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Do “Vulnerable” Economies Need Deposit Insurance? Lessons from U.S. Agriculture in the 1920s

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 is 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 bank borrowers, it would be hard to conceive of a payments system without banks.¹

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. In recent research 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; Calomiris, Hubbard, and Stock, 1986). The externalities generated by banks' special roles 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 (1991) 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 bank's potential gain from pursuing long shots by increasing the implicit value of the put option inherent in deposit insurance (see also Merton, 1977). 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 Brewer (1991), among others.

Furthermore, critics argue that regulators underestimate to what extent the financial "safety net" can be provided with little or no government insurance of banks. For example, private clearing-

houses 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 get a free ride on the group protection (see Cannon, 1910; 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).² 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 (which predated clearing-house private coinsurance) 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 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 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 sponsorship 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—the Clearinghouse for Item Processing Services (CHIPS) network, for example, or the futures and options clearinghouses—indicates 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 distribution of privately insuring 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 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; Calomiris and Gorton, 1991). Lacking effective means to insure against such disturbances, the thousands of independent and geographically distant unit banks were sometimes forced to suspend convertibility as a defensive reaction during such economywide bank runs. Suspensions of convertibility limited depositors' and noteholders' liquidity and reduced the desirability of placing funds in banks, thereby reducing the supply of loans and forcing banks to adopt more conservative lending practices than under normal circumstances. In a few cases, large numbers of banks were liquidated when the banking system failed to coordinate timely suspension (see Calomiris and Schweikart, 1991).

The relative success of statewide systems of branching banks, or mutual-liability banks, in meeting crises such 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 large sector- or region-specific shocks to bank capital from becoming a threat to aggregate bank capital and, therefore, the payments system.³

One could argue, however, that this approach might not be sufficient for economies with intrinsic vulnerability to large sector-specific shocks. In the United States, full interstate branching could virtually 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, 1984; 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. These limitations 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 advantageous to limit the repatriation of bank profits to support bank branches in other countries.

The central question I will address in this paper is this: Should the governments of such intrinsically risky economies stand ready to rescue banks in the event of a large shock to the economic base? The question may be divided into 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 the existence of bank deposit insurance engenders, greater or less than the supposed benefits of insurance?⁴

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 financial intermediaries. Interstate branch banking was not permitted, although some states allowed full, or limited, intrastate branching. Furthermore, some states had enacted deposit insurance before the crisis. Finally, the existence in each state of nationally chartered banks (under a common regulatory regime across states) provides a point of comparison for the magnitude of the shock to banks in each state, the relative performance of the various state-chartered banking regimes, and the significance of deposit insurance or branch banking in magnifying or lessening the impact on banks.

In Calomiris (1989) I presented evidence from the 1920s of higher initial growth, and higher 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 artifact of different exposure to agricultural risk, due to different locational patterns (rural or urban) for state- and national-chartered banks or more restrictive regulations on national-chartered banks—in particular, stricter limitations on real estate loans.⁵ Here I look at all eight of the insured systems. I compare the performance of national- and state-chartered banks within and across states, taking account of differences in economic and regulatory environment (for example, 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 government deposit insurance is socially desirable in price-sensitive economies. Only through the accumulation of evidence—from examples of the costs of such crises and the consequences of the decisions to provide insurance

or allow branching—will policy makers be able to make informed choices in the difficult matter of bank regulatory policy.

The following section provides cross-sectional evidence of price, income, and wealth movements and of indicators of financial distress experienced by various states in the 1920s. The next section measures changes in the size, number, and portfolio structure of national- and state-chartered banks before and during the crisis. The third section evaluates differences in the performance of the state-chartered banking systems in response to the crisis—specifically, differences in 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. The fourth section returns to the central question of whether deposit insurance is desirable for economies with intrinsic vulnerability to large income disturbances.

The Post-World War I Agricultural Crisis

Typically, wars have been prosperous times for farmers. World War I, like the Napoleonic Wars and the Crimean War, witnessed a rapid expansion of agricultural income. As with previous wartime booms, however, the end of war brought a severe decline in the agricultural terms of trade. Declines in price and income translated into declines in farm land values. Farmers who had used debt financing to expand operations 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 in the United States 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 declining income and financial collapse.⁶ Differences from state to state 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 5.1 provides indices of real gross farm income and its components for 1910–1930. These figures show that the post–World War I decline in agricultural income affected virtually all producers, although 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 in income and wealth across states. Furthermore, Alston (1983) finds that similar reductions in farm wealth and earnings produced far greater rates of farm foreclosure in some states than in others. Holding declines in wealth and income constant, one finds that states that had expanded both farm acreage and farm leverage during the wartime boom suffered much higher rates of farm foreclosure.

