the financial system. To evaluate the influences of the different state regulatory decisions in propagating adverse shocks, I compare the performance of banks in the states that were substantially affected by the agricultural depression, under different regulatory environments.

14

The sample of states defined to have been substantially affected, whose financial systems are analysed in greatest detail below, includes any state that experienced farm real estate value reduction (per acre) of greater than 20 percent from 1920 to 1930, or an average annual farm foreclosure rate of greater than 20 per thousand from 1926 to 1930. This sample includes states that suffered extreme depression, as well as those with more moderate commercial failure rates and bank failure experiences (discussed in section IV). The states in the sample are listed in Table 5, categorized according to their deposit insurance and branch banking laws.

III. BANK MEMBERSHIP AND BALANCE SHEET PATTERNS ACROSS STATES

Regulation's Influence on Membership, Location, and Risk

National banks were governed by common regulations across different states, and thus their experience provides something of a state-specific benchmark against which to compare the behavior of state-chartered banks across states. Bank entry and asset growth, as well as financing and portfolio decisions of state-chartered banks, can be compared to one another, in absolute terms, as well as relative to the behavior of national banks in the respective states.

Of course, national banks were not identical across states and faced different exposure to agricultural risk. While in every state national banks were larger on average, and located

15

more often in cities than their state-chartered counterparts, differences across states in the locational and size patterns of national and state banks were important. In some states, national or state banks operated more in urban locations and were larger on average than in others. Furthermore, national banks in cities that served as regional reserve centers for agricultural areas may have suffered asset depletion due to the impact of agricultural disturbances on correspondents. In what follows, I try as much as possible to control for these differences across states.

The years prior to 1920 saw the establishment of deposit insurance systems in several states. Often it has been remarked that incentive problems due to insurance made insured banking systems grow at a "reckless" rate, and caused them to limit the growth of capital, and overextend themselves in the farm loan market (Thies and Gerlowski, 1989; Calomiris, 1989; White, 1983; FDIC, 1956; ABA, 1933; Robb, 1921); however, no systematic quantitative comparisons of the behavior of the different state-chartered systems have been made before, to my knowledge.

It is difficult to distinguish incorrect expectations of persisting prosperity from excess risk taking induced by deposit insurance unless one has a standard against which to measure the behavior of insured banks. When one controls for differences in economic environment, using uninsured state banking systems in other states, and national banks in the same

16

state, one has provided such standards of comparison.

The dates for which the different state deposit-insurance systems came into and out of operation are given in Table 5. For three states (Kansas, Texas, and Washington), participation in state-run deposit insurance was voluntary. Numbers and deposits of participating and non-participating state banks in these states are given in Table 10. All state-run insured banking systems were in operation during the boom of 1918-1920, and with the exception of Washington, the state-operated insurance systems were the dominant component of the state-chartered systems by 1920. In Texas, state banks that did not belong to the state-run system were privately insured, as required by regulation; while in Washington and Kansas state-chartered banks could avoid insurance altogether.

In describing the peculiar incentives of insured banks, one should distinguish between voluntary and involuntary state systems. Under voluntary insurance legislation, banks could retain state charters without joining the insured system. Since national charters were a costly means for many banks to avoid the insurance fund, voluntary state insurance was an important additional option.

The laws governing withdrawal from a state's insurance plan were extremely important as well. In two of the three voluntary systems (Washington and Kansas), banks opting out of state-run insurance could avoid any form of insurance. These two systems also limited the effectiveness of insurance -- and

17

thereby reduced risk subsidization among banks -- by allowing member banks to leave the insurance system at any time. Washington's system went further, and provided essentially no protection for large losses, because it allowed banks to opt out at any time without even retaining liability for past losses. In Washington, low initial insurance premia and the ability to leave the voluntary systems seem to have encouraged many banks that were not aggregious risk takers to join, only to opt out once troubles began. In Texas, voluntary withdrawal was not permitted until the insurance law was amended in 1925. Of course, banks could also opt out of any of the compulsory or voluntary state systems by securing a national charter, although this would have entailed costs to banks that relied on activities prohibited by national law, or those with insufficient capital.

In Texas, even though all state-chartered banks were required to have some form of insurance, the privately insured banks were unlikely to have had the same opportunities to take advantage of insurance through excessive risk taking. While there is much evidence that supervision and regulation were lax in the state-run plans, historical examples of privately run insurance (see Calomiris, 1989) indicate that excessive risk taking was not a problem because of strong incentives by insurers to provide effective regulation and supervision. Thus Texas' state-chartered banks that chose private rather than state-run insurance are likely to have assumed risks comparable

18

to uninsured banks in other states.

Both compulsory and voluntary insurance during this period differed from current U.S. federal deposit insurance in several important respects. Typically, interest rates on insured deposits were restricted by law (except in Nebraska), and capital requirements were much higher than today (typically, 10 percent of deposits for insured banks). While these interest rate ceilings were sometimes hard to enforce because of outright fraud, or the use of discounts as an alternative to interest (see Cooke, 1910), they constrained the availability of funds somewhat, in contrast to FDIC and FSLIC regulations that allow risk-taking member to attract funds by offering unusually high-interest insured CDs. Furthermore, as in virtually all state systems, and the national banking system, stockholders had extended liability equal to the amount of capital in the bank. This was not equivalent to a doubling of the capital stock because collections from assessments on the stockholders of failed banks averaged less than 50 percent of assessments, for all state banking systems from 1921 to 1930.[9] Finally, the state systems were not insured by the state treasuries, but rather by member banks as a group, through an insurance fund to which banks contributed annual assessments. These assessments had upper bounds annually, which meant that solvent banks' liability was limited. Furthermore, by leaving the system, or forcing repeal of the insurance statute by threatening to do so, solvent banks who belonged to the insured

19

systems in the 1920s were able to avoid much of the liability
to depositors of failed banks (more on this below). All these
considerations imply that the effective protection of
depositors, and the potential for excessive risk taking would
have been less under the historical insured systems than under
current federal deposit insurance. Thus evidence on incentive
problems in these plans provides an a fortiori case for
potential excessive risk taking under government-guaranteed
insurance of the kind available in the U.S. currently.

Evidence on the Effects of Deposit Insurance

Tables 6 through 10 present measures of state banking
system averages and aggregates, disaggregated by type of bank
charter and by state, for the 32 "agricultural-crisis" states
for various dates. The indicators include: the number of
banks, the proportion located in towns or cities of 2500 or
more, average total assets per bank, aggregate total asset
growth, and the ratio of capital to assets.

As the data for the various state- and national-chartered
systems show, not all types of banks were equally likely to
join one or another system. Larger minimum capital
requirements and more restrictive portfolio regulations for
national banks meant that small banks, particularly those that
wished to specialize in agricultural credit backed by real
estate, would be attracted to the state-chartered systems.

20

Table 7 reports the proportion of banks in each system that were located in towns and cities of greater than 2500 inhabitants, and the average size of banks in each system. While there is considerable variation among states, national banks were always larger on average, and always had a higher proportion of banks located in cities.

Historical accounts and economic theory lead one to expect that deposit insurance for state-chartered banks reinforced this propensity for small, rural banks to belong to the state system, and for large, urban banks to join the national system, because the potential benefits of deposit insurance were greater for small rural banks. White (1983, pp. 198-200) finds that the support for deposit insurance regulation was greatest among small bankers operating in agricultural areas in unit banking states with low minimum capital requirements. For large, urban state banks (which opposed deposit insurance legislation) deposit insurance was seen as a burden, a legislated subsidy from large to small banks operating in the periphery.[10] Insured deposits typically had interest rate ceilings that kept them from being as competitive in the market for large, sophisticated depositors as in the market for deposits in rural areas.[11] Capital requirements in the insured systems (typically 10 percent of deposits) were more of an impediment to risk taking for large banks than for smaller banks operating in the periphery. A group of oil men, ranchers, or farmers could organize a small bank to finance

21

their expansion, while placing limited funds of their own at risk.[12] Many of the large city banks found advantages to operating in a more disciplined environment, with stockholders and subordinated debtholders keeping watch over conflicts of interest between bank and banker. For urban banks, the expanding opportunities in trust activities and alternatives to standard demand-deposit banking as a means of finance were the wave of the future; for small rural banks, deposit-financed agricultural lending was the way to expand.[13] There were exceptions. Some particularly unscrupulous large city banks chose to enter the insured systems, intending to use them as a means to create and exploit conflicts of interest, and finance speculative expansion on a scale that would not have been possible for a rural unit bank.[14]

Bank membership and balance sheet patterns indicate that deposit insurance was an important force in determining who joined or left the various systems, and in influencing bank expansion and risk taking during the boom and bust. No single indicator in Tables 6 through 10 provides a "litmus test" of the importance of deposit insurance for adverse selection in bank membership and excessive risk taking, but a combination of factors apparent in the tables indicates that state systems that featured deposit insurance were a special class, during both the era of expansion and that of contraction.

During the boom period of 1914-1920 the insured banks grew more rapidly than others. Sixteen state banking systems grew

22

by a factor of greater than 2.5 from 1914 to 1920, as shown in Table 11. Of these 16 systems, 7 were insured (one of the voluntary systems, Washington, is excluded from this list). The compulsory systems ranked first, fourth, fifth, eighth, and eleventh in asset growth over this period. Two of the voluntary-participation state systems (Kansas and Texas) ranked thirteenth and fifteenth. High growth, by itself, does not imply excessive risk taking. As Table 11 shows, high growth was not confined to insured systems, as the experiences of Wyoming, North Carolina, and Idaho demonstrate, in particular.

Three factors, however, made the high growth rates of the insured systems unique: they accomplished high growth mainly through increases in the numbers of banks, rather than in assets per bank; growth seems to have been concentrated in relatively sparsely populated regions; and insured banks operated with low capital-to-asset ratios, typically reserved for systems of larger average size. Of the 8 banking systems that averaged less than $400,000 in total assets in 1920, 6 were insured banking systems, with the frontier states, Wyoming and New Mexico, accounting for the remaining two.

The West as a region, therefore, was experiencing its era of extraordinary banking growth, comparable to the growth of New England banking in the early national period (1790-1830), or the South from 1820 to 1860.[15] But the insured banks differed in certain respects from the other high-growth Western states. In New Mexico, state-chartered banks operated in more

23

populous areas, on average (see Table 7), and the fragility inherent in such rapid growth and small size were offset, in part, by the unusually high capital-to-asset ratio of banks (12 percent) in 1920, as shown in Table 9. Wyoming's capital-to-asset ratio of 9 percent was higher than any of the insured banks of comparable size, as well. Thus if one uses the combined standard of high growth, small bank size, and low capital-to-asset ratios, the insured banking systems appear especially vulnerable at the peak in 1920. Texas operated with a relatively high capital ratio, because its law required capital as a percentage of deposits of between 10 and 20 percent (depending on deposit size), while other insurance systems required 10 percent.

It is important to verify that the high growth and unique vulnerability of the insured state systems relative to other state systems is attributable to different banking responses, rather than different fundamental economic conditions. To this end, additional comparisons of insured systems with other banking systems within and across states are useful. Specifically, I consider three standards of comparison: the relative growth of insured and uninsured state banks in states where insurance was optional; the growth of state-chartered banks across states, relative to the growth of national banks in the same state; and the growth of insured banking relative to uninsured state-chartered banking in adjoining states with similar "economic fundamentals."

24

For two of the three states with voluntary systems (Kansas and Texas), it is clear that the growth differences between national- and state-chartered banking from 1914 to 1920 (Table 8) were due to the disproportionate growth of state-run insured banking, as Table 10 reveals. These two voluntary systems grew rapidly during the boom period 1914-1920 relative to other state banking, both in number of banks and total deposits. The Texas' system -- which did not allow voluntary withdrawal by member banks, and therefore, provided more anticipated insurance protection than the Washington or Kansas system -- was the fastest growing of the three voluntary insurance systems, relative to national or uninsured banks in the state. In Texas, the deposits in banks of all types in the state grew by 271 percent from the end of 1914 to the end of 1919, while those in insured banks grew by 402 percent.[16] The total number of banks in the state increased by 11 percent, while the number of insured banks increased 25 percent, from 1914 to 1920. In Kansas, total deposit growth was 131 percent for 1914-1919, while insured-banking deposit growth was 173 percent.

In the third voluntary-insurance state, Washington, the state-chartered system as a whole grew slowly compared to the national system, and the insured system never accounted for more than 41 percent of state-chartered deposits (FDIC, 1956, p. 50). Several features of the Washington experience made it a special case. First, Washington's free-exit provision provided virtually no protection, and hence no encouragement

25

for excessive expansion. Second, its was the last insurance system to be established (in 1917), and there was less time for banks to join prior to 1920. Third, Washington's banking growth during this period was concentrated more in the large urban banks. Its national banking system was third among the sample of 32 states in average asset size of banks in 1920, and experienced above average growth in assets from 1914 to 1920. The lack of a rural/agricultural boom in Washington -- farm land prices grew a modest 38 percent from 1914 to 1920 -- further limited any perceived advantages to small rural banks of membership in the insured system.

A second standard for comparing growth during the boom -- one that controls for state-specific economic conditions -- is the relative growth of state and national systems across states with and without insurance. Typically, state banking systems grew faster than national systems, but in some states this difference is especially pronounced; in others it is actually reversed.

A rough comparison is provided in Table 12 -- a four-by-four matrix, that arranges states according to the quartile growth rates of their national- and state-chartered banking systems for 1914-1920. Only two state-chartered systems ranked two or more quartiles higher in growth of assets than the quartile rank of their state's national banks: Mississippi and Nebraska. These were two of the five compulsory insurance states.

26

A more formal approach to comparing state-chartered banking growth to national bank growth, across states, is presented in Table 13. Using cross-sectional data for the sample of 32 states, I regress state-chartered bank asset growth for 1914-1920 on: national-chartered asset growth, the percentage rise in farm land value per acre, the ratio of farm population to total population, and dummy variables for the presence of insurance. In one version I separate the voluntary insurance states -- Kansas and Texas -- from the compulsory insurance systems. Washington is excluded from the set of insured states altogether. I also add a dummy variable (which interacts with the growth of national banking) for states that contained especially important "reserve centers". National asset growth is included as a measure of state-specific opportunities for expansion, holding regulation constant. The growth in the value of farm real estate is included to control for different expectations of long-run profitability from agricultural loans (which should have a disproportionate effect on state banks). The reserve center dummy is included to control for peculiarities in the growth of national-chartered banks due to interstate influences through correspondent relations.

The regression results confirm that insurance was associated with very high relative rates of growth of state-chartered banks, and that national banks in reserve-center states grew more than national banks elsewhere. As predicted,

27

the effect of compulsory insurance is stronger than that of voluntary insurance, because voluntary plans provide less cross-subsidization, and because (in Kansas) withdrawal was allowed for by law. Even in Kansas and Texas, however, the effects of insurance dummies were important (accounting for an additional 33 percent of asset growth from 1914 to 1920), although the few degrees of freedom, and consequent high coefficient standard errors, limit the power of hypothesis tests.

Finally, comparisons among state banking systems in the same regions also support the conclusion that insured banking growth was unusually high, and that insured states were more vulnerable, during the boom. First, consider the states in the Western region adjoining the Western insured states. These include: Arkansas, Colorado, Idaho, Iowa, Missouri, Minnesota, Montana, New Mexico, and Wyoming. How do these states compare, in growth, bank size, and capitalization, to the insured states of Kansas, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas? Data on the ratio of state-chartered bank assets in 1914 relative to 1920, average state-chartered bank size, and capitalization are reported in Table 14. A similar comparison is performed in Table 14 between Mississippi statistics and those of the uninsured states in the deep South in our sample: Alabama, Georgia, and South Carolina (Louisiana is excluded, because of the special role of New Orleans as a financial center.).