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.⁷ From 1926 to 1930, foreclosures in Montana relative to owner-operated farms in the state averaged 52.2 per thousand per year.⁸ Other northern and western states with extremely high foreclosure rates (per thousand owner-operated farms per year) 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). 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 farm foreclosure rates considerably above the national average of 27.1 per thousand per year.

Tables 5.2 and 5.3 provide a variety of measures of economic conditions for each of the forty-eight contiguous states during the period 1919–1930. Table 5.2 contains data on the following: gross

farm income change from 1919 to 1921; changes in total net income from all sources received by farm and by nonfarm populations from 1919 to 1921; 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 5.3 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 5.2 and 5.3 reflect the data availability as well as the peaks and troughs of the agricultural cycle. Whereas the income, wealth, and price variables in Tables 5.2 and 5.3 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, except for 1920, according to recent estimates by both Romer (1989) and Balke and Gordon (1989). These estimates are reproduced in Table 5.4. 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 5.2 and 5.3 indicate that the first years of the agricultural crisis (1920–1930) can be divided into three stages: the initial shock of 1920–1921, a period of 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 considerably during these three stages, as the tables show.

No single indicator provides an adequate measure of the experience of a particular state during one of these stages. First, income and price indicators are extremely sensitive to the specific dates over which they are calculated. As an example, 1924 was a relatively good year for Montana and North Dakota; it 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

TABLE 5.1

Indices of Gross Farm Income, by Products and Total Production, 1910-1937 (1909-1913 = 100)

Year	Twelve important crops ^a	Staple foodstuffs ^b	Fruits ^c	Dairy and poultry products	Textile raw materials ^d	Meat animals ^e	Meat animals, adjusted ^f	Total farm production	Total farm production, adjusted ^g
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

^aWheat, corn, oats, barley, rye, buckwheat, flaxseed, hay, potatoes, sweet potatoes, cotton and cottonseed, tobacco.^bWheat, rye, potatoes, sweet potatoes, dry beans, rice.^cOrchard fruits, citrus fruits, grapes.^dCotton and cottonseed, flaxseed, wool.^eCattle, calves, hogs, sheep, and lambs slaughtered, and live cattle exported.^fAdjusted for changes in inventory values.^gAdjusted for changes in inventory values of meat animals.

SOURCES: See Data Appendix.

TABLE 5.2

Price and Income Changes, by State, 1919-1928

	Percentage change					
	1919-1921	1919-1921	1919-1921	1919-1924	1922-1925	1925-1928
	Gross farm income	Total net farm income	Total net nonfarm income	Crop price index	Value of crops sold	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 5.3

Farm Land, Population, and Foreclosures, by State, 1913-1930

	1913-1920	1920-1925	1925-1930	1920	1920	1926-1930
	% change in	% change in	% change in	Ratio of farm	Ratio of farm	Average annual
	value farm real	value farm real	value farm real	mortgage debt	population to	farm foreclosure
	estate per acre	estate per acre	estate per acre	to farm value	total population	(per 1,000 farms)
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 5.4
GNP Deflator Estimates, 1917-1929

	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.

changes, the economic impact of income shocks on farmers' wealth and financial survival depended on market 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 is relative to previous expectations of future income. Some of the highest foreclosure rates occurred in states with a relatively high ratio of farm mortgage debt to farm real estate value (Table 5.3). While changes in prices and income provide measures of the magnitude of disturbances, these considerations suggest that changes in the value of farms and the farm foreclosure rate are more indicative of likely (anticipated) long-term changes in farm income associated with those shocks.⁹

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

The links (explored in a later section) between economic conditions, for which indicators are reported in Tables 5.2 and 5.3,

and the threat to banks in a given state are therefore subtle. Ideally, in analyzing 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 relationship between the degree of concentration of income in agriculture and the impact on banks from agricultural shocks.

This study investigates the role of regulatory regimes in limiting the incidence and costs of financial disruption in the face of a major 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 thirty-two states that were substantially affected by the agricultural depression.

The sample of states whose financial systems are later analyzed in greatest detail include any state that (1) experienced a farm real estate value reduction (per acre) exceeding 20 percent from 1920 to 1930, or (2) had an average annual farm foreclosure rate exceeding 20 per 1,000 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 a later section). The states in the sample are listed in Table 5.5 according to their deposit insurance and branch banking laws.