28

These data reveal that the nine uninsured state-chartered systems of adjoining Western states were larger on average, grew less, and had higher capital than their counterparts in the insured systems. On average, uninsured Western asset ratios (1914/1920) were 0.42, compared to 0.35 for the insured group. The average size of the uninsured group was $448,000 in total assets, while the insured banks averaged $334,000. The historic vulnerability of small banks explains why, ceteris paribus, their depositors required them to maintain higher than average ratios of capital to deposits.[17] But in this sample, capital averaged 9 percent of assets for the uninsured group, and 8 percent for the insured. When Texas is excluded -- the insured state with a high legally mandated capital-to-deposit ratio that exceeded "market-determined" bank leverage in other states -- the difference becomes even greater.

The comparison between Mississippi and its neighbors is similar. The asset ratio averaged 0.45 in the uninsured states, as compared to 0.34 in Mississippi. The ratio of capital to assets for the uninsured states was 9 percent, as compared to 6.6 percent in Mississippi. Average bank size in Mississippi was greater than that of the other states (664 as compared to 538), but this size difference is partly attributable to the much higher growth in assets in Mississippi, which tripled from 1914 to 1920, compared to the other states whose aggregate assets roughly doubled over the same period. Also, Mississippi's state-chartered banks

29

included older, relatively large branching banks (10 banks
with 24 branches in 1920) that were allowed to continue
operating, even though new branching was not allowed. Finally,
as discussed in section IV, many of Mississippi's rural banks
had failed during the boll weevil crisis of 1912-1913, and the
state banking regulators were notoriously restrictive in
granting entry by new banks.

Insured Banking: From Boom to Crisis

Having established, using several standards of comparison,
that deposit insurance was associated with high growth and
greater bank vulnerability (small size and low capital) during
the boom, I now turn to evaluate the effects of insurance on
the membership and balance sheet responses of state banking
systems to the crisis. As several authors (ABA, 1933; FDIC,
1956; White, 1983; and Calomiris, 1989) have documented, the
insurance plans did not provide effective protection to the
states' payments systems or to bank depositors. Reimbursements
to depositors were neither timely nor complete, and exit from
the insured systems relieved solvent banks of the
responsibility of covering insolvent banks' liabilities. Here
I quantify the role of deposit insurance, and the vulnerability
it entailed, in preventing state-chartered banking systems in
states with insurance from responding to the crisis as well as
other state systems.

As one would expect, failures and assessments rose during

30

the collapse, and there was widespread defection of relatively
healthy insured banks to alternative systems, as shown in Table
15. In all cases, there was a net transfer of banks from the
insured state systems to the national system.

Table 15 reports data on changes of charter across the two
systems within each state from 1921 to 1930. From 1921 to 1930
the 48 contiguous states as a group experienced a total of 346
net conversions from state- to national-chartered banking. All
8 states with deposit insurance had positive net conversions
over this period, and as a group they accounted for 278 of the
346 net conversions -- an average of 43 per state. At the same
time, neighboring states in the West experienced virtually no
net conversions to national banking. As a group, Montana,
Iowa, Colorado, Idaho, Wyoming, Oregon, Arizona, Arkansas,
Minnesota, and New Mexico had only 5 net conversions in all.
Furthermore, few other states witnessed a substantial number of
conversions to national banking. Only 8 states other than
those with insurance plans had net conversions of greater than
5: Alabama, California, Illinois, Minnesota, Missouri, Oregon,
Virginia, and Wisconsin. This group of states -- unlike the
insured states -- did not suffer a collapse of state banking
during this period. Alabama's state system showed essentially
flat total assets over the period; California's, Wisconsin's,
and Virginia's state systems experienced substantial intensive
growth; in Illinois only a small percentage of banks converted,
and total state banking assets grew substantially relative to

31

that of national banks; in Minnesota, the percentage that

converted was also small; and Oregon was not an "agricultural

crisis" state.   Thus the insured state-chartered systems were

virtually the only cases of national banking gaining at the

expense of state banking in response to the agricultural

crisis.

In the states with voluntary state-run insurance

participation, there was widespread movement to the other state

systems, as well.   In Kansas and Texas banks switched en masse,

from 1924 to 1926.   The timing of the demise of the Texas

system reflects the fact that withdrawal was not allowed by law

until 1925.   In Kansas, the failure of the largest bank in the

insured system in 1923, and a court ruling in 1926 that

absolved withdrawing banks from liabilities for prior bank

failures (above the amount of securities already deposited in

the state fund), explain the timing of withdrawal.   In

Washington, one bank failure -- again, that of the largest bank

in the state, which accounted for one-fifth of insured deposits

-- prompted all other insured banks to leave the system.[18]

Thus while deposit insurance produced abnormally high

growth during the boom, it caused abnormally low state-

chartered growth during the crisis.   Table 16 reports

regression results analogous to those of Table 13, but for the

periods 1920-1926 and 1920-1930.   The average annual rate of

business failure from 1921 to either 1925 or 1929, relative to

the average rate for the four years prior to 1921, is included

in the regressions to capture better the financial distress banks faced in each state. The regressions are run for two sub-periods because prior to 1930 Nebraska's insurance fund chose not to close many insolvent banks, thus contaminating the measure of solvent bank deposits. For this reason I exclude Nebraska from the dummy for insured states in the 1920-1926 regression. Results for the 1920-1930 regression are reported with and without including Nebraska in the dummy banking variable.

The regressions show that the presence of insurance was associated with lower growth during the decline. Growth for the insured systems from 1920 to 1926 was 27 percent lower (as a fraction of the 1920 level) than in uninsured state systems. Not surprisingly, the difference in growth is lessened if one chooses a longer period (1920-1930) to gauge recovery from the crisis. When the postponed collapse of Nebraska is included for the 1920-1930 sample, there is an increase from a 19 percent to a 24 percent slowdown in decadal growth. Other variables generally have the predicted signs -- failure rates and farm population concentration are associated with lower growth, and controlling for omitted variables by including national bank growth is important for the 1920-1926 period. Land value changes add little after taking these other control variables into account.

Insured banks were not the only ones that saw a decline in growth during the crisis. Many states experienced a

substantial decline as agricultural earnings fell and bankruptcies rose. Interestingly however, there was substantial variation in the rate of recovery from the crisis across states, and across banks within states. As Table 8 shows, the state systems of Arizona, Idaho, and Wyoming saw high growth rates in the period 1927-1929 that essentially reversed the negative growth of the previous seven years. In all three cases, state-chartered banking growth for the period 1920-1929 exceeded the growth of national-chartered banks in those states.[19]

Furthermore, within states the growth of state-chartered banks was not identical across banks. In almost all cases (with the exception of the insured systems) the average size of state-chartered banks increased from 1920 to 1929. In some extreme cases assets per bank doubled (Arizona, Illinois, Michigan, Ohio, and Wyoming).

Interestingly, aggregate recovery of banking asset levels and increases in average bank size are positively related during this period (as exemplified by the experiences of Arizona and Wyoming, in particular). This suggests that as small, rural banks failed they were not likely to be replaced by similar institutions, but rather by larger banks. White (1985) finds that the merger wave in banking from 1919 to 1933 was partly the result of the desire to move away from a system of small, fragile unit banks. While several factors could account for variations across states in the extent of

consolidation (e.g., a reduction in the perceived desirability of rural farm loans and a change in emphasis toward industry located in cities and towns, in which larger unit banks operate), in part this variation may reflect different regulations across states, in particular laws governing branch banking.[20]

In states that allowed branch banking, it should have been easier to acquire small rural banks that failed or replace them with new branches, because the cost (including risk) of establishing branches was lower than that of opening a bank.[21] Chapman (1934, chapter XI) provides evidence of relatively high growth of branching banks for the nation as a whole during the 1920s. A thorough analysis of the relative growth of branching banks and unit banks during the 1920s in states that permitted branching would require a panel data study at the level of individual banks, which is beyond the scope of this paper. Instead, using available data, I examine the growth in the number of branching banks and their branches at the state level and link it to total banking growth, in number and total assets. I also report results using disaggregated data (at the individual-bank level) for a few states where this is feasible.

Branch Banking and Banking System Recovery

Table 17 summarizes the data on the growth of the number of total banks, branching banks, and branches of national and state banks for 1924 (the earliest available data) and 1928

35

(the last disaggregated data available for the 1920s),
categorized according to state banking laws on branching, for
the 32 "agricultural-crisis" states. The state-bank regulatory
regimes are divided into four groups: full free entry for
branching banks statewide, full free entry with locational
limitations on branches, limited (or zero) entry of new
branching banks but continuation of existing branching, and a
final category in which prohibitions kept branching from
developing.

Wyoming is an exceptional case in that it allowed
statewide branch banking, but no banks opened branches during
the 1920s. Apparently, in Wyoming's mainly livestock-producing
hinterlands opportunities for diversification through branching
were limited (as contrasted to Arizona's economy in which
cotton, livestock, and copper all offered substantial
opportunities in rural areas), and profitable opportunities for
bank entry were concentrated in the major cities. As Woods
(1985, p. 101) points out, banking outside of major cities was
confined mainly to very small banks organized in rural areas to
provide financing for expansion to local groups of insider
entrepreneurs. Of Wyoming's 113 non-national banks in 1920, 31
had a deposit base of under $100,000 (see Woods, 1985, p. 96).

National banks often were permitted to maintain branches
in existence at the time of their conversion to national
charters, which explains why national banks operated branches
in some states. In no states prior to 1927, however, did

36

national banks maintain significant branching systems. Upon passage of the McFadden Act (February 1927), limited national bank branching was allowed in states that permitted branch banking. Even under the McFadden Act national banks were still restricted to establishing branches within the "city, town or village" of their main office. Thus there is little cross-sectional variation across states in national bank branching during the 1920s.

Several interesting patterns are visible in Table 17. Because of switching between national and state charters, it is best to focus on branching within the states for national and state banks as a whole. Of the 18 states that allowed branches to exist, only 3 saw a reduction in the number of total branch-banking facilities from 1924 to 1928. These reductions all occurred in states that prohibited the establishment of new branches, but allowed existing branches to be maintained (Georgia, Minnesota, and Washington). In all three cases, the reduction is accounted for by the departure (failure or closing) of a single bank.[22] In all the other states that allowed branching to continue, but prohibited the establishment of new branches, the number of branching facilities remained the same. In states that allowed new branching, branching facilities uniformly increased at a rapid rate, often as the total number of banking facilities declined, and branching thus came to comprise a much larger fraction of total banking facilities.

37

Moreover, the recovery of total bank asset levels was higher for systems that permitted growth in branch banking. Arizona, Kentucky, Louisiana, Michigan, North Carolina, Ohio, Tennessee, and Virginia all saw relatively high rates of asset recovery in the late 1920s relative to other states. These were also the states that experienced the largest increases in the average size of banks. South Carolina was the only exception to the rule, with negative asset growth in both banking systems during this period. Clearly, this exception "proves the rule," as South Carolina witnessed a more than doubling of its branch banking facilities from 1924 to 1929, even though the combined growth of unit and branching banks was negative.

More formally, in Table 18, I regress bank asset growth from 1920 to 1926 and 1926 to 1930 on the same regressors used in Table 16, with the addition of branching dummies for city-restricted and out-of-city branching. Out-of-city branching includes the statewide branching systems, and Ohio, that allowed limited out-of-city branching. I also report regressions using the change in average bank size as the dependent variable. While the few degrees of freedom in the regressions recommends a cautious interpretation of the results, the branching indicator variables were both relatively large and statistically significant. Indeed, branching indicators have a larger, more significant, and more persistent effect on total asset growth than deposit-insurance

38

indicators in the regression. These results indicate that, from the standpoint of <u>long-run</u> banking recovery, the distinction between unit and branch banking was more important than the distinction between insured and uninsured banking. Deposit insurance mainly caused a retreat from the state-chartered systems until the insurance fund was dissolved, after which the state systems gradually recovered as well as other unit banking systems. In contrast, the effect of branching on banking growth and average bank size increase with time.

These comparisons actually understate the difference in growth between branching banks and independent unit banks, because many unit banks operated as members of bank "chains." The Federal Reserve, which collected data on "chain" banks, distinguished chains from other banking conglomerates. Chains were defined as groups of corporately independent banks "under centralized control."[23] As was recognized at the time, chains sometimes served as a "second best" substitute for branches in states where branching was prohibited. While banks in chains were separate corporate entities, they imitated to a lesser degree some of the advantageous features of branch banks. First, chains of banks could reduce individual bank risk by coordinating their response to crises and coinsuring as a group. Second, chains pooled resources and staffs to reduce overhead expenses and improve account management procedures (see Chapman, 1934, pp. 322-363). The potential for chains to allow member banks to diversify seems to have been more

39

limited, as the high failure rates of chains relative to branching banks indicates.[24]

As Table 19 shows, the freedom to branch was inversely related to the prevalence of chain banking. Table 19 reports the number and proportion of chain banks in the state- and national-chartered systems for our sample of 32 agricultural-crisis states. States with branching restrictions saw much higher incidence of chain banking, and that incidence increased with the extent of the branching prohibition.

Summary of Findings

The evidence on the aggregate growth, average size, and membership patterns of banks during the 1920s indicates that state banking systems can be usefully grouped into three categories: states where deposit insurance made the system more fragile, magnified the expansion in response to the agricultural boom, and worsened the contraction during the bust; other unit banking states with less drastic swings in aggregate growth; and branch-banking systems (restricted, or statewide) that managed to respond most successfully to the challenges brought by the declining terms of trade in agriculture.

IV. BANK FAILURE COSTS AND THE ROLE OF REGULATION

Aggregate data on numbers of banks and their assets over time do not distinguish voluntary exits by banks from bank

40

failures. In particular, it is conceivable that the decline in insured banking was primarily the result of voluntary exit in response to rising assessments once a few banks failed, in conjunction with laws that permitted banks to switch charters. If this were the case, skeptics of the failings of the insured systems might argue that the prohibition of voluntary exit would have been sufficient to make the systems viable.

Evidence on bank failures, and their costs, therefore, provides a complement to the results reported in section III. A study of bank failure propensities permits one to distinguish exits from failures, and supplies further direct evidence on the extent of risk taking during the boom across different regulatory regimes.

ABA (1933), Calomiris (1989), and Thies and Gerlowski (1989) provide evidence that insured banks were more likely to fail than national banks in the same state, uninsured state banks in the same state, and uninsured state banks in other states. While the within-state comparisons made by these authors of the failure propensities of insured-state and uninsured-state banks in Kansas (summarized below) is compelling, the other evidence is less so. Differences in states' product specialization, and differences across states in the relative agricultural risk exposure of national and state banks (due to other regulatory differences between national and state banks) must be controlled for if one wants to isolate the role of deposit insurance regulation in

41

promoting risk taking.[25]

Furthermore, the definitions of "bank failure" may differ across these studies in ways that are not always clear. In analysing bank failures, I restrict attention to involuntary liquidations of banks. Sometimes banks suspended operations, and reopened; other times banks were acquired by other institutions; and, finally, banks could choose to close while still solvent. The withdrawal of a bank, therefore, may reflect very different events with different social costs. Suspensions, consolidations, and voluntary closings may have had social costs as well -- consolidations and closings may have reduced the supply of banking services in some areas, and suspensions were disruptive to the payments system. I focus on failures because they offer a clearer index of the costs of the crisis across states -- forced permanent departure of banks and depositor losses -- and provide a clearer measure of the risk-taking of banks, since closings, acquisitions, and suspensions often had explanations other than bank insolvency.[26] I also focus on average failure rates for several years, rather than perform a year-by-year comparison across states. Differences in state closure rules (in particular, the long delay in closing insolvent banks by the Nebraska Guaranty Fund)[27] argue for this approach.