Bank Membership and Balance Sheet Patterns across States

The influence of regulation on membership, location, and risk. In 1920 the same regulations governed national banks in each state. The experience of these national banks provides 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 with 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 they faced different exposure to agricultural risk. In every state, national banks were larger on average and located more often in

TABLE 5.5
Regulatory Regimes (in thirty-two "agricultural crisis" states)

	No deposit insurance	Compulsory insurance	Voluntary insurance
Full intrastate branching allowed	Arizona North Carolina South Carolina Virginia		
Limited new branching	Kentucky Louisiana Michigan Ohio		
No new branching, old branches remain	Tennessee Alabama Arkansas Georgia ^a Indiana Minnesota Wisconsin	Nebraska (1911-1930) Mississippi (1914-1930)	Washington (1917-1921)
No branching allowed	Colorado Idaho Illinois Iowa Missouri Montana Nevada New Mexico Wyoming ^b	North Dakota (1917-1929) Oklahoma (1908-1923) South Dakota (1916-1927)	Kansas (1909-1929) Texas (1910-1927)

^aNew branching prohibited in 1927.

^bBranching authorized by legal implication; none allowed in practice.

SOURCES: See Data Appendix.

cities than their state-chartered counterparts. These differences from state to state were important. Also, urban national banks that served as regional reserve centers for agricultural areas were more likely to suffer 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.

Before 1920 several states established deposit insurance systems. Incentive problems due to insurance are often said to have made insured banking systems grow at a "reckless" rate, limit the growth of

capital, and overextend themselves in the farm loan market (Thies and Gerlowski, 1989; Calomiris, 1989; White, 1983; FDIC, 1956; American Bankers Association, 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 between incorrect expectations of continuing prosperity and excess risk taking induced by deposit insurance without a standard against which to measure the behavior of insured banks. When one controls for differences in economic environment by using uninsured state banking systems in other states and national banks in the same 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 5.5. For three states (Kansas, Texas, and Washington), participation in state-run deposit insurance was voluntary. Numbers and deposits of participating and nonparticipating state banks in these states are given in Table 5.10. All state-run insured banking systems were in operation during the boom of 1918-1920; except for Washington, the state-operated insurance systems were the dominant component of the state-chartered systems by 1920. In Texas, state banks not belonging 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, state banking without insurance was an important 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 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 withdraw at any time without even retaining liability for past losses. In Washington, low initial insurance premiums and the ability to leave the voluntary systems seem to have encouraged many banks that were not egregious risk takers to join, only to withdraw 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. To do so, however, would have been costly for banks that relied on activities prohibited by national law or for those with insufficient capital.

Although all state-chartered Texas banks were required to have some form of insurance, the privately insured banks were unlikely to have had the same opportunities as those insured by the state 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 to those of 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 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 limited the availability of funds somewhat, unlike FDIC regulations that allow risk-taking members to attract funds by offering insured certificates of deposit

at unusually high interest rates. Furthermore, as in virtually all state systems and throughout the national banking system, stockholders in privately insured banks had extended liability equal to the amount of capital in the bank. Such liability 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 1930.¹⁰ 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, meaning that the liability of solvent banks was limited. Furthermore, solvent banks that belonged to the insured systems in the 1920s were able to avoid much of the liability to depositors of failed banks by leaving the system or forcing repeal of the insurance statute by threatening to do so (more on this later). All these considerations suggest that the effective protection of depositors and the potential for excessive risk taking would have been less under past insured systems than under current federal deposit insurance. Evidence on incentive problems in these plans provides an *a fortiori* case for potential excessive risk taking under government-guaranteed insurance of the kind currently available in the United States.

Evidence of the effects of deposit insurance. Tables 5.6 through 5.10 present measures of state banking system averages and aggregates, broken down by type of bank charter and by state, for the thirty-two "agricultural crisis" states for various dates. The indicators include the following: the number of banks (Table 5.6), the proportion located in towns or cities of 2,500 or more and the average total assets per bank (Table 5.7), aggregate total asset growth (Table 5.8), the ratio of capital to assets (Table 5.9), and the participation of banks in voluntary insurance systems (Table 5.10).