I examine three dimensions of the failure "performance" of banking systems: the rate of bank failure, the severity of bank failure -- measured as the ratio of claims on failed banks to

their remaining resources (excluding payments by insurance funds) -- and the efficiency of the bank-liquidation process, with emphasis on the roles of deposit insurance and branching regulations.

Bank Failure Rates

Table 20 provides data on average annual bank failure rates, by state and type of banking system, for various sub-periods from 1917 to 1929, for the sample of 32 agricultural-crisis states.[28] These data echo the substantial variation in economic fundamentals and banking system responses across states and types of banks that were visible in earlier tables. Clearly, the cotton belt and the grain-producing states suffered disproportionately during the 1920s. Table 20 shows the pitfalls of using the difference between state and national bank failure rates for a given state (as in Calomiris, 1989) as a measure of the role of deposit insurance. While it is true that the difference between state and national bank annual failure rates for 1921-1929 are greater for insured states than for uninsured states on average (1.4 percent for compulsory-insurance states, as compared to 1.0 percent for states without deposit insurance), this difference is positive for most states, presumably because of their smaller size and more liberal real-estate lending regulations.

Similarly, state comparisons across state-chartered systems reveal several cases where uninsured systems fared

43

worse than insured. The difference in annual failure rates

between uninsured (2.26 percent) and insured (2.92 percent)

state-chartered banking systems for 1921-1929 on average is

0.68 percent, but by varying the definition of region -- a

control used in Thies and Gerlowski (1989) -- one could easily

conclude from such simple comparisons that insured state-

chartered banks had lower failure experiences than uninsured

state-chartered banks. For example, one could define Texas and

Oklahoma to be in the same region as Arizona and New Mexico or

define Mississippi to be in the same region as Alabama,

Georgia, Louisiana, and South Carolina.

Regional distinctions, of course, are intended as rough

proxies for economic environments under which banking systems

operate. Thus, rather than experiment with different

definitions of economic regions, I include measures of economic

environment directly in weighted-least-squares regressions to

capture the marginal effects of deposit insurance on bank-

failure propensities.[29] I refrain from reporting these results

because I found that, depending on the precise mix of control

variables one uses, the measured impact of deposit insurance

(and the control variables) varied greatly and were typically

positive and insignificant.[30] In other words, given the few

degrees of freedom available, regression results seem unable to

deliver much information on the contribution of deposit

insurance to bank failure propensities. The only robust

findings from this analysis were the strong positive

44

association between commercial failure rates and bank failure rates, and the strong negative relation between average bank size and bank failure rates.

Perhaps the best evidence of excess failure rates for insured banks remains the simple comparison of failure propensities of insured and uninsured state-chartered banks operating in Kansas.[31] Kansas provides a unique "controlled experiment" because it was the only state with a large number both of insured and uninsured state-chartered banks. The annual failure rate for insured banks in Kansas from 1921 to 1924 (prior to the mass conversions of banks to uninsured charters) is 1.90, compared to an annual failure rate of 0.67 percent for uninsured banks.

Bank Failure Severity for Insured and Uninsured Systems

It would be a mistake to place too much emphasis on bank failure rates as indicators of the costliness of financial crises. Bank failures are discrete events; particularly severe financial crises force many banks to cross the threshold of failure. For this reason, bank system performance may be better gauged by the overall losses of depositors, rather than the propensity to fail, which may show relatively little variation.

Data exist with which to perform cross-state, cross-system comparisons of insolvent banks' asset shortfalls in the 1920s and thereby measure the average severity of bank failures across states. Complete data for insured banking systems are

45

provided in FDIC (1956), but data for the rest of U.S. banking

systems are only available for banks whose liquidations were

completed by 1930 (see Data Appendix). As Table 21 shows, for

some state-chartered systems only a small percentage of

liquidations that occurred during the 1920s were processed in

time to be included in this sample. The ratio of repayments to

total unsecured deposit claims from the limited sample in each

state is likely to be a biased indicator of the total sample;

for example, banks with higher losses might take longer to

liquidate.

Notwithstanding this problem, there is little room for

doubt that insolvent insured banks suffered worse asset

depreciation in the 1920s than state-chartered banks in other

states. The rates of shortfall for insured state banks, were

among the highest in the country, as shown in Table 21.

Regional comparisons are particularly telling. Consider the

difference between North and South Dakota's low ratios of

repayments from assets to total claims (17.2 and 24.1 percent,

respectively) and their neighbors' ratios: Montana (51.9),

Idaho (47.4), Wyoming (53.7), Colorado (68.1), and Minnesota

(48.2). A comparison of insured banking in Nebraska (35.4)

with Iowa (53.6), Missouri (52.6), Colorado, and Wyoming is

similarly revealing.

Kansas, Oklahoma, Texas, and Mississippi showed ratios

more similar to the average experience of their neighbors.

Significantly, two of these were voluntary-insurance states,

46

and Texas' exceptionally high required capital ratio may have played a role here, as well.

Oklahoma's compulsory insurance system lasted only until 1923, and thus should have had a relatively small influence on failure propensity for the 1920s as a whole. As current critics of deposit insurance emphasize, much of the losses that occur in an insured system reflect responses by banks to adverse shocks that reduce bank capital and magnify the incentives for risk taking (see Kane, 1988; and Calomiris and Kahn, 1989). By closing its system early in the 1920s Oklahoma may have avoided this magnification of risk taking.

Mississippi had the lowest rate of asset shortfall of the five compulsory-insurance states, as well as the lowest rate of bank failure for that group by far for the period 1921-1929. Mississippi's special experience may reflect, in part, the circumstances of its creation. The Mississippi deposit insurance law was passed in response to the state banking crisis of 1912-1913, induced by the destruction of cotton crops in those years by the boll weevil. The relatively low failure rate and degree of asset shortfall in Mississippi during the 1920s may indicate simply that many of the most vulnerable banks in that state had collapsed prior to the period of deposit insurance coverage, leaving surviving banks that on average were less likely to use deposit insurance protection to promote high-risk agricultural expansion. That is, larger, more urban banks were more likely to survive the attack of the

47

boll weevil. Entry by new banks seeking to take advantage of deposit insurance was notoriously difficult in Mississippi, as well, due to the strict chartering standards set by the state's regulators.[32] Thus Mississippi seems to have avoided the failure rates of the other compulsory systems mainly because its insurance system was enacted after a major agricultural depression, and because its regulators prevented the entry of small rural unit banks that were so common in the other insured states. This view is consistent with the relatively large average size of banks in 1918 and 1920 in Mississippi, relative to its neighbors, or relative to other insured banking systems (see Table 7).

Inefficient Bank Liquidation Procedures in Insured States

A final interesting difference between insured and uninsured banking was the efficiency of the liquidation procedures. Delays in winding up the operations of banks impose costs of illiquidity and forgone interest on depositors, apart from the ultimate larger losses due to asset shortfalls. Delays in closing banks, or in final liquidation of closed banks, also may afford insolvent bankers greater opportunities for risk taking or fraudulent behavior.

On average, for the United States as a whole during the 1920s, it took 3 years and 11 months for state-bank liquidations to be completed, and for national banks it took 4 years and 2 months. In the five compulsory-insurance states

48

time delays for insured state banks were much longer than for state banks in other states, and much longer than for national banks in those states (see Table 22). In Nebraska, state-chartered banks that were liquidated before 1930 took an average of 6 years and 4 months to be liquidated, compared to 4 years and 9 months for national banks. In North and South Dakota state-bank liquidation delays averaged 6 years and 3 months, and 5 years and 7 months, respectively, compared to 4 years, and 4 years and 8 months, for national banks in the respective states. In Oklahoma, delays averaged 5 years, compared to 3 years and 8 months for national banks. Voluntary-insurance systems showed roughly comparable average delays to national banks operating within the same states, as did virtually all other agricultural-crisis states.[33]

What can explain this phenomenon? Others have noted that deposit insurance systems redeemed the losses of depositors slowly and partially, owing in part to the limited resources of the funds (see ABA, 1933; and FDIC, 1956), but these data reveal that even the liquidation of failed banks was more protracted in the insured systems than otherwise. One explanation for the inordinate delays is political. Perhaps solvent banks and bank regulators sought to delay insolvent bank asset liquidation to limit the rate of increase of the obligations of the guarantee funds. The evidence of delayed closure of banks, especially in Nebraska, is consistent with this interpretation of delayed liquidation. This is akin to

49

the FSLIC's recent policy of delaying the closure of insolvent savings and loans, purportedly at the behest of members of Congress or Savings and Loan owners themselves.[34] State politicians of the 1920s may have acted similarly, and clearly solvent banks had a motive in encouraging delays, as this would have given them an opportunity to switch charters in anticipation of increasing obligations and assessments. Whether political motives or other factors explain delays in closures and liquidations must await further historical research into the process of bank liquidation in these states.

The Unusual Survivability of Branching Banks

In section III, I established that branch banking flourished in response to the crisis of the 1920s in states that allowed branching. While it is likely that the physical costs of entry of branches was lower than unit banks in many cases, another dimension of the advantage to branching -- one that was particularly noted by contemporaries in the 1920s -- was that branching banks suffered lower risk of failure.

References to this phenomenon were quite common, (e.g., Cartinhour, 1931). The Congressional hearings of 1930 on "Branch, Chain, and Group" provided data that allow some quantification of the lower risks of branch banking in the U.S. during the 1920s. From 1921 to 1929, only 37 branching banks operating 75 branches were liquidated. More than two-thirds of these banks operated a single branch, and no more than 6 of

50

them operated three or more branches.[35] In 1924 714 banks

operated 2,293 branches. Thus only 112 of the 3,007 branch

banking facilities in existence in the middle of the decade, or

roughly 4 percent of branching facilities, failed over the

entire decade.

Of course, national comparisons can be misleading.

California and other states that were relatively prosperous

during this period account for a large percentage of branching

facilities. In 1924, the 32 agricultural-crisis states

contained 1,312 of the 3,007 branch banking facilities. But

even if all branching failures had been concentrated in these

states during the 1920s, the annual rate of branch-banking

facility failure would be only 0.85 percent. This is a very

low rate of failure compared to those of state systems on the

whole. Only four state-chartered systems had lower failure

rates than 0.85 -- Illinois, Michigan, Ohio, and

Nevada -- and none of these states was among those most

affected by the crisis; for example, they all had below-median

farm foreclosure rates (see Table 3).

In some cases, specific within-state comparisons are

possible. In the states that prohibited new branching from

1924 to 1928, but allowed branching banks to continue to

operate branching (Alabama, Arkansas, Indiana, Minnesota,

Nebraska, Washington, and Wisconsin), branch-bank failures can

be derived from the difference between the number of branches

in operation in 1928 and the number in operation in 1924.[36] In

this sample of seven states, 28 branching banks operated 58 branches in 1924; and 26 branching banks operated 53 branches in 1928, for a remarkably low annual failure rate (for all facilities) of 0.02 percent.

Finally, for other states, branch-bank failure experiences can be gleaned from data on bank "disappearances," using The Bankers Encyclopedia to trace the presence or absence of banks from 1920 to 1929. In all cases, a careful review of entries revealed whether disappearances were due to acquisitions or to closings. I traced the entries for the branching banks of three states over this period: Arizona, Mississippi, and South Carolina. These states were chosen because they experienced high rates of bank failure, had a small number of branching banks (making data collection easier), and because branching banks in these states operated branches mainly outside their home city. In Mississippi, all 24 branches in operation in 1920 were located outside their banks' home cities. The same was true of Arizona's 20 branches in operation in 1920. In South Carolina, 13 out of 15 branches operated outside the home city. These banks, therefore, provide a useful measure of the potential advantages of statewide branching during a crisis.

Arizona permitted statewide branching throughout the period. In Arizona in 1920, 8 banks operated 20 branches. By 1929, 2 of these (each operating one branch) had been acquired by larger branching banks. One of the branching banks (operating one branch) failed. In the interim, three new

branching banks had entered, which explains the stability in the total number of branch banks (see Table 17). The average annual failure rate for total branching facilities, therefore, was 1.6 percent for 1921-1929, compared to 4.3 percent for the state-chartered banks as a whole.

Mississippi had allowed branching outside home cities, but later prohibited branching, except for the establishment of limited agency facilities within home cities. Nevertheless, the existing statewide branches were permitted to continue operating. During the 1920s none of the 10 branching banks operating 24 branches failed, while the average annual failure rate for state-chartered banks as a whole was 1.4 percent.

In South Carolina from 1920 to 1929, 4 out of 8 branching banks in operation in 1920 closed, but all of these were banks that operated a single branch, and 2 of the 4 operated branches within their home city. Thus of the 23 towns or cities in which branch banking facilities were located, 19 retained their branch-banking facilities. This is important since the lack of available banking facilities in thinly populated areas (where virtually all branches were located in Arizona, Mississippi, and South Carolina) increases transactions costs in those locations and can inhibit the flow of capital to worthy enterprises located there. The overall failure rate of existing branching facilities in South Carolina was 2.9 percent, compared to a rate of 4.9 percent for all state-chartered banks.

Entry into branch banking was especially strong in South Carolina, and entrants apparently learned the importance of establishing multiple branches. Two new entrants -- The Peoples Bank of South Carolina and the South Carolina Savings Bank -- entered during the 1920s and established 18 and 9 branches, respectively, operating outside their home cities.

The lessons of the high survival rates of branching banks during the crisis apparently were not lost on bankers. As Table 17 shows, and these examples confirm, in states where branching was allowed, it flourished and increasingly took the form of multi-branch banks, where that was allowed. Four of the eight states that had enacted deposit insurance legislation prior to the 1920s passed laws in the aftermath of the crises of the 1920s and 1930s allowing branching. By 1939, North Dakota had provided for limited branching, and Mississippi had reversed its previous prohibition on new branches to allow limited branching as well. South Dakota and Washington permitted full statewide branching. For the U.S. as a whole, 19 states allowed full branch banking, and 17 allowed limited branching, compared to 12 statewide and 6 limited branching systems in operation in 1924.[37]

Unfortunately, policymakers in many agricultural unit banking states did not change their approach to branch banking following the debacle of the 1920s and 1930s. Thus the 1980s saw a repeat of the same patterns of high unit bank failure rate in states hit by the agricultural crisis of 1980-1985. As

in the earlier period, branching banks weathered the storm far better than unit banks. In California, for example, despite relatively high farm-loan delinquency rates and loan charge-offs, only one bank failed during the crisis (see Calomiris, Hubbard, and Stock, 1986, p. 469).

V. LESSONS FOR POLICY IN PRICE-SENSITIVE LDCs

It has been widely known that deposit insurance systems enacted in the 1920s failed ex post to offer sufficient and timely protection to depositors, or the payments system more generally. In this paper I have shown that deposit insurance created costs as well. It provided incentives for excess risk taking by banks and hampered banking system recovery from the agricultural crisis because of the costs to solvent banks of remaining in the insured banking system. The excessive growth of the halycon days of 1914-1920 was matched by the excessive failures of banks and declines in banking operations of insured states in response to the crisis.

Voluntary insurance systems provided less coverage than insured systems. In the extreme case of Washington's free-exit policy, there was virtually no insurance protection. The positive aspect of the failed voluntary plans, however, was that the limits on depositor protection also limited the cross-subsidization of risk among banks. This explains the differences between the observed responses to voluntary and compulsory insurance.