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

TABLE 5.6

Number of State and National Banks, 1914-1929 (in thirty-two "agricultural crisis" states)

	National banks					
	1914	1918	1920	1923	1927	1929
Alabama	90	91	101	106	105	106
Arizona	13	18	20	20	15	14
Arkansas	57	72	83	88	79	73
Colorado	124	122	141	143	124	121
Georgia	115	97	93	97	83	80
Idaho	55	68	81	73	52	43
Illinois	463	469	480	505	490	487
Indiana	255	258	254	251	233	224
Iowa	341	352	358	349	287	265
Kansas	212	234	249	266	257	247
Kentucky	143	132	134	139	142	138
Louisiana	31	31	38	34	32	33
Michigan	99	105	112	119	134	133
Minnesota	273	294	331	344	277	272
Mississippi	37	33	30	31	36	35
Missouri	130	131	136	132	135	134
Montana	61	126	145	121	74	69
Nebraska	228	191	188	182	153	158
Nevada	10	10	10	11	10	10
New Mexico	37	43	47	42	29	28
North Carolina	73	81	87	83	77	73
North Dakota	146	165	181	184	141	125
Ohio	379	369	370	368	340	323
Oklahoma	343	340	348	459	350	307
South Carolina	51	81	82	84	65	53
South Dakota	105	125	136	131	98	93
Tennessee	113	106	98	105	104	99
Texas	518	543	556	561	649	623
Virginia	133	149	165	181	167	164
Washington	77	80	87	115	109	106
Wisconsin	131	147	151	155	156	157
Wyoming	32	38	47	45	30	25

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TABLE 5.6 (continued)

	State banks					
	1914	1918	1920	1923	1927	1929
Alabama	267	238	251	254	251	244
Arizona	47	60	67	55	32	34
Arkansas	425	389	404	403	376	347
Colorado	206	236	262	224	175	159
Georgia	675	659	686	586	412	362
Idaho	134	136	141	109	92	94
Illinois	1,439	1,434	1,489	1,416	1,358	1,319
Indiana	664	773	798	854	827	757
Iowa	1,410	1,561	1,564	1,506	1,222	1,129
Kansas	952	1,037	1,100	1,068	923	830
Kentucky	467	444	450	474	444	432
Louisiana	217	218	229	232	200	193
Michigan	702	740	739	765	739	718
Minnesota	863	863	863	863	863	863
Mississippi	282	266	302	303	290	277
Missouri	1,337	1,407	1,516	1,495	1,304	1,191
Montana	226	277	286	242	136	129
Nebraska	749	946	1,037	968	896	714
Nevada	21	23	23	24	25	25
New Mexico	47	74	76	59	30	30
North Carolina	384	434	491	477	432	399
North Dakota	619	693	718	648	390	309
Ohio	746	778	772	745	724	703
Oklahoma	574	580	612	446	348	344
South Carolina	329	336	379	345	216	170
South Dakota	526	517	543	556	319	303
Tennessee	378	415	450	466	418	393
Texas	1,038	1,037	1,125	1,071	852	791
Virginia	274	300	331	343	334	321
Washington	296	281	306	274	224	233
Wisconsin	652	778	819	838	810	801
Wyoming	72	98	113	89	58	62

SOURCES: See Data Appendix.

TABLE 5.7
Total Assets per Bank, and Bank Location, 1914-1929 (in thirty-two "agricultural crisis" states)

	Average total assets per bank (thousands of dollars)					
	National banks					
	1914	1918	1920	1923	1927	1929
Alabama	806	1,224	1,516	1,449	1,944	2,311
Arizona	1,215	1,299	1,766	1,389	1,863	2,608
Arkansas	607	818	1,020	1,004	1,285	1,352
Colorado	1,069	1,614	1,801	1,695	2,116	2,244
Georgia	884	1,676	2,145	1,704	3,299	3,377
Idaho	546	811	1,088	827	1,079	1,094
Illinois	1,912	2,764	3,562	3,068	3,737	3,295
Indiana	960	1,319	1,667	1,635	1,890	2,097
Iowa	692	1,010	1,301	1,144	1,264	1,381
Kansas	531	839	977	870	1,016	1,104
Kentucky	900	1,474	1,824	1,957	2,118	2,162
Louisiana	2,075	3,677	4,119	3,416	3,846	4,099
Michigan	2,054	2,826	3,784	3,634	4,324	4,991
Minnesota	1,220	1,682	1,979	1,785	2,325	2,468
Missisquoi	756	1,281	1,843	1,956	2,589	2,702
Missouri	2,820	4,276	5,507	4,162	4,887	4,509
Montana	895	746	761	766	1,191	1,489
Nebraska	694	1,342	1,566	1,424	1,496	1,615
New Mexico	972	1,545	1,823	1,529	1,990	2,299
North Carolina	921	1,379	2,064	2,086	1,047	1,331
North Dakota	338	499	563	528	644	702
Ohio	1,345	2,464	2,912	2,470	2,638	2,785
Oklahoma	343	766	1,096	848	1,219	1,448
South Carolina	908	1,244	1,818	1,520	2,048	2,371
South Dakota	446	718	862	731	733	871
Tennessee	1,026	1,583	2,352	2,070	2,459	3,033
Texas	705	1,081	1,588	1,356	1,771	2,347
Virginia	1,265	2,045	2,461	2,110	2,381	2,477
Washington	1,610	2,570	3,039	2,482	2,958	3,306
Wisconsin	1,592	2,065	2,720	2,476	2,979	3,413
Wyoming	630	1,102	1,365	1,369	1,442	1,711