55

During the boom voluntary-insurance systems grew less than compulsory-insurance systems, but more than did unit-banking state systems without insurance plans. Voluntary-insurance states were also intermediate cases with respect to failure rates and liquidation delays. Branching banks suffered much lower risks of failures and enjoyed disproportionately high rates of growth and entry during the 1920s, relative to unit banks, in states that permitted branching, especially those that allowed branching outside the home city of the bank. Thus from the standpoint of desirability of outcomes during the 1920s the various regulatory regimes could be ranked (in descending order) as follows: full statewide branching, limited branching, uninsured unit banking, voluntary-insurance unit banking, and compulsory-insurance unit banking.[38]

The contrast between the effects of branch-banking regulations and deposit-insurance regulations is ironic, since the two regulatory choices were viewed as alternative solutions to the problem of providing banking-system stability, without sacrificing banking services in remote areas, during the years of active bank regulatory reform after the Panic of 1907 (White, 1982 and 1983).[39] The history of the 1920s reveals that branching and deposit guarantee in fact had opposite effects with respect to generating banking stability. From this perspective, an added cost of deposit insurance legislation was that it was incorrectly perceived as an alternative to branch banking, and thereby helped to perpetuate

56

unit banking.

Proponents of deposit insurance, however, might argue that it was the manner in which deposit insurance was implemented, not insurance per se, that caused systemic collapse in the 1920s. They might argue that higher capital requirements, better supervision, risk-based insurance premia, and government financing of the insurance fund might have produced a better result. Clearly with high enough capital requirements and sufficiently strict entry barriers (as in Mississippi), the moral hazard and adverse selection problems of deposit insurance will be reduced and may disappear, but at the expense of higher financing costs to banks, and less entry of banking into peripheral areas. Elsewhere (Calomiris, 1989) I have argued that a more successful, efficient, and historically proven reform of deposit insurance would be to move to a mutual-guarantee system of self-regulating branching banks, in which the governments' main role would be to define membership criteria for mutually insuring groups of banks. Such systems were extraordinarily successful in dealing with financial panics during the pre-Civil War years in the U.S., while providing access to affordable loans in peripheral areas. Unlike virtually all government deposit insurance regulators, banks regulated and monitored one another effectively, discovered and corrected unsound banking practices quickly, and kept the payments system operating smoothly in the face of financial crises.[40] Evidence of similarly successful self-

57

regulating systems in other countries is provided in Bordo and Schwartz (1989) and Pope (1989).

A possible objection to this approach is the difficulty of banks as a group to insure themselves against very large disturbances because of limited aggregate banking capital. In such circumstances, a systemic collapse could occur. Furthermore, given this possibility it might be impossible for the government to commit credibly to allowing the banking system to fail. Knowledge of this implicit guarantee may provide incentives for risk taking.

I have two responses to this objection. First, if an economy is prone to shocks of this magnitude it may be that deposit insurance is inadvisable altogether. Why should not banking capital in aggregate be allowed to fall drastically at a time when the investment opportunities of an economy have been so devastated? In the presence of free entry and branch banking, one would expect new banks or branches to arise to take the place of failed ones, as in Arizona and South Carolina in the 1920s. Furthermore it seems inadvisable for an economy so devastated by a terms-of-trade shock to attempt a banking-system rescue, particularly in a developing economy that relies on indirect (often financial) taxation to finance such bail-outs. It might be more advisable to act in advance to subsidize new industries with an eye toward diversifying the economy, rather than focus on banking system solvency as a panacea. The fundamental problem of such an economy, after

58

all, is not its financial system, but its economic base.

My second response to the supposed need for government-financed and government-regulated deposit insurance is an empirical one. In most cases during the 1920s aggregate banking capital within each state would have been sufficient to repay losses to depositors of failing institutions -- and thus mutual-guarantee, self-regulating systems operating even at the state level would have been feasible.

Table 23 reports total deposits of suspended banks (deposits of failed banks are not available) aggregated by state from 1921 to 1929 for national and state banks in the 13 states with the largest total bank failure rates and provides estimates of the total shortfall of assets in failed banks of each type. A rough indication of the rate of asset shortfall for national- and state-chartered banks that failed in these states can be derived from Table 21, although as already noted these data are imperfect indicators. To obtain an estimate of total asset shortfalls I multiply the total deposits of suspended banks by the shortfall rate from Table 21 (one minus the repayment rate) and multiply this product by the ratio of failed banks to suspended banks. As Table 23 shows, in many states, the number of bank suspensions far exceeded the number of bank failures, because banks were sometimes reopened or acquired rather than being placed in receivership. A comparison of the average size of failed banks (estimated using data on completed liquidations) and average size of suspended

59

banks revealed that larger banks were more likely to avoid
liquidation after suspension. Thus I adjusted for the average
size difference between suspended and liquidated banks in
estimating the total asset shortfalls. To summarize, the
estimated shortfall of assets (the difference between depositor
claims and receipts from asset liquidation) is given by the
product of four terms: total deposits of suspended banks, the
ratio of liquidations to suspensions, the shortfall ratio
(estimated using data from completed liquidations), and the
ratio of the average size of liquidated banks to the average
size of suspending banks (again, estimated using data from
completed liquidations).

These estimates appear in Table 23 for state- and
national-chartered banks. The level of bank capital plus
surplus (bank equity) of solvent banks in 1930 is provided for
comparison. Only 3 of the 13 states show a ratio of shortfall
to bank equity approaching or above unity: Nebraska, North
Dakota, and South Dakota. For all other states banks as a
whole would have had sufficient capital to support failing
banks. The national banking failures in all the states could
have been absorbed by surviving national banks, and state-
chartered systems could have covered losses of failed banks in
every state except Nebraska, North Dakota, and South Dakota.
These three state systems, however, suffered bank losses
several times the size of remaining state banks' equity.
Significantly, these were the only states that had compulsory

60

insurance for most of the 1920s (this criterion excludes Oklahoma), and that also allowed substantial entry by new banks (this criterion excludes Mississippi). These states had foreclosure rate and land depreciation experiences comparable to several other states (see Table 3) --notably Montana, Georgia, and South Carolina -- but none of these other states' state-chartered systems approached the banking losses relative to remaining equity of the three long-lived, compulsory-insurance systems.

This evidence supports the evidence from balance sheet data and the evidence on failure rates and failure severity reported above. Moreover, it supports the argument that, absent compulsory deposit insurance (and free entry), the fundamental disturbances experienced in these states would have had very different consequences for their banking systems. If statewide branch banking had been permitted within these states, bank failures would have been even lower, and the entry of banking capital during the 1920s would have been higher. Moreover, in a mutual-liability, self-regulating system of banks (like that of three states in the pre-Civil War era) bank risk taking would have been substantially circumscribed by self-imposed regulations and vigorous supervision of other banks.

Of course, no degree of regulatory wisdom could, or should, have made the 1920s a profitable time for banks in agricultural regions affected by drastic declines in prices and

land values. In the face of these shocks, some failures were
inevitable. What regulation could have done, but did not do,
was make the system as a whole less susceptible to shocks and
more resilient in its response to failures.

NOTES

1. For a discussion of the behavior of Southern branching banks during the Panic of 1837 and the Panic of 1857, see Calomiris and Schweikart (1988).

2. Of course, there will still be a need for a properly designed monetary authority and lender of last resort to manage the money supply, but this is separate from the question of insuring banks.

3. Of course, any government transfer program must be financed somehow, and this gives rise to additional costs. Raising revenue, either through direct taxation or money creation, can have important adverse allocative consequences. Indeed, as McKinnon (1973, 1988) and others (see Fry, 1988 for a review) point out, in less-developed economies, the need to raise revenue often places a disproportional burden on the banking system. Reserve requirements and mandated loan subsidies are among the means to tax financial intermediaries. The ease of enforcing these taxes, and their indirect nature presumably have made them a desirable means of raising funds for governments with little power to impose or enforce direct taxation. The fact that governments in less-developed economies need to rely on banks as a source of finance may limit the ability of the government to bail out banks. I return to this point in the concluding section of the paper.

4. As White (1983) has shown, these points are related. Banks wishing to locate in rural areas were more likely to choose a state charter, presumably because of the less restrictive provisions for making loans on agricultural real estate.

5. The sector-specific crisis of the 1920s was followed by the general Depression of the early 1930s. The dust storms of 1934-1935 kept agriculture from sharing in the general recovery of 1933-1937. These factors combined to produce a period of agricultural depression that lasted for some fifteen years.

6. Alston (1983), p. 886.

7. Foreclosure data are provided in Table 3. These data are not identical to those reported in Alston (1983), for two reasons. First, 1928 rather than 1930 is used as a benchmark for the number of farms operating from 1926 to 1930. Second, and more important, Alston only subtracted "croppers" from the total number of farms to estimate the number of farms at risk of foreclosure; my estimates subtract all farms operated by tenants, not only "croppers." This alternative definition is

63

meant to capture better the relevant population of farmers
subject to foreclosure risk, assuming that tenant-run farms
typically are owned by individuals who operate their own farms,
as well.

8. It is also important to note that the threat to the
financial viability of farms and farm lenders from a given
decline in income or wealth depends in a non-linear fashion on
the rapidity of the decline and its persistence. Two
consecutive years of drastic price and income reductions may
produce far more bankruptcies than a similar decline amidst
intervening good years, or a similar overall decline spread
over a longer period. This is especially true when a rapid
decline follows a boom period -- farm leverage, having first
been increased by borrowing during the boom becomes further
increased by reductions in farm values during the bust,
precisely at a time when the cash-flow necessary to meet debt
service requirements is reduced. For evidence on the
importance of such non-linearities see Rucker and Alston
(1987).

9. See Goldenweiser et al. (1932), vol.5, pp. 205-207.

10. See, for example, the discussion of large urban bank
reactions to deposit insurance in cities such as Chicago and
Philadelphia in White (1983), pp. 191-197.

11. Specifically, in Oklahoma and Kansas interest rates were
limited to 3 percent; in Texas deposits bearing any interest
would be exempt from insurance; in Mississippi and South
Dakota interest rates were limited to 4 and 5 percent,
respectively; and in North Dakota and Washington interest rate
limits were set by the Guaranty Boards. Summary tables of
these and other regulations are provided in White (1983, pp.
210-11) and Calomiris (1989, p. 18).

12. Evidence of this phenomenon can be found in numerous
historical studies of the operations of bankers under deposit
insurance. For example, see Robb (1921).

13. In Oklahoma and Kansas, trusts were not admitted to the
insured system, which further discouraged large urban banks
from joining.

14. Oklahoma's first bank failure, that of the Columbia Bank
and Trust, was a clear case of speculative expansion through
loans to the oil firms owned by the banker, W. L. Norton. For
details, see Robb (1921), pp. 50-53.

15. See Fenstermaker et al. (1984) and Schweikart
(1987).

64

16.   The data in Table 12 are end-of-year, unlike the other
tables which are end-of-June.   Thus, the peak in Table 12
occurs in 1919, rather than 1920.

17.   For the 48 contiguous states the correlation between the
ratio of capital to assets and the average size of banks is
strongly negative.   For state-chartered banks the correlation
in 1920 is -0.47 (significantly different from zero at the 99
percent confidence level); for national banks the correlation
in 1920 is -0.43 (significant at the 97 percent confidence level).

18.   See FDIC (1956), pp. 55-58.

19.   Some of this exceptionally high banking growth in these
states reflects favorable economic fundamentals.   As Table 1
shows, livestock prices rose rapidly in the late 1920s relative
to grain prices; thus livestock-dependent states like Wyoming,
Idaho, and Arizona should have seen more banking recovery.   In
regression results that follow, I control for economic
environment to isolate the role of regulatory regimes in
promoting banking growth.

20.   Lee Alston has suggested to me that the increased use of
automobiles may have permitted greater bank consolidation, as
well, by reducing the need for banks to be located in thinly
populated areas.

21.   The reduced riskiness of branch, as opposed to unit, banks
is established in section IV, where I show that branching banks
were less likely to fail during the 1920s than unit banks.   See
also Cartinhour (1931), Schweikart and Doti (1989, chapter
III), and White (1983), pp. 218-219.

22.   In Georgia, one of the largest banks in the state,
operating 30 branches, failed.   According to Cartinhour (1931,
p. 307), the cause of this failure was "poor management."

23.   The Federal Reserve's agents used their own judgment in
determining whether banks under a single holding company operated
under centralized control.   While they attempted to provide an
exhaustive survey of bank practices, sometimes the agents found
that "neither the power to exercise such control nor the amount of
control actually exercised [could] be determined."   See Board of
Governors (Dec. 1929), p. 766.

24.   Data on chain bank failures have not been collected in a
consistent or thorough manner, but evidence reported in Chapman
(1934), and other examples of the collapse of large chains
indicates that unit banks belonging to chains were not
insulated from shocks as were branch banks.   The failure rates
of branching banks are discussed in section IV.

25. Thies and Gerlowski (1989) provide a detailed discussion of the Oklahoma experience, and describe regression results showing that insured state systems had a 0.7 percent higher propensity to fail on average than uninsured state-chartered systems, for the period 1921-1929. A separate regression for national banks found no significant difference for national banks in the insured states. While the authors do control for "time, region, and urbanization" (specific results and explanation of data are not provided), this is insufficient to capture differences across states in fundamental disturbances.

26. The distinction between failures and suspensions is empirically important. Their incidences often differed greatly, and the fraction of suspended banks that reopened differed across states and chartering systems. A cross-sectional analysis of these differences remains a topic for future research. Thies and Gerlowski (1989) seem to have used suspensions as their measure of bank failures.

27. See FDIC (1956), p. 69

28. These are calculated using the banks in existence immediately prior to the period of failure as a scale variable (denominator) in the calculation. As noted above, insured banks sought to avoid rising assessments, and converted to national charters (as shown in Table 17). This avoids exaggeration of failure rates due to voluntary exit by banks that arises when the average number of banks in existence over the whole period is used instead as the denominator. Using either measure there is an adverse selection problem to consider in measuring failure rates of different systems within the same state. Early failures in the insured system could lead insured banks to exit to the other available systems, and thereby raise the subsequent observed failure rates for national and uninsured state banks. This means that observed differences in failure propensity provide _a fortiori_ evidence of greater riskiness of insured banks. Empirical evidence, however, indicates that the movement of banks from one system to another did not have an important effect on bank failure rates. For example, compare failure rates for national and state banks reported in Table 21 for the periods 1921-1924 and 1925-1929 for Kansas, North Dakota, Oklahoma, Mississippi, and Texas -- all states with a substantial rate of conversion from state to national charters. In two cases (Mississippi and Oklahoma), national bank failure rates fell in the later period; in the other three cases, they rose slightly.

29. Weighted least squares is the appropriate regression technique in circumstances where aggregate failure rates are compared across different samples. I used the log-odds ratio (the log of $p/(1-p)$) as the dependent variable in the

66

regressions to control for truncation bias, where p is the probability of failing, measured by the proportion of banks failing. For a more complete description of the weighted-least-squares technique and its applicability to this case, see Maddala (1984), pp. 28-30.

30. The variations I experimented with included: whether to include Mississippi with the other compulsory-insurance states (given its stricter entry requirements, discussed below); whether to pool national- and state-chartered banks, estimate them separately, or allow their coefficients to differ within a pooled regression; whether to include the ratio of capital to assets and the average size of banks in the regressions; and whether to use commercial failures, real-estate loans, and land price declines, by themselves, or interacted with farm-population proportion and bank real estate loan holdings, as control variables.

31. See also ABA, 1933; Calomiris, 1989; and Thies and Gerlowski, 1989. The inability to separate unincorporated and incorporated state bank failures in Texas and Washington makes a similar comparison impossible for those states. Also, the small number of uninsured banks in Texas, and the short duration of insurance in Washington make such comparisons less interesting.

32. ABA (1933), p. 22 and Robb (1921), pp. 165-170 argue that Mississippi maintained exceptionally high standards for admission of new banks. For example, ABA (1933) writes that "the banking authorities in Mississippi had full discretion in the matter of granting new charters and used it liberally in refusing permission for unneeded banks or to unqualified promoters to open new institutions."

33. For sources see Data Appendix.

34. For a discussion of the costliness of these delays in liquidating Savings and Loans see Barth et al. (1989).

35. U.S. House of Representatives (1930), volume I, p. 462.

36. Georgia is not part of this group because it prohibited new branch banking only in August 1927.

37. See Chapman and Westerfield (1942), pp. 126-130.

38. Note that I am not arguing that insurance systems should allow voluntary exit. I would argue, however, that since none of the insurance systems succeeded in providing payments system protection, voluntary insurance was superior to compulsory insurance in the 1920s because it engendered less loss.

39. Not only does branching lead to a more stable banking system; it also increases the ability of banks to meet the banking needs of peripheral areas. Using current county-level data from the U.S., Evanoff (1988) shows that branch banks provide a far superior means of servicing remote areas than unit banks. Holding demographic factors constant, branching increases the number of banking offices per square mile by 65 percent.

40. Ideally, such a system would allow branching, as well. In the absence of freedom to branch the large number of unit banks creates a problem, as noted in Calomiris (1989). For mutual guarantee systems to be effective they must be small enough to make interbank monitoring worthwhile to individual banks. Systems of hundreds of mutually liable banks entail trivially small marginal gains to monitoring the behavior of another bank. An alternative would be separate smaller groups of mutually liable unit banks. A second problem that arises in either the branching or unit banking versions of the mutual-guarantee system is the potential for banks to abuse their self-regulatory power to inhibit competition. To prevent this, the government should create more than one group of banks, and define group membership in a manner than encourages inter-group competition. For example, in a unit-banking mutual-guarantee system (where local monopolies may arise) groups should overlap geographically.

DATA APPENDIX

Income and Price Data

Data on indices of gross income by type of farm product reported in Table 1 are taken from Strauss and Bean (1940), p. 31. Data on income -- farm and non-farm, gross and net -- and farm and non-farm population are taken from Leven (1925), pp. 192-209, 259. The state-specific crop price index is defined as the relative price in 1924 of the bundle of crops sold in 1919. These data are reported in U.S. Department of Commerce (1927), passim. Data on the value of crops sold, by state, was compiled by the Bureau of Agricultural Economics, Department of Agriculture, and reported in U.S. Department of Commerce, Statistical Abstract of the United States, various years.

Farm Land Values, Mortgages, and Foreclosures

Data on farm real estate values per acre, total real estate value, and amount of farm mortgage debt are provided in Clifton and Crowley (1973). Farm foreclosure data are from Stauber (1931).

GNP Deflator Estimates

Alternative annual estimates of the GNP deflator, reported in Table 4, are from Balke and Gordon (1989) and Romer (1989).

Branch and Chain Banking

Data on state branching regulations, numbers of branch banks
and their branches, and banking chains are taken from Board of
Governors (1924, 1926, 1927, Feb. 1929, Dec. 1929).

Bank Balance Sheet Data

Bank balance sheet data, and total numbers of banks,
disaggregated by state and by type of charter are taken from
Board of Governors (1959), and -- for insured banking systems--
from FDIC (1956), pp. 66-67.

Locations and Survival of Individual Banks

Data for individual banks, and bank locations, are taken from
Bankers Encyclopedia Co., various years.

Numbers of Bank Liquidations

Liquidations of national banks are reported in the Annual
Report of the Comptroller of the Currency. State-bank
liquidations for each state were published in the Comptroller's
Annual Report, as well. The definition of banks employed in
Board of Governors (1959) is used to construct state-level
series for failed "state" banks. This definition includes
trusts and unincorporated banks, as well as narrowly defined
state-chartered banking corporations. It is not possible to
derive consistent series of narrowly defined state-chartered
bank balance sheet or failure data using these sources.

70

Charter Switching

Data on bank charter switching are taken from Board of Governors (1937), pp. 1087-1122.

Business Failures

Business failures and number of solvent enterprises for each state are reported in U.S. Department of Commerce, <u>Statistical Abstract of the United States</u>.

Number and Deposits of Suspending Banks

The number and deposits of state and national bank suspensions are reported in Board of Governors (1943), pp. 286-291. These are used to derive the average size of suspended banks in Table 23.

Data on Liquidated Banks

Data used in Tables 21-23 on the number, deposits, losses, and time taken to liquidate banks for which liquidations had been completed by 1930 are reported in Goldenweiser et al. (1932), vol. 5, pp. 191-207.

71

REFERENCES

Alston, Lee J., "Farm Foreclosures in the United States During the Interwar Period," <u>Journal of Economic History</u>, vol. 43, December 1983.

American Bankers' Association, <u>The Guaranty of Bank Deposits</u>, New York, 1933.

Balke, Nathan S. and Gordon, Robert J., "The Estimation of Prewar Gross National Product: Methodology and New Evidence," <u>Journal of Political Economy</u>, vol. 97, February 1989.

Bankers Encyclopedia Co., <u>The Bankers Encyclopedia</u>, New York, semi-annual.

Barth, James R., Bartholomew, Philip F., and Labich, Carol J., "Moral Hazard and the Thrift Crisis: An Analysis of 1988 Resolutions," Research Paper No. 160, Federal Home Loan Bank Board, May 1989.

Bernanke, Ben S., "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression," <u>American Economic Review</u>, vol. 73, June 1983.

Board of Governors of the Federal Reserve System, <u>All Bank Statistics</u>, Washington D.C., 1959.

Board of Governors of the Federal Reserve System, <u>Banking and Monetary Statistics</u>, Washington D.C., 1943.

Board of Governors of the Federal Reserve System, "Changes in the Number of National and State Banks During 1921-1936," <u>Federal Reserve Bulletin</u>, November 1937.

Board of Governors of the Federal Reserve System, "Branch Banking in the United States," <u>Federal Reserve Bulletin</u>, December 1924.

Board of Governors of the Federal Reserve System, "Branch Banking in the United States," <u>Federal Reserve Bulletin</u>, June 1926.

Board of Governors of the Federal Reserve System, "Branch Banking Developments June 30, 1928," <u>Federal Reserve Bulletin</u>, February 1929.

Board of Governors of the Federal Reserve System, "Branch and Chain Banking Developments: 1929," <u>Federal Reserve Bulletin</u>, December 1929.

Board of Governors of the Federal Reserve System, "McFadden Bill Now Law," <u>Federal Reserve Bulletin</u>, March 1927.

Bordo, Michael D. and Schwartz, Anna J., "The Performance and Stability of Banking Systems Under 'Self-Regulation': Theory and Evidence," Unpublished manuscript, 1989.

Brock, Philip L., "The Transmission of Terms of Trade Shocks in Latin America," Unpublished manuscript, Duke University, November 1988.

Calomiris, Charles W., "Deposit Insurance: Lessons from the Record," <u>Economic Perspectives</u>, Federal Reserve Bank of Chicago, May/June 1989.

Calomiris, Charles W., Hubbard, R. Glenn, and Stock, James H., "The Farm Debt Crisis and Public Policy," <u>Brookings Papers on Economic Activity</u>, vol. 2, 1986.

Calomiris, Charles W. and Kahn, Charles M., "The Role of Demandable Debt in Structuring Optimal Banking Arrangements," Unpublished manuscript, Northwestern University, 1988.

Calomiris, Charles W. and Kahn, Charles M., "Interbank Monitoring as Seignorage Sharing: The Suffolk System," Northwestern University, 1989.

Calomiris, Charles W. and Schweikart, Larry, "Was the South Backward?: North-South Differences in Antebellum Banking During Crisis and Normalcy," Unpublished manuscript, Federal Reserve Bank of Chicago, 1988.

Cannon, James G., <u>Clearing Houses</u>, Washington D.C., 1910.

Cartinhour, Gaines T., <u>Branch, Group, and Chain Banking</u>, New York, 1931.

Chapman, John M., <u>Concentration of Banking</u>, New York, 1934.

Chapman John M. and Westerfield, Ray B., <u>Branch Banking: Its Historical and Theoretical Position in America and Abroad</u>, New York, 1942.

Clifton, Ivery D. and Crowley, William D., Jr., "Farm Real Estate Historical Series Data: 1850-1970," U.S. Department of Agriculture, Economic Research Service, June 1973.

Comptroller of the Currency, <u>Annual Report</u>, Washington D.C., various years.

73

Cooke, Thorton, "The Insurance of Bank Deposits in the West," in George E. Barnett, State Banks and Trust Companies, Washington D.C., 1910.

Evanoff, Douglas D., "Branch Banking and Service Accessibility," Journal of Money, Credit and Banking, vol. 20, May 1988.

Federal Deposit Insurance Corporation, Annual Report, Washington D.C., 1956.

Fenstermaker, J. Van, Filer, J.E., and Herren, R.S., "Money Statistics of New England, 1785-1837," Journal of Economic History, June 1984.

Fry, Maxwell, Money, Interest, and Banking in Economic Development, 1988.

Goldenweiser, E.A., et al., Bank Suspensions in the United States, 1892-1931, Material prepared for the information of the Federal Reserve System by the Federal Reserve Committee on Branch, Group, and Chain Banking, 1932.

Gorton, Gary, "Clearing Houses and the Origin of Central Banking in the U.S.," The Wharton School, 1985.

Gorton, Gary, "Self-Regulating Banking Coalitions," The Wharton School, 1989.

Kane, Edward J., "How Incentive-Incompatible Deposit-insurance Funds Fail," Unpublished manuscript, Ohio State University, 1988.

Kareken, John H. and Wallace, Neil, "Deposit Insurance and Bank Regulation," Journal of Business, July 1978.

Leven, Maurice, Income in the Various States: Its Sources and Distribution, 1919, 1920, and 1921, New York, 1925.

Maddala, G.S., Limited-Dependent and Qualitative Variables in Econometrics, London, 1984.

McKinnon, Ronald I., Money and Capital in Economic Development Washington D.C., 1973.

McKinnon, Ronald I., "Financial Liberalization and Economic Development: A Reassessment of Interest-Rate Policies in Asia and Latin America," International Center for Economic Growth, Occasional Paper No. 6, 1988.

Pope, David, "Free Banking in Australia Before World War I," Unpublished manuscript, 1989.

Robb, Thomas B., _The Guaranty of Bank Deposits_, New York, 1921.

Romer, Christina D., "The Prewar Business Cycle Reconsidered: New Estimates of Gross National Product, 1869-1908," _Journal of Political Economy_, vol. 97, February 1989.

Rucker, Randal R. and Alston, Lee J., "Farm Failures and Government Intervention: A Case Study of the 1930s," _American Economic Review_, vol. 77, September 1987.

Stock, James H., "Real Estate Mortgages, Foreclosures, and Midwestern Agrarian Unrest, 1865-1920," _Journal of Economic History_, vol. 43, March 1984.

Schweikart, Larry, _Banking in the American South_, Baton Rouge, 1987.

Schweikart, Larry, and Doti, Lynne Pierson, _Banking in the American West from Gold Rush to Deregulation_, Unpublished Manuscript, University of Dayton, 1989.

Stauber, B.R., "The Farm Real Estate Situation," U.S. Department of Agriculture, Circular No. 209, Washington D.C., December 1931.

Strauss, Frederick, and Bean, Louis H., "Gross Farm Income and Indices of Farm Production and Prices in the United States, 1869-1937," Technical Bulletin No. 703, U.S. Department of Agriculture, December 1940.

Thies, Clifford F., and Gerlowski, Daniel A., "Deposit Insurance: A History of Failure," _Cato Journal_, vol. 8, Winter 1989.

U.S. Department of Commerce, _Statistical Abstract of the United States_, Washington D.C., various years.

U.S. Department of Commerce, _United States Census of Agriculture, 1925_, Washington D.C., 1927.

U.S. Department of Commerce, _Fifteenth Census of the United States_, Washington D.C., 1932.

U.S. House of Representatives, "Branch, Chain, and Group Banking," Hearings before the Committee on Banking and Currency, 71st Congress, Second Session (1930).

White, Eugene N., "The Political Economy of Bank Regulation," _Journal of Economic History_, March 1982.

White, Eugene N., _The Regulation and Reform of the American Banking System, 1900-1929_, Princeton, 1983.

75

White, Eugene N., "The Merger Movement in Banking, 1919-1933,"
Journal of Economic History, vol. 45, June 1985.

Woods, L. Milton, Sometimes the Books Froze: Wyoming's Economy
and Its Banks, Boulder, 1985.

76

Table 1

Indices of gross income, from various groups of farm products and from total farm production, crop years [1909-13=100]

Year	12 important crops[1]	Staple food-stuffs[2]	Fruits[3]	Dairy products, chickens, and eggs	Textile raw materials[4]	Meat animals slaughter and export of live cattle[5]	Meat animals adjusted for for changes in inventory values	Total farm production	Total farm production adjusted for changes in inventory values of meat animals
1910	99.8	93.2	101.6	100.3	105.3	99.7	96.1	101.4	101.5
1911	97.6	97.7	106.8	88.7	96.0	89.9	83.0	95.3	94.2
1912	102.4	101.0	108.5	101.5	99.5	95.2	92.7	102.1	102.4
1913	101.3	99.6	102.4	103.9	110.0	107.7	110.9	105.6	107.7
1914	102.4	131.3	109.0	105.5	77.0	107.5	117.3	106.5	110.6
1915	112.1	146.5	117.7	104.5	85.9	104.4	112.2	110.1	113.6
1916	143.3	154.6	126.0	117.1	134.3	129.0	133.1	134.2	136.9
1917	220.3	222.2	147.3	158.6	201.6	180.8	189.5	194.6	199.2
1918	239.5	284.2	189.2	191.7	231.9	242.7	232.8	231.5	231.3
1919	269.4	326.2	260.7	223.1	255.4	239.0	219.5	253.5	250.5
1920	177.5	252.7	269.4	241.6	136.5	186.6	173.6	204.0	202.3
1921	109.6	150.7	183.5	173.8	84.7	116.4	112.5	132.6	132.8
1922	132.9	140.5	222.3	167.0	135.6	129.1	126.5	146.3	147.0
1923	150.2	127.3	203.1	189.4	179.2	132.0	122.5	160.0	158.7
1924	167.9	162.0	222.8	191.3	195.4	135.8	118.6	169.6	166.1
1925	167.9	176.4	223.6	211.9	198.8	163.2	147.4	182.8	180.0
1926	142.4	176.8	231.5	223.8	145.6	172.8	163.5	178.0	177.3
1927	156.6	177.3	220.1	223.6	167.6	158.9	155.2	179.5	180.2
1928	147.0	144.9	221.0	234.9	170.6	163.6	164.1	180.4	182.4
1929	143.7	159.7	233.6	245.0	161.7	171.4	172.6	184.1	186.4
1930	87.5	106.8	184.4	205.7	90.3	146.5	147.6	141.0	143.0
1931	56.7	65.5	150.0	157.1	62.3	102.6	105.8	100.9	103.0
1932	50.5	51.9	102.9	119.8	53.1	68.2	73.4	76.7	79.0
1933	74.1	83.0	137.3	112.3	80.9	73.8	76.7	89.0	90.7
1934	71.2	73.4	145.6	126.0	87.0	86.0	64.8	95.0	89.7
1935	82.4	88.0	160.8	155.5	83.0	114.1	110.8	115.8	116.1
1936	110.3	116.3	166.5	160.8	107.1	139.2	130.3	133.1	132.0
1937	105.4	121.2	195.7	169.7	111.0	141.8	136.2	139.6	139.5

[1]Contained in the index of crop production of the Business of Agricultural Economies: wheat, corn, oats, barley, rye, buckwheat, flaxseed, hay, potatoes, sweetpotatoes, cotton and cottonseed, tobacco.
[2]Wheat, rye, potatoes, sweetpotatoes, dry beans, rice.
[3]Orchard fruits, citrus fruits, grapes.
[4]Cotton and cottonseed, flaxseed, wool.
[5]Slaughter of cattle, calves, hogs, sheep, and lambs, and export of live cattle.
Sources: See Data Appendix.