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TABLE 5.7 (continued)

	Average total assets per bank (thousands of dollars)						Proportion of banks in towns of more than 2,500 people, 1920 ^a	
	State banks						National banks	State banks
	1914	1918	1920	1923	1927	1929		
Alabama	283	368	543	522	578	545	.55	.26
Arizona	555	807	974	974	1,745	2,107	.70	.54
Arkansas	164	304	456	404	445	492	.66	.31
Colorado	263	397	460	514	437	477	.42	.23
Georgia	224	355	534	519	489	538	.75	.31
Idaho	162	335	487	334	436	568	.58	.25
Illinois	739	996	1,322	1,610	2,085	2,584	.52	.31
Indiana	352	451	609	628	769	806	.57	.37
Iowa	314	423	563	542	562	596	.36	.15
Kansas	146	269	326	285	304	320	.43	.18
Kentucky	245	389	497	537	651	826	.63	.24
Louisiana	581	950	1,592	1,472	2,029	2,184	.79	.31
Michigan	635	988	1,470	1,505	2,272	2,555	.71	.25
Minnesota	235	287	425	403	443	466	.34	.18
Missisquoi	238	450	664	552	632	660	.80	.28
Missouri	350	493	572	631	722	741	.63	.22
Montana	269	391	436	393	605	680	.28	.16
Nebraska	155	298	335	319	365	383	.40	.12
Nevada	593	817	1,030	947	1,063	1,228	.60	.39
New Mexico	197	277	347	364	365	466	.47	.37
North Carolina	232	345	578	565	744	809	.77	.28
North Dakota	106	165	248	211	262	289	.16	.06
Ohio	806	1,162	1,645	2,167	3,095	3,271	.59	.41
Oklahoma	95	228	346	211	279	292	.51	.21
South Carolina	241	342	536	424	471	588	.72	.43
South Dakota	136	271	395	344	424	471	.27	.07
Tennessee	240	396	562	558	626	714	.65	.23
Texas	159	242	375	304	379	429	.49	.24
Virginia	329	478	613	656	819	878	.50	.29
Washington	449	637	752	520	606	703	.56	.29
Wisconsin	365	440	626	634	776	752	.62	.24
Wyoming	148	242	300	307	431	514	.47	.13

^aBranches excluded.

SOURCES: See Data Appendix.

TABLE 5.8

Asset Growth, 1914-1930 (percentage change in thirty-two "agricultural crisis" states)

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

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TABLE 5.8 (continued)

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

SOURCES: See Data Appendix.

TABLE 5.9
Capital as a Percentage of Total Assets, 1914-1929 (in thirty-two "agricultural crisis" states)

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

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TABLE 5.9 (continued)

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

SOURCES: See Data Appendix.

TABLE 5.10

Banks in States with Voluntary Insurance Systems

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

^aTexas had no state-insured banks after 1927.

^bWashington had no state-insured banks after 1920.

^cIn millions of dollars.

SOURCES: See Data Appendix.

266

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. As Table 5.7 shows, although there was considerable variation among states, national banks were always larger on average and always had a higher proportion of banks located in cities.

Because the potential benefits of deposit insurance are greater for small rural banks, historical accounts and economic theory lead one to expect that deposit insurance for state-chartered banks will reinforce this propensity for small rural banks to belong to the state system, and for large urban banks to join the national system. White (1983: 198-200) found that support for deposit insurance regulation was greatest among small bankers operating in unit banking states with low minimum capital requirements. For large urban state banks (which generally opposed deposit insurance legislation), deposit insurance was seen as a burden, a legislated subsidy from large to small banks.¹¹ Interest rates on insured deposits typically had ceilings that kept insured banks from being as competitive in the market for large, sophisticated depositors as in the market for deposits in rural areas.¹² 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 geographic periphery. A group of oil prospectors, ranchers, or farmers could organize a small bank to finance their expansion, while placing limited funds of their own at risk.¹³ Many 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.¹⁴ 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 to finance speculative

expansion on a scale that would not have been possible for a rural unit bank.¹⁵

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 5.6 through 5.10 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 featuring deposit insurance constituted a distinct group, during the eras of both expansion and contraction.