Table 2

Price and Income Changes Across States

	1919-1921 % Δ gross farm income	1919-1921 % Δ total net farm income	1919-1921 % Δ total net non-farm inc.	1919-1924 % Δ crop price index	1922-1925 % Δ value of crops sold	1925-1928 % Δ value of crops sold
Alabama	-44	-38	25	-29	2	-16
Arizona	-37	-26	14	-35	18	44
Arkansas	-44	-49	27	-33	1	-10
California	-24	58	82	-45	20	0
Colorado	-41	-19	56	-43	41	-24
Connecticut	-7	162	44	-36	-7	-19
Delaware	-39	-39	39	-34	13	-15
Florida	-35	8	51	-37	8	31
Georgia	-57	-78	20	-54	11	0
Idaho	-39	-58	20	-54	61	-22
Illinois	-50	-89	45	-45	11	-4
Indiana	-48	-101	23	-55	10	-14
Iowa	-50	-113	3	-50	5	3
Kansas	-45	-66	39	-32	9	19
Kentucky	-46	-32	51	-48	-10	-2
Louisiana	-47	-64	35	-43	-23	-43
Maine	-26	24	48	-65	-60	-65
Maryland	-42	-10	45	-45	-20	-45
Massachusetts	-14	111	53	-41	-35	-41
Michigan	-34	-6	27	-55	-23	-55
Minnesota	-48	-75	38	-34	-23	-34
Mississippi	-51	-54	17	-37	-25	-37
Missouri	-48	-116	42	-51	-14	-51
Montana	-30	NA	34	-47	2	47
Nebraska	-51	-92	16	-37	23	2
Nevada	-38	NA	53	-38	0	-3
New Hampshire	-12	222	40	-49	10	-39
New Jersey	-29	17	44	-51	8	-11
New Mexico	-37	40	47	-18	51	-6
New York	-25	35	61	-50	19	-36
North Carolina	-41	-40	29	-47	4	-9
North Dakota	-46	-39	69	-1	21	-16
Ohio	-44	-49	25	-56	11	-21
Oklahoma	-50	-76	14	-32	21	0
Oregon	-30	-32	29	-48	17	-13
Pennsylvania	-32	11	42	-46	23	-34
Rhode Island	-22	64	61	-48	18	-42
South Carolina	-56	-88	-6	-62	6	-14
South Dakota	-53	-101	-19	-36	3	-14
Tennessee	-39	-28	42	-39	-10	-6
Texas	-44	-63	37	-16	-15	27
Utah	-43	14	37	-50	43	-16
Vermont	-15	77	43	-44	1	-30
Virginia	-41	-36	32	-46	-5	-7
Washington	-21	-21	37	-55	41	-25
West Virginia	-33	1	43	-48	14	-22
Wisconsin	-30	1	40	-54	26	-26
Wyoming	-43	106	77	-34	28	1

Sources: See Data Appendix.

Table 3

Farm Land, Population, and Foreclosure Data

	1913–1920 % Δ value farm real estate per acre	1920–1925 % Δ value farm real estate per acre	1925–1930 % Δ value farm real estate per acre	1920 ratio of farm mortgage debt to farm value	1920 ratio of farm to total popul.	1926–1930 average annual farm foreclosure (per 1000)
Alabama	77	-11	-7	.12	.57	29.5
Arizona	65	-56	2	.20	.27	42.7
Arkansas	122	-20	-12	.11	.65	39.7
California	67	10	-2	.13	.15	16.3
Colorado	41	-31	-10	.17	.28	42.4
Connecticut	37	10	2	.13	.07	5.3
Delaware	39	-3	-1	.15	.23	13.7
Florida	78	75	0	.08	.29	11.1
Georgia	117	-40	-14	.08	.58	56.5
Idaho	72	-34	-6	.21	.46	37.6
Illinois	60	-27	-21	.09	.17	29.0
Indiana	61	-32	-22	.08	.31	23.8
Iowa	113	-34	-17	.16	.41	48.3
Kansas	51	-19	-2	.12	.42	27.2
Kentucky	100	-30	-9	.09	.54	20.2
Louisiana	98	-22	-6	.10	.44	40.1
Maine	42	2	0	.10	.26	10.5
Maryland	66	-5	-6	.13	.19	16.8
Massachusetts	40	8	-1	.13	.03	6.5
Michigan	54	-6	-9	.15	.23	21.6
Minnesota	113	-27	-16	.15	.37	36.2
Mississippi	118	-34	-10	.11	.71	47.7
Missouri	67	-30	-18	.14	.36	34.1
Montana	26	-37	-4	.22	.41	52.2
Nebraska	79	-32	-8	.13	.45	38.4
Nevada	35	-41	-3	.20	.21	21.0
New Hampshire	29	11	-2	.10	.17	7.3
New Jersey	30	24	1	.16	.05	7.2
New Mexico	44	-31	2	.13	.44	26.3
New York	33	3	-7	.16	.08	13.8
North Carolina	123	-7	-16	.06	.58	23.4
North Dakota	45	-28	-13	.19	.61	58.0
Ohio	59	-23	-18	.08	.20	16.4
Oklahoma	66	-20	-3	.16	.50	50.1
Oregon	30	-13	-3	.14	.27	17.4
Pennsylvania	40	-4	-6	.10	.11	6.9
Rhode Island	30	14	5	.08	.02	6.0
South Carolina	130	-34	-25	.07	.63	68.0
South Dakota	81	-37	-19	.13	.57	70.4
Tennessee	100	-19	-10	.09	.54	20.5
Texas	74	-14	-5	.12	.48	23.7
Utah	67	-20	-3	.16	.31	13.5
Vermont	50	-7	-2	.18	.36	10.6
Virginia	89	-7	-13	.07	.46	15.6
Washington	40	-17	-3	.13	.21	20.0
West Virginia	54	-8	-13	.04	.32	9.0
Wisconsin	71	-12	-10	.21	.35	22.6
Wyoming	76	-54	-2	.15	.34	26.3

Sources: See Data Appendix.

Table 4

GNP Deflator Estimates

	Balke and Gordon (1989)	Romer (1989)
1917	11.36	13.06
1918	13.35	15.20
1919	15.23	15.58
1920	17.58	17.75
1921	15.30	15.12
1922	14.22	14.30
1923	14.63	14.69
1924	14.64	14.51
1925	14.90	14.77
1926	14.98	14.84
1927	14.72	14.48
1928	14.60	14.59
1929	14.64	14.60

Sources: See Data Appendix.

Table 5

32 State Regulatory Regimes of the 1920s

	No deposit insurance	Compulsory insurance	Voluntary insurance
Full intrastate branching allowed	Arizona North Carolina South Carolina Virginia Wyoming[1]		
Limited new branches	Kentucky Louisiana Michigan Ohio Tennessee		
No new branching, old branches remain	Alabama Arkansas Georgia[2] Indiana Minnesota Wisconsin	Nebraska (1911-30) Mississippi (1914-30)	Washington (1917-21)
No branches allowed	Colorado Idaho Illinois Iowa Missouri Montana Nevada New Mexico	North Dakota (1917-29) Oklahoma (1908-23) South Dakota (1916-27)	Kansas (1909-29) Texas (1910-27)

---

[1]Branches authorized by implication; none in existence.
[2]New branching prohibited in 1927.

Sources: See Data Appendix.

Table 6

Number of banks

	National banks						State banks					
	1914	1918	1920	1923	1927	1929	1914	1918	1920	1923	1927	1929
Alabama	90	91	101	106	105	106	267	238	251	254	251	244
Arizona	13	18	20	20	15	14	47	60	67	55	32	34
Arkansas	57	72	83	88	79	73	425	389	404	403	376	347
Colorado	124	122	141	143	124	121	206	236	262	224	175	159
Georgia	115	97	93	97	83	80	675	659	686	586	412	362
Idaho	55	68	81	73	52	43	134	136	141	109	92	94
Illinois	463	469	480	505	490	487	1439	1434	1489	1416	1358	1319
Indiana	255	258	254	251	233	224	664	773	798	854	827	757
Iowa	341	352	358	349	287	265	1410	1561	1564	1506	1222	1129
Kansas	212	234	249	266	257	247	932	1037	1100	1068	923	830
Kentucky	143	132	134	139	142	138	467	444	450	474	444	432
Louisiana	31	31	38	34	32	33	217	218	229	232	200	193
Michigan	99	105	112	119	134	133	702	740	739	765	739	718
Minnesota	273	294	331	344	277	272	863	1141	1177	1151	912	794
Mississippi	37	33	30	31	36	35	282	266	302	303	290	277
Missouri	130	131	136	132	135	134	1337	1407	1516	1495	1304	1191
Montana	61	126	145	121	74	69	226	277	286	242	136	129
Nebraska	228	191	188	182	153	158	749	946	1037	968	896	714
Nevada	10	10	10	11	10	10	21	23	23	24	25	25
New Mexico	37	43	47	42	29	28	47	74	76	59	30	30
North Carolina	73	81	87	83	77	73	384	434	491	477	432	399
North Dakota	146	165	181	184	141	125	619	693	718	648	390	309
Ohio	379	369	370	368	340	323	746	778	772	745	724	703
Oklahoma	343	340	348	459	350	307	574	580	612	446	348	344
South Carolina	51	81	82	84	65	53	329	336	379	345	216	170
South Dakota	105	125	136	131	98	93	526	517	543	556	319	303
Tennessee	113	106	98	105	104	99	378	415	450	466	418	393
Texas	518	543	556	561	649	623	1038	1037	1125	1071	852	791
Virginia	133	149	165	181	167	164	274	300	331	343	334	321
Washington	77	80	87	115	109	106	296	281	306	274	224	233
Wisconsin	131	147	151	155	156	157	652	778	819	838	810	801
Wyoming	32	38	47	45	30	25	72	98	113	89	58	62

Sources: See Data Appendix.

Table 7

Total Assets per bank, and bank location

| | Total Assets per bank | | | | | | | | | | | | Proportion of banks in towns of greater than 2,500 people, 1920[1] | |
| | National banks | | | | | | State banks | | | | | | National banks | State banks |
	1914	1918	1920	1923	1927	1929	1914	1918	1920	1923	1927	1929		
Alabama	806	1224	1516	1449	1944	2311	283	368	543	522	578	545	.55	.26
Arizona	1215	1299	1766	1389	1863	2608	555	807	974	974	1745	2107	.70	.54
Arkansas	607	818	1020	1004	1285	1352	164	304	456	404	445	492	.66	.31
Colorado	1069	1614	1801	1695	2116	2244	263	397	460	514	437	477	.42	.23
Georgia	884	1676	2145	1704	3299	3377	224	355	534	519	489	538	.75	.31
Idaho	546	811	1088	827	1079	1094	162	335	487	334	436	568	.58	.25
Illinois	1912	2764	3562	3068	3737	3295	739	996	1322	1610	2085	2584	.52	.31
Indiana	960	1319	1667	1635	1890	2097	352	451	609	628	769	806	.57	.37
Iowa	692	1010	1301	1144	1264	1381	314	423	563	542	562	596	.36	.15
Kansas	531	839	977	870	1016	1104	146	269	326	285	304	320	.43	.18
Kentucky	900	1474	1824	1957	2118	2162	245	389	497	537	651	826	.63	.24
Louisiana	2075	3677	4119	3416	3846	4099	581	950	1592	1472	2029	2184	.79	.31
Michigan	2054	2826	3784	3634	4324	4991	635	988	14780	1505	2272	2555	.71	.25
Minnesota	1220	1682	1979	1785	2325	2468	235	287	425	403	443	466	.34	.18
Mississippi	756	1281	1843	1956	2589	2702	238	450	664	552	632	660	.80	.28
Missouri	2820	4276	5507	4162	4887	4509	350	493	572	631	722	741	.63	.22
Montana	895	746	761	766	1191	1489	269	391	436	393	605	680	.28	.16
Nebraska	694	1342	1566	1424	1496	1615	155	298	335	319	365	383	.40	.12
Nevada	972	1545	1823	1529	1990	2299	593	817	1030	947	1063	1228	.60	.39
New Mexico	612	879	963	968	1047	1331	197	277	347	364	365	466	.47	.37
North Carolina	921	1379	2064	2086	2544	2634	232	345	578	565	744	809	.77	.28
North Dakota	338	499	563	528	644	702	106	165	248	211	262	289	.16	.06
Ohio	1545	2484	2912	2470	2638	2785	806	1162	1645	2167	3095	3271	.59	.41
Oklahoma	343	766	1096	848	1219	1448	95	228	346	211	279	292	.51	.21
South Carolina	908	1244	1818	1520	2048	2371	241	342	536	424	471	588	.72	.43
South Dakota	446	718	862	731	733	871	136	271	395	344	272	318	.27	.07
Tennessee	1026	1583	2352	2070	2459	3033	240	396	562	558	626	714	.65	.23
Texas	705	1081	1588	1356	1567	1771	159	242	375	304	379	429	.49	.24
Virginia	1265	2045	2461	2110	2381	2347	329	478	613	656	819	878	.50	.29
Washington	1610	2570	3039	2482	2958	3306	449	637	752	520	606	703	.56	.29
Wisconsin	1592	2065	2720	2476	2979	3413	365	440	626	634	776	752	.62	.24
Wyoming	630	1102	1365	1369	1442	1711	148	242	300	307	431	514	.47	.13

[1]Branches excluded.
Sources: See Data Appendix.

Table 8

Asset Growth (% Δ)

	National banks						State banks					
	1914 1918	1918 1920	1920 1923	1923 1927	1927 1929	1929 1930	1914 1918	1918 1920	1920 1923	1923 1927	1927 1929	1929 1930
Alabama	53	37	0	33	20	60	16	56	-3	9	-8	-2
Arizona	48	51	-21	1	31	3	86	35	-18	4	28	10
Arkansas	70	44	4	15	-3	17	70	56	-12	3	2	-7
Colorado	48	29	-5	8	0	7	73	29	-4	-33	-1	-37
Georgia	60	23	-17	65	-1	35	55	57	-17	-33	-3	-47
Idaho	84	60	-32	-7	-16	-47	94	51	-47	10	33	-22
Illinois	46	32	-9	18	-12	-6	34	38	16	24	20	73
Indiana	39	24	-3	7	7	11	49	39	10	19	-4	26
Iowa	51	31	-14	-9	1	-21	56	33	-7	-16	-2	-24
Kansas	74	24	-5	13	4	12	105	28	-15	-8	-5	-26
Kentucky	51	26	11	11	-1	22	51	30	14	14	23	60
Louisiana	77	37	-26	6	10	-14	64	76	-6	19	4	16
Michigan	46	43	2	34	15	57	64	48	6	46	9	69
Minnesota	48	32	-6	5	4	2	61	53	-7	-13	-8	-26
Mississippi	51	31	10	54	1	71	78	68	-17	10	0	-9
Missouri	53	34	-27	20	-8	-19	48	25	9	0	-6	2
Montana	72	17	-16	-5	17	-7	78	15	-24	-13	7	-30
Nebraska	62	15	-12	-12	12	-13	142	23	-11	6	-16	-21
Nevada	59	18	-8	18	16	26	51	26	-4	17	16	30
New Mexico	67	20	-10	-25	23	-18	121	28	-19	-49	28	-47
North Carolina	66	61	-4	13	-2	7	68	89	-5	19	0	14
North Dakota	67	24	-5	-7	-3	-14	75	56	-23	-23	-13	-50
Ohio	57	18	-16	-1	0	-17	50	40	27	39	3	81
Oklahoma	121	46	2	10	4	17	142	60	-56	3	3	-53
South Carolina	118	48	-14	4	-6	-16	45	77	-28	-30	-2	-51
South Dakota	91	31	-18	-25	13	-31	96	46	-6	-55	11	-47
Tennessee	45	37	-6	18	17	30	81	54	3	1	7	11
Texas	61	50	-14	34	9	25	52	68	-23	-1	5	-19
Virginia	81	33	-6	4	-3	0	59	41	11	22	3	39
Washington	66	29	8	13	9	33	35	29	-38	4	11	-29
Wisconsin	46	35	-7	21	15	30	44	50	4	18	-4	17
Wyoming	108	53	-4	-30	-1	-33	122	43	-19	-9	27	-6

Sources: See Data Appendix.

Table 9

Capital as a percent of total assets

| | National banks | | | | | | State banks | | | | | |
	1914	1918	1920	1923	1927	1929	1914	1918	1920	1923	1927	1929
Alabama	14	10	8	9	7	7	17	12	9	9	10	9
Arizona	7	7	5	6	5	5	7	6	6	9	7	6
Arkansas	15	10	8	9	7	7	20	12	8	10	9	9
Colorado	8	5	5	5	5	5	12	8	8	8	8	7
Georgia	15	8	7	8	7	7	20	12	10	11	12	12
Idaho	12	7	6	8	6	6	17	9	8	10	7	6
Illinois	9	6	5	6	5	6	10	8	7	7	7	7
Indiana	11	8	7	8	7	7	13	10	8	9	8	7
Iowa	10	7	6	7	7	6	10	8	7	7	7	7
Kansas	11	7	7	8	7	7	14	8	8	9	9	9
Kentucky	14	9	7	7	7	6	17	11	9	9	8	9
Louisiana	11	7	6	7	7	7	12	8	6	7	6	6
Michigan	8	6	5	6	5	5	8	6	5	6	5	5
Minnesota	8	7	5	7	6	6	10	9	7	8	6	6
Mississippi	13	9	7	8	6	6	16	8	7	7	6	6
Missouri	10	7	6	8	7	6	12	9	7	8	8	8
Montana	10	8	8	8	6	5	14	10	9	10	7	7
Nebraska	10	6	6	7	6	6	14	8	8	9	8	8
Nevada	15	9	8	9	7	7	14	9	7	8	7	6
New Mexico	9	7	7	8	7	6	19	13	12	12	11	8
North Carolina	13	8	7	8	8	8	13	9	7	9	8	8
North Dakota	11	8	7	8	6	6	14	10	8	10	9	9
Ohio	11	7	6	7	6	7	8	6	5	6	5	6
Oklahoma	13	6	6	8	6	6	16	8	7	10	8	8
South Carolina	17	9	8	10	7	8	16	11	8	11	10	9
South Dakota	9	6	5	6	6	5	12	7	6	7	9	8
Tennessee	11	8	6	8	7	7	16	9	8	9	9	9
Texas	14	9	7	9	8	8	21	14	11	13	11	10
Virginia	11	7	6	8	8	8	15	10	11	12	10	10
Washington	9	6	5	6	6	7	12	9	7	9	9	8
Wisconsin	9	6	6	7	6	6	9	8	6	7	6	6
Wyoming	9	5	5	6	6	5	16	10	9	10	7	6

SOURCES: See Data Appendix.

Table 10

Voluntary Insurance Systems

	Kansas				Texas				Washington			
	Participating		Not participating		Participating		Not participating		Participating		Not participating	
	#	Deposits	#	Deposits	#	Deposits	#	Deposits	#	Deposits	#	Deposits
1917	577		430		828		46		46		239	
1919	649		427		907		41		104		191	
1920	683		409		990		41		116		190	
1922	698		369		936		34		–		–	
1924	651		371		896		37		–		–	
1926	399		547		34		748		–		–	
1928	794		39		–		–		–		–	
1917		152		73		204		12		40		109
1919		205		88		321		15		80		123
1920		191		81		266		14		75		107
1922		180		62		252		11		–		–
1924		195		75		302		21		–		–
1926		79		154		3		226		–		–
1928		219		3		–		–		–		–

Sources: See Data Appendix.

Table 11

High-Growth States: Insured vs. Uninsured

| | Assets 1914/Assets 1920 | | Assets per bank in 1920 | | 1920, capital/total assets | |
	National Bank	State Bank	National Bank	State Bank	National Bank	State Bank
Arkansas	.408	.379	1020	456	.084	.085
Colorado	.522	.450	1069	460	.081	.083
Idaho	.341	.316	1088	487	.059	.088
Iowa	.507	.503	1301	562	.057	.104
Minnesota	.509	.406	1979	425	.054	.069
Missouri	.490	.540	5507	572	.063	.072
Montana	.495	.489	761	436	.077	.091
New Mexico	.501	.352	963	347	.073	.119
Wyoming	.314	.315	1365	300	.048	.090
Average	.454	.418	1673	448	.066	.090
Kansas	.463	.380	977	326	.066	.079
Mississippi	.506	.335	1843	664	.069	.066
Nebraska	.537	.335	1566	335	.057	.082
North Dakota	.485	.367	563	248	.068	.081
Oklahoma	.309	.259	1096	346	.126	.070
South Dakota	.400	.351	862	376	.053	.062
Texas	.414	.391	1588	375	.071	.112
Average	.447	.344	1231	389	.073	.078

Sources: See Data Appendix.

Table 12

Growth Quartile Comparison

National-chartered	State-chartered Lowest 25th percentile growth	25% – 50% (second quartile)	50% – 75% (third quartile)	Highest 25th percentile growth
Lowest growth quartile	Nevada, Illinois, Kentucky	Colorado, Georgia, Indiana, Ohio		Nebraska
Second quartile	Iowa, Missouri, Montana	Minnesota, Wisconsin	New Mexico, Tennessee	Mississippi
Third quartile	Alabama, Washington	Michigan, Virginia	Arizona, Kansas, North Dakota, Texas	
Fourth quantile			Arkansas, South Carolina	Idaho, Louisiana, North Carolina, Oklahoma, South Dakota, Wyoming

Sources: See Data Appendix.

Table 13

Regression Results: Early Asset Growth of State-Chartered Banks

Dependent variable: Growth in total assets of state-chartered banks, 1914 - 1920

Independent Variables	Coefficient	Standard Error	Prob > 1T1
Intercept	0.156	0.468	0.741
National bank growth	0.682	0.147	0.000
(Reserve center)x(Nat. bank growth)	-0.115	0.063	0.080
Growth in land values, 1914-1920	0.526	0.334	0.127
Ratio of farm to non-farm popul.	-0.328	0.655	0.621
Presence of voluntary insurance	0.327	0.251	0.205
Presence of compulsory insurance	0.609	0.189	0.004

$R^2 = 0.683$

$\bar{R}^2 = 0.607$

Dependent variable: Growth in total assets of state-chartered banks, 1914 - 1920

Independent Variables	Coefficient	Standard Error	Prob > 1T1
Intercept	0.101	0.465	0.829
National bank growth	0.681	0.147	0.000
(Reserve center)x(Nat. bank growth)	-0.132	0.060	0.038
Growth in land values, 1914-1920	0.555	0.333	0.107
Ratio of farm to non-farm popul.	-0.283	0.654	0.669
Presence of vol. or comp. insurance	0.518	0.165	0.004

$R^2 = 0.670$

$\bar{R}^2 = 0.607$

Table 14

State-Chartered Regional Comparison: Insured vs. Uninsured

	Assets 1914/ Assets 1920	Assets per bank in 1920	Capital /total assets in 1920
Arkansas	.379	456	.085
Colorado	.450	460	.083
Iowa	.503	563	.067
Idaho	.316	487	.077
Minnesota	.406	425	.069
Missouri	.540	572	.072
Montana	.489	436	.091
New Mexico	.352	347	.119
Wyoming	.315	300	.090
Average	.417	450	.084
Kansas	.380	326	.079
North Dakota	.367	248	.081
Nebraska	.335	335	.082
Oklahoma	.259	346	.070
South Dakota	.351	376	.062
Texas	.391	374	.112
Average	.347	334	.081
Alabama	.553	543	.087
Georgia	.412	534	.097
South Carolina	.390	536	.085
Average	.452	538	.090
Mississippi	.335	664	.066

Sources: See Data Appendix.

Table 15

Charter Switches

	From State – to National-	From National – to State-	Net Change
Alabama	10	0	10
Arizona	1	1	0
Arkansas	7	4	3
California	16	0	16
Colorado	6	1	5
Connecticut	0	1	-1
Delaware	0	2	-2
Florida	4	6	-2
Georgia	7	0	7
Idaho	0	13	-13
Illinois	13	3	10
Indiana	3	7	-4
Iowa	2	2	0
Kansas	14	2	12
Kentucky	7	3	4
Louisiana	0	2	-2
Maine	0	1	-1
Maryland	1	1	0
Massachusetts	4	1	3
Michigan	4	0	4
Minnesota	19	5	14
Mississippi	10	0	10
Missouri	10	4	6
Montana	1	0	1
Nebraska	31	0	31
Nevada	0	0	0
New Hampshire	0	1	-1
New Jersey	2	11	-9
New Mexico	1	1	0
New York	7	8	-1
North Carolina	6	5	1
North Dakota	12	0	12
Ohio	2	1	1
Oklahoma	113	50	63
Oregon	7	0	7
Pennsylvania	11	8	3
Rhode Island	0	1	-1
South Carolina	4	1	3
South Dakota	4	1	3
Tennessee	8	3	5
Texas	130	8	122
Utah	0	0	0
Vermont	0	1	-1
Virginia	16	3	13
Washington	27	2	25
West Virginia	2	0	2
Wisconsin	9	1	8
Wyoming	1	6	-5

Sources: See Data Appendix.

Table 16

<u>Regression Results:</u> <u>Late Asset Growth of State Chartered Banks</u>

<u>Dependent Variable:</u> Growth in total assets of state-chartered banks, 1920-1926

<u>Independent Variable</u>	<u>Coefficient</u>	<u>Standard Error</u>	<u>Prob > ITI</u>
Intercept	0.400	0.458	0.391
National bank growth	0.598	0.239	0.019
(Reserve center)x(Nat. bank growth)	0.213	0.098	0.039
Ratio of farm to non-farm popul.	-0.251	0.347	0.477
Growth in land values, 1920-1925	0.269	0.540	0.622
<u>Business failure rate, 1921-1925</u> Business failure rate, 1917-1920	-0.048	0.039	0.233
Presence of deposit insurance (excluding Nebraska)	-0.271	0.123	0.036

$R^2 = 0.537$

$\overline{R}^2 = 0.426$

<u>Dependent Variable:</u> Growth in total assets of state-chartered banks, 1920-1930

<u>Independent Variable</u>	<u>Coefficient</u>	<u>Standard Error</u>	<u>Prob > ITI</u>
Intercept	1.482	0.554	0.013
National bank growth	0.063	0.225	0.782
(Reserve center)x(Nat. bank growth)	0.141	0.135	0.308
Ratio of farm to non-farm popul.	-0.648	0.475	0.185
Growth in land values, 1920-1930	-0.091	0.659	0.891
<u>Business failure rate, 1921-1929</u> Business failure rate, 1917-1920	-0.095	0.053	0.088
Presence of deposit insurance (excluding Nebraska)	-0.194	0.171	0.267

$R^2 = 0.405$

$\overline{R}^2 = 0.262$

Table 16 (continued)

Dependent Variable: Growth in total assets of state-chartered banks, 1920-1930

Independent Variable	Coefficient	Standard Error	Prob > |T|
Intercept	1.467	0.529	0.010
National bank growth	0.055	0.220	0.803
(Reserve center)x(Nat. bank growth)	0.130	0.133	0.337
Ratio of farm to non-farm popul.	-0.593	0.465	0.214
Growth in land values, 1920-1930	-0.065	0.641	0.920
<u>Business failure rate, 1921-1929</u> Business failure rate, 1917-1920	-0.094	0.052	0.079
Presence of deposit insurance (including Nebraska)	-0.240	0.155	0.134

$R^2 = 0.429$

$\bar{R}^2 = 0.292$

Table 17

Growth in Branch Banking

	National Banks						State Banks						All Banks			
	Total fac.	Br. Banks	Bran- ches	Tot.	B.B.	Br.	Tot.	B.B.	Br.	Tot.	B.B.	Br.	Tot.	B.B. & Br.	Tot.	B.B.& Br.
		1924		1928			1924			1928			1924		1928	
Arizona	19	0	0	15	0	0	64	6	20	53	8	23	83	26	68	31
North Carolina	86	2	3	83	4	6	535	39	64	437	39	73	621	108	520	122
South Carolina	84	2	3	66	3	8	347	7	17	247	12	28	431	29	313	66
Virginia	352	7	11	182	9	16	216	24	34	376	30	47	568	76	558	102
Wyoming	37	0	0	26	0	0	79	0	0	60	0	0	116	0	86	0
Kentucky	145	3	7	155	4	15	483	1	5	480	29	34	628	16	635	82
Louisiana	41	1	8	41	1	8	303	33	85	299	42	103	344	127	340	154
Michigan	144	10	23	181	9	48	906	53	309	989	55	374	1050	395	1170	486
Ohio	363	4	4	338	7	7	947	47	199	960	52	243	1310	254	1298	309
Tennessee	110	2	2	122	7	19	512	19	51	446	20	42	622	74	568	88
Alabama	105	0	0	107	0	0	276	5	19	269	5	19	381	24	376	24
Arkansas	88	0	0	79	0	.0	400	2	3	361	2	3	488	5	440	5
Georgia	101	2	7	97	4	16	608	19	46	394	15	21	709	74	491	56
Indiana	248	0	0	229	1	2	863	4	8	808	3	7	1111	12	1037	13
Minnesota	345	3	11	285	2	6	1081	0	0	855	0	0	1426	14	1140	8
Mississippi	36	1	1	37	1	1	346	10	24	313	10	24	382	36	350	36
Nebraska	177	2	2	160	2	2	925	0	0	746	0	0	1102	4	906	4
Washington	114	1	2	111	1	2	272	4	5	247	3	4	386	12	358	10
Wisconsin	157	1	2	159	1	2	839	6	7	817	6	7	996	16	976	16
Colorado	141	0	0	123	0	0	201	0	0	164	0	0	342	0	287	0
Idaho	70	0	0	46	0	0	107	0	0	94	0	0	177	0	140	0
Illinois	502	0	0	484	0	0	1408	0	0	1337	0	0	1910	0	1821	0
Iowa	347	0	0	270	0	0	1438	0	0	1169	0	0	1785	0	1439	0
Kansas	260	0	0	250	0	0	1033	0	0	864	0	0	1293	0	1114	0
Missouri	134	0	0	134	0	0	1478	0	0	1231	0	0	1612	0	1365	0
Montana	93	0	0	70	0	0	155	0	0	132	0	0	248	0	202	0
Nevada	11	0	0	10	0	0	23	0	0	25	0	0	34	0	35	0
New Mexico	33	0	0	29	0	0	43	0	0	29	0	0	76	0	58	0
North Dakota	165	0	0	136	0	0	523	0	0	354	0	0	688	0	490	0
Oklahoma	421	0	0	333	0	0	388	0	0	337	0	0	809	0	670	0
South Dakota	116	0	0	97	0	0	437	0	0	315	0	0	553	0	412	0
Texas	573	0	0	638	0	0	1046	0	0	816	0	0	1619	0	1454	0

Sources: See Data Appendix.