During the boom period of 1914-1920, the insured banks grew more rapidly than others. The fastest-growing state banking systems from 1914 to 1920 are shown in Table 5.11. Of these sixteen systems, seven were insured (one of the voluntary systems, Washington, is excluded from this list). The compulsory systems ranked first, fourth, fifth, sixth, and eighth in asset growth over this period. Two of the voluntary participation state systems (Kansas and Texas) ranked tenth and eleventh. High growth by itself does not imply excessive risk taking. As Table 5.11 shows, high growth was not confined to insured systems, as the experiences of Wyoming and Idaho demonstrate.

Three factors, however, made the high growth rates of the insured state banking systems unique: They accomplished high growth mainly through increases in the numbers of banks (see Table 5.6), rather than in assets per bank (Table 5.11); growth seems to have been concentrated in relatively sparsely populated regions; and insured banks operated with low capital-to-asset ratios; typically observed only in systems of larger-than-average size. Of the eight state banking systems that averaged less than \$400,000 in total assets per bank in 1920, six were insured banking systems, with the frontier states, Wyoming and New Mexico, accounting for the remaining two.

The West as a region was experiencing an 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

TABLE 5.11
High-growth States: Insured and Uninsured

	Assets in 1920/ Assets in 1914		Assets per bank in 1920 ^a		Capital/total assets in 1920	
	National banks	State banks	National banks	State banks	National banks	State banks
Uninsured						
Arkansas	2.45	2.64	1,020	456	.084	.085
Colorado	1.92	2.22	1,801	460	.048	.083
Idaho	2.93	3.16	1,088	487	.059	.077
Iowa	1.97	1.99	1,301	563	.057	.067
Minnesota	1.96	2.46	1,979	425	.054	.069
Missouri	2.04	1.85	5,507	572	.063	.072
Montana	2.02	2.04	761	436	.077	.091
New Mexico	2.00	2.84	963	347	.073	.119
Wyoming	3.18	3.17	1,365	300	.048	.090
Average	2.27	2.49	1,755	448	.063	.084
Insured						
Kansas	2.16	2.63 ^b	977	326 ^b	.066	.079 ^b
Mississippi	1.98	2.99	1,843	664	.069	.066
Nebraska	1.86	2.99	1,566	335	.057	.082
North Dakota	2.06	2.72	563	248	.068	.081
Oklahoma	3.24	3.86	1,096	346	.060	.070
South Dakota	2.50	2.85	862	395	.053	.062
Texas	2.42	2.56 ^b	1,588	375 ^b	.071	.112 ^b
Average	2.32	2.94	1,231	391	.064	.078

^aIn thousands of dollars.

^bThe data for Kansas and Texas state banks includes insured and uninsured banks.

SOURCES: See Data Appendix.

1860.¹⁶ But the insured banks differed in certain respects from those in other high-growth western states. In New Mexico, state-chartered banks operated in more populous areas, on average (see Table 5.7); and the fragility inherent in such rapid growth and small size were partly offset by the unusually high capital-to-asset ratio of banks (12 percent) in 1920, as shown in Table 5.9. Wyoming's capital-to-asset ratio of 9 percent was higher than any of the other 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, then 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 are attributable to different banking responses, rather than to different fundamental economic conditions. To this end, additional comparisons of insured systems with other banking systems within and across states are instructive. 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."

For two of the three states with voluntary systems (Kansas and Texas), the growth differences between national- and state-chartered banking before 1920 (Table 5.8) were clearly due to the disproportionate growth of state-run insured banking, as Table 5.10 reveals. These two voluntary systems grew rapidly during the pre-1920 boom period relative to other state banking systems, in both number of banks (Table 5.6) 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.¹⁷ 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 with the national system; and the insured system never accounted for more than 41 percent of state-chartered deposits (FDIC, 1956: 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 for excessive expansion. Second, its insurance system was the last to be established (in 1917), and there was less time for banks to join before 1920. Third, Washington's banking growth during this period was concentrated more in the large urban banks. Its national banking system was fifth among the sample of thirty-two 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 40 percent from 1913 to 1920 (see Table 5.3)—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 between states with and without insurance. Typically, state banking systems grew faster than national systems. In some states this difference is especially pronounced; in others it is actually reversed.

A rough comparison is provided in Table 5.12, 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.

A more formal approach to comparing state-chartered banking growth to national bank growth across states is presented in Table 5.13. Using cross-sectional data for the sample of thirty-two states, I performed a regression of state-chartered bank asset growth for 1914–1920 on the following: national-chartered asset growth, the

TABLE 5.12
Bank Growth Quartile Comparison, 1914-1920 (in thirty-two "agricultural crisis" states)

State-chartered banking systems				
	First quartile	Second quartile	Third quartile	Fourth quartile
First quartile	Nevada, Illinois, Kentucky	Colorado, Georgia, Indiana, Ohio		<i>Nebraska</i>
Second quartile	Iowa, Missouri, Montana	Minnesota, Wisconsin	New Mexico, Tennessee	<i>Mississippi</i>
Third quartile	Alabama, <i>Washington</i>	Michigan, Virginia	Arizona, <i>Kansas, North Dakota, Texas</i>	
Fourth quartile			Arkansas, South Carolina	Idaho, Louisiana, North Carolina, <i>Oklahoma, South Dakota, Wyoming</i>

NOTE: First quartile states had the lowest growth rates; fourth quartile states had the highest. Italicized states had state-insured banking systems.

SOURCES: See Data Appendix.

TABLE 5.13
Regression Results: Early Asset Growth of State-chartered Banks (in thirty-two "agricultural crisis" states)

Dependent variable: Growth in total assets of state-chartered banks, 1914-1920	Standard		
	Coefficient	error	Prob > T
Independent variables			
Intercept	0.156	0.468	0.741
National bank growth	0.682	0.147	0.000
(Reserve center) × (national bank growth)	-0.115	0.063	0.080
Growth in land values, 1914-1920	0.526	0.334	0.127
Ratio of farm to nonfarm population	-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
$R^2 = 0.683$			
$R^2 = 0.607$			
Dependent variable: Growth in total assets of state-chartered banks, 1914-1920			
Independent variables		Standard	
	Coefficient	error	Prob > T
Intercept	0.101	0.465	0.829
National bank growth	0.681	0.147	0.000
(Reserve center) × (national bank growth)	-0.132	0.060	0.038
Growth in land values, 1914-1920	0.555	0.333	0.107
Ratio of farm to nonfarm population	-0.283	0.654	0.669
Presence of voluntary or compulsory insurance	0.518	0.195	0.004
$R^2 = 0.670$			
$R^2 = 0.607$			

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 the first 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, 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 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 the consequent high coefficient standard errors limit the power of hypothesis tests.

Finally, comparisons among state banking systems in the same regions also support the conclusions 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: 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 5.14. Then consider a similar comparison between Mississippi statistics and those of the uninsured states in the deep South: Alabama, Georgia, and South Carolina. (Louisiana is excluded because of the special role of New Orleans as a financial center.)

These data reveal that the nine uninsured state-chartered systems of adjoining western states had larger banks on average, grew less, and had somewhat higher capital than their counterparts in the insured systems. On average, uninsured western asset growth from 1914 to 1920 was 138 percent, compared to 186 percent for the insured

TABLE 5.14
Regional Comparison of Insured and Uninsured State-chartered Banks

	Assets 1920/ Assets 1914	Assets per bank in 1920 (thousands of dollars)	Capital/total assets in 1920
West			
<i>Uninsured</i>			
Arkansas	2.64	456	.085
Colorado	2.22	460	.083
Idaho	3.16	487	.077
Iowa	1.99	563	.067
Minnesota	2.46	425	.069
Missouri	1.85	572	.072
Montana	2.04	436	.091
New Mexico	2.84	347	.119
Wyoming	3.17	300	.090
Average	2.49	450	.084
<i>Insured</i>			
Kansas ^a	2.63	326	.079
Nebraska	2.99	335	.082
North Dakota	2.72	248	.081
Oklahoma	3.86	346	.070
South Dakota	2.85	395	.062
Texas ^a	2.56	375	.112
Average	2.94	338	.081
South			
<i>Uninsured</i>			
Alabama	1.81	543	.087
Georgia	2.43	534	.097
South Carolina	2.56	536	.085
Average	2.27	538	.090
<i>Insured</i>			
Mississippi	2.99	664	.066

^aData for Kansas and Texas include uninsured banks.

SOURCES: See Data Appendix.

group. The average total assets of banks in the uninsured group was \$450,000, while for the insured banks the average was \$338,000. The historic vulnerability of small banks explains why, other things being equal, their depositors required them to maintain higher than average ratios of capital to deposits.¹⁸ But in this sample, capital averaged 8.4 percent of assets for the uninsured group and 8.1

percent for the insured. When Texas—the insured state with a high legally mandated capital-to-deposit ratio that exceeded “market-determined” bank leverage in other states—is excluded the difference becomes even greater (8.4 percent, compared to 7.5 percent).