Table 18

Regression Results: Late Asset Growth and Bank Size of State-Chartered Bank

Dependent Variable: Growth in total assets of state-chartered banks, 1920-1926

Independent variable	Coefficient	Standard Error	Prob > 1T1
Intercept	0.544	0.450	0.239
National bank growth	0.602	0.235	0.018
(Reserve center)x(Nat. bank growth)	0.178	0.098	0.084
Ratio of farm to non-farm popul.	-0.404	0.346	0.254
Growth in land values, 1920-1925	0.037	0.541	0.946
Business failure rate, 1921-1925			
Business failure rate, 1917-1920	-0.040	0.038	0.308
Presence of deposit insurance (excluding Nebraska)	-0.190	0.126	0.146
Out-of-city branch banking	0.179	0.124	0.163
Within-city branch banking	0.204	0.132	0.136

R^2 = 0.601

$\bar{R}^2$ = 0.462

Dependent Variable: Growth in total assets of state-chartered banks, 1920-1930

Independent variable	Coefficient	Standard Error	Prob > 1T1
Intercept	1.539	0.449	0.002
National bank growth	0.124	0.200	0.539
(Reserve center)x(Nat. bank growth)	0.078	0.115	0.502
Ratio of farm to non-farm popul.	-0.936	0.405	0.030
Growth in land values, 1920-1930	-0.386	0.551	0.490
Business failure rate, 1921-1929			
Business failure rate, 1917-1920	-0.072	0.044	0.118
Presence of deposit insurance (excluding Nebraska)	-0.065	0.140	0.647
Out-of-city branch banking	0.398	0.150	0.014
Within-city branch banking	0.428	0.161	0.014

R^2 = 0.625

$\bar{R}^2$ = 0.495

Table 18 (continued)

Regression Results: Late Asset Growth and Bank Size of State-Chartered Bank

Dependent Variable: Assets per bank for state-chartered banks in 1926

Independent variable	Coefficient	Standard Error	Prob > ITI
Intercept	1341.96	739.24	0.082
National bank growth	0.101	0.115	0.385
(Reserve center)x(Nat. bank growth)	0.084	0.072	0.256
Ratio of farm to non-farm popul.	-1782.05	580.74	0.005
Growth in land values, 1920-1925	-160.61	884.00	0.857
Business failure rate, 1921-1925 Business failure rate, 1917-1920	-40.55	60.60	0.510
Out-of-city branch banking	593.49	198.93	0.007
Within-city branch banking	540.64	257.51	0.047

R^2 = 0.688

$\bar{R}^2$ = 0.597

Dependent Variable: Assets per bank for state-chartered banks in 1930

Independent variable	Coefficient	Standard Error	Prob > ITI
Intercept	1868.64	847.17	0.037
National bank growth	0.072	0.128	0.577
(Reserve center)x(Nat. bank growth)	0.100	0.079	0.219
Ratio of farm to non-farm popul.	-2642.12	725.33	0.001
Growth in land values, 1920-1930	-375.72	952.96	0.697
Business failure rate, 1921-1929 Business failure rate, 1917-1920	-24.39	75.20	0.749
Out-of-city branch banking	876.91	244.74	0.002
Within-city branch banking	736.32	330.63	0.036

R^2 = 0.700

$\bar{R}^2$ = 0.612

Table 19

Chains and Banks in Chain Systems, by States: June 30, 1929

| | Numbers of Chain systems | | Banks in chain systems | |
	Total	Total	National	State
Total	230	1,561	596	965

State-Wide Branch Banking Permitted

		Total		
Total	^	49	25	
State				
Arizona		6	1	5
California		30	20	10
Delaware				
District of Columbia				
Maryland				
North Carolina				
Rhode Island				
South Carolina				
Virginia				
Wyoming		10		

Branches Restricted as to Location

Total	61	337	135	202
State				
Kentucky		4	4	
Louisiana	2	10	6	4
Maine	1	5	2	3
Massachusetts	4	33	19	14
Michigan	11	71	3	68
Mississippi				
New Jersey	12	49	22	27
New York	17	111	58	53
Ohio	1	6	3	3
Pennsylvania	9	38	12	25
Tennessee	3	10	6	4

Establishment of Branches Prohibited by Law

Total	141	1,026	365	661
State				
Alabama		22	11	11
Arkansas		63	13	50

Table 19 (cont'd)

State

State				
Colorado	2	13	8	5
Connecticut				
Florida	4	32	13	19
Georgia	6	23	8	15
Idaho	3	23	7	16
Illinois	11	81	20	61
Indiana	1	3	2	1
Iowa	12	92	33	59
Kansas	10	55	15	40
Minnesota	34	279	130	149
Missouri	4	26	7	19
Montana	2	15	4	11
Nebraska	9	63	15	48
Nevada	2	14	2	12
New Mexico	1	6	4	2
Oregon	6	32	14	18
Texas	6	37	7	30
Utah	5	50	12	38
Washington	11	62	26	36
West Virginia				
Wisconsin	5	35	14	21

Establishment of Branches Prohibited in Practice

Total	20	149	71	78

State

State				
New Hampshire				
North Dakota	7	60	20	40
Oklahoma	8	59	41	18
South Dakota	5	30	10	20
Vermont				

Sources: See Data Appendix.

Table 20

Average Annual Bank Failure Rate: 32 "Agricultural-Crisis" States

	1918-1920		1921-1924		1925-1929		1921-1929	
	National AFR1820	State AFR1820	National AFR2124	State AFR2124	National AFR2529	State AFR2529	National AFR2129	State AFR2129
Alabama	.0000000	.0014124	0.002475	0.00697	0.005714	0.011673	0.004400	0.009739
Arkansas	.0049751	.0034364	0.003012	0.01052	0.013636	0.029219	0.009371	0.020627
Arizona	.0000000	.0000000	0.037500	0.07090	0.000000	0.031111	0.016667	0.043118
Colorado	.0000000	.0029240	0.007092	0.02958	0.015603	0.024876	0.011820	0.023749
Georgia	.0000000	.0031299	0.002688	0.03098	0.019149	0.058007	0.011947	0.040168
Iowa	.0000000	.0004424	0.002793	0.01055	0.043228	0.027816	0.024519	0.018897
Idaho	.0000000	.0000000	0.043210	0.05674	0.028571	0.028037	0.032922	0.037037
Illinois	.0000000	.0016317	0.000521	0.00386	0.004382	0.004830	0.002778	0.004253
Indiana	.0000000	.0017683	0.000984	0.00533	0.005645	0.012164	0.003500	0.009607
Kansas	.0000000	.0016617	0.004016	0.01432	0.005385	0.021878	0.004909	0.017778
Kentucky	.0000000	.0007491	0.000000	0.00667	0.000000	0.011416	0.000000	0.009630
Louisiana	.0000000	.0015798	0.006579	0.01638	0.000000	0.014679	0.002924	0.015041
Michigan	.0000000	.0004617	0.000000	0.00169	0.001653	0.001038	0.000992	0.001353
Minnesota	.0011614	.0045537	0.005287	0.01954	0.031138	0.039630	0.019805	0.028887
Missouri	.0000000	.0021536	0.000000	0.01022	0.007463	0.023275	0.004085	0.017150
Mississippi	.0000000	.0000000	0.008333	0.01407	0.005714	0.014667	0.007407	0.014349
Montana	.0000000	.0000000	0.067241	0.10140	0.032258	0.019355	0.041379	0.050894
North Carolina	.0000000	.0000000	0.008621	0.01884	0.019277	0.024000	0.014049	0.021951
North Dakota	.0000000	.0009592	0.035912	0.07103	0.036364	0.066922	0.034377	0.058651
Nebraska	.0000000	.0007491	0.017287	0.01808	0.016000	0.042737	0.015957	0.029787
New Mexico	.0000000	.0000000	0.079787	0.08882	0.018182	0.051163	0.042553	0.055556
Nevada	.0000000	.0000000	0.000000	0.01087	0.000000	0.000000	0.000000	0.004831
Ohio	.0008985	.0004323	0.001351	0.00130	0.001671	0.005906	0.001502	0.003742
Oklahoma	.0009921	.0017889	0.017241	0.04820	0.014727	0.028866	0.017561	0.031590
South Carolina	.0000000	.0000000	0.000000	0.02309	0.037037	0.079394	0.020325	0.048666
South Dakota	.0000000	.0006588	0.040441	0.05985	0.048276	0.058581	0.040850	0.052793
Tennessee	.0000000	.0000000	0.000000	0.00389	0.003704	0.021166	0.002268	0.013827
Texas	.0000000	.0019685	0.005845	0.01689	0.006283	0.013958	0.006195	0.014716
Virginia	.0000000	.0033784	0.001515	0.00982	0.001099	0.009169	0.001347	0.009735
Washington	.0000000	.0023474	0.005747	0.01961	0.010714	0.011321	0.010217	0.014161
Wisconsin	.0000000	.0000000	0.003311	0.00336	0.005161	0.009615	0.004415	0.006919
Wyoming	.0000000	.0000000	0.042553	0.06195	0.016216	0.050633	0.026005	0.047198

Sources: See Data Appendix.

Table 21

1921-1930 Bank Liquidations (as of 1930)

	National Banks			State Banks		
	# completely liquidated	# in process of liquid.	repayment ratio[2]	# completely liquidated	# in process	repayment ratio[2]
Alabama	2	11	1.00	9	39	.59
Arizona	2	0	.50	4	20	.91
Arkansas	3	15	.87	37	96	.36
Colorado	8	9	.60	62	9	.68
Georgia	5	11	.51	120	130	.44
Idaho	17	4	.47	28	11	.49
Illinois	2	31	.76	9	131	.63
Indiana	1	12	.77	6	109	.88
Iowa	14	69	.69	182	130	.54
Kansas	4	10	.79	119[1]	0[1]	.53[1]
Kentucky	0	3	.NA	18	41	.NA
Louisiana	1	0	.69	16	19	.41
Michigan	0	4	.NA	2	8	.72
Minnesota	13	43	.58	50	245	.48
Mississippi	2	3	.88	64[1]	0[1]	.52[1]
Missouri	2	10	.66	109	200	.53
Montana	38	15	.34	27	28	.52
Nebraska	13	15	.44	317[1]	0[1]	.35[1]
Nevada	0	0	.NA	0	0	.NA
New Mexico	12	2	.51	18	19	.70
North Carolina	4	17	.71	2	87	1.00
North Dakota	21	38	.45	340[1]	0[1]	.17[1]
Ohio	3	7	.66	0	42	.NA
Oklahoma	25	26	.43	139[1]	0[1]	.56[1]
South Carolina	8	16	.51	16	189	.66
South Dakota	16	34	.51	242[1]	0[1]	.24[1]
Tennessee	1	4	.93	12	61	.83
Texas	21	22	.58	138[1]	0[1]	.54[1]
Virginia	1	3	.90	4	41	.57
Washington	4	5	.84	1[1]	0[1]	.75[1]
Wisconsin	2	6	.30	20	40	.66
Wyoming	8	2	.70	15	13	.54

[1]Insured Banks only. Includes liquidations completed after 1930.
[2]The repayment ratio is defined as the ratio of deposits repaid from asset liquidation for banks that were completely liquidated.

Sources: See Data Appendix.

Table 22

Average Time elapsed between closing and Completed Liquidation
(for banks liquidated 1921-1930)

	National Banks			State Banks		
	Years	Months	# banks	Years	Months	# banks
Alabama	3	2	2	3	3	8
Arizona	4	10	2	3	8	3
Arkansas	2	5	3	2	10	37
Colorado	4	5	8	2	11	60
Georgia	3	9	5	3	8	113
Idaho	4	2	17	4	6	28
Illinois	3	3	2	3	10	8
Indiana	7	6	1	4	4	5
Iowa	3	8	14	3	7	179
Kansas	3	3	4	3	4	117
Kentucky	NA	NA	NA	3	4	17
Louisiana	7	2	1	4	3	14
Michigan	NA	NA	NA	6	3	2
Minnesota	4	1	13	5	7	48
Mississippi	1	1	2	6	0	2
Missouri	3	6	2	3	2	109
Montana	4	6	38	4	4	23
Nebraska	4	9	13	6	4	15
Nevada	NA	NA	NA	NA	NA	NA
New Mexico	4	5	12	5	0	17
North Carolina	2	11	4	7	1	1
North Dakota	4	0	21	6	3	35
Ohio	3	5	3	NA	NA	NA
Oklahoma	3	8	25	5	0	64
South Carolina	3	10	8	3	11	8
South Dakota	4	8	16	5	7	22
Tennessee	0	11	1	3	11	6
Texas	4	0	21	3	9	19
Virginia	4	8	1	3	11	4
Washington	4	2	4	4	1	32
Wisconsin	3	8	2	3	2	20
Wyoming	4	10	8	3	4	10

Sources: See Date Appendix.

Table 23

Estimated Asset Shortfalls of Failed Banks Relative to Remaining-Bank Equity in "Severe-Failure" States

	National Banks						State-Chartered Banks						All Banks
	Deposits of Suspended Banks 1921-30	Number of Liq. Relative to Suspensions	Avg. size of Liq. Bks Rel. to Susp.	Rate of Asset Shortfall	Estimated Shortfall	Total Bank Equity June 1930	Deposits of Sus. Banks 1921-30	Liq./ Susp.	Size Ratio	Rate of Asset Shortfall	Estimated Shortfall	Total Bank Equity June 1930	Ratio of Shortfall to Equity
Arizona	1256	.67	.83	.50	349	3,815	15,056	.80	.06	.09	65	8,496	.03
Colorado	11003	.94	.45	.40	1,862	13,776	12,187	.95	.95	.32	3,520	10,273	.22
Georgia	16538	.84	.09	.49	613	39,064	46,318	.75	.70	.56	13,618	39,805	.18
Idaho	10601	.81	.65	.53	2,958	4,612	9,185	.85	.63	.51	2,509	4,983	.57
Iowa	55984	.79	.50	.31	6,855	35,750	138,995	.75	.66	.46	31,649	74,935	.35
Minnesota	28338	.97	.59	.42	6,812	69,387	80,634	.77	.47	.52	15,174	38,417	.20
Montana	16287	.87	.44	.66	4,115	9,999	31,361	.89	.47	.48	6,297	9,947	.52
Nebraska	13695	.80	.94	.56	5,767	26,083	78,093	.85	1.04	.65	44,872	27,760	.94
North Dakota	17438	.84	.80	.55	6,445	9,210	45,199	.92	1.05	.83	36,240	9,695	2.26
Oklahoma	27364	.72	.70	.57	7,861	41,251	38,986	.79	.28	.44	3,794	11,493	.22
South Carolina	12153	.92	.57	.49	3,123	11,665	50,970	.91	.58	.34	9,147	17,069	.43
South Dakota	21109	.93	.60	.49	5,772	8,477	91,619	.77	1.00	.76	53,615	10,848	3.07
Wyoming	9154	.91	.45	.30	1,125	4,819	7,536	.80	.48	.46	1,331	3,844	.28

Sources: See Data Appendix.