The relation between Mississippi and its neighbors is similar. Asset growth averaged 122 percent in the uninsured states, as compared to 194 percent in Mississippi. The ratio of capital to assets for the uninsured states was 9.0 percent, as compared to 6.6 percent in Mississippi. Average bank size in Mississippi was greater than that of the other states in the deep South (\$664,000 as compared to \$538,000), but this size difference is partly attributable to the much higher growth in assets in Mississippi. From 1914 to 1920 their assets tripled, compared with those of the other states whose assets on average roughly doubled over the same period. Also, Mississippi's state-chartered banks included older, relatively large branching banks (ten banks with twenty-four branches in 1920) that were allowed to continue operating even though new branching was not allowed. Finally, as discussed in the following section, 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, by 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 evaluate the effects of insurance on the membership and balance sheet responses of state banking systems to the crisis. As several authors (American Bankers Association, 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 to cover 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 the collapse, and there was widespread defection of relatively healthy insured banks to alternative systems, as shown in Table 5.15. In all cases, there was a net transfer of banks from the insured state systems to the national system.

Table 5.15 reports data on changes of charter across the two systems within each state from 1921 through 1930. During this period the forty-eight contiguous states as a group experienced a total of 361 net conversions from state- to national-chartered banking. All eight states with deposit insurance had positive net conversions over this period, and as a group they accounted for 278 of the 361 net conversions. At the same time, the group of Montana, Iowa, Colorado, Idaho, Wyoming, Oregon, Arizona, Arkansas, Minnesota, and New Mexico had only five net conversions in all. Furthermore, only eight states other than those with insurance plans had net conversions of greater than five: 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 growth; in Illinois only a small percentage of banks converted, and total state banking assets grew substantially relative to 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 for which national banking gained at the expense of state banking in response to the agricultural crisis.

In the states with voluntary state-run insurance participation (Table 5.5), there was widespread movement to the other state systems as well (Table 5.10). In Kansas and Texas, banks switched en masse from 1924 to 1926. The demise of the Texas system reflects the fact that withdrawal was illegal until 1925. In Kansas, the failure in 1923 of the largest bank in the insured system, and a court ruling in

TABLE 5.15
Bank Charter Switches, 1921-1930

	From state to national charter	From national to state charter	Net increase in banks under national system
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	2	3	-1
Louisiana	7	2	5
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

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TABLE 5.15 (continued)

	From state to national charter	From national to state charter	Net increase in banks under national system
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.

1926 absorbing banks that chose to withdraw from liabilities for prior bank failures (above the amount of securities already deposited in the state fund), explain the timing of withdrawal. In Washington, the failure of one bank—again, the largest in the state, which accounted for one-fifth of insured deposits—prompted all other insured banks to leave the system.¹⁹

Thus, while deposit insurance produced abnormally high growth during the boom, it caused abnormally low state-chartered growth during the crisis. Table 5.16 reports regression results analogous to those of Table 5.13 but for the periods 1920-1926 and 1920-1930. The average annual rate of business failure from 1921 to either 1925 or 1929 divided by 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 subperiods because, before 1930, Nebraska's insurance fund chose not to close many insolvent banks that had suspended convertibility; this action contaminated 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

TABLE 5.16

Regression Results: Late Asset Growth of State-chartered Banks

Dependent variable: Growth in total assets of state-chartered banks, 1920-1926			
Independent variable	Coefficient	Standard error	Prob > T
Intercept	0.400	0.458	0.391
National bank growth	0.598	0.239	0.019
(Reserve center) × (national bank growth)	0.213	0.098	0.039
Ratio of farm to nonfarm population	-0.251	0.347	0.477
Growth in land values, 1920-1925	0.269	0.540	0.622
Business failure rate, 1921-1925	-0.048	0.039	0.233
Business failure rate, 1917-1920			
Presence of deposit insurance (excluding Nebraska)	-0.271	0.123	0.036
$R^2 = 0.537$			
$R^2 = 0.426$			
Dependent variable: Growth in total assets of state-chartered banks, 1920-1930			
Independent variable	Coefficient	Standard error	Prob > T
Intercept	1.482	0.554	0.013
National bank growth	0.063	0.225	0.782
(Reserve center) × (national bank growth)	0.141	0.135	0.308
Ratio of farm to nonfarm population	-0.648	0.475	0.185
Growth in land values, 1920-1930	-0.091	0.659	0.891
Business failure rate, 1921-1929	-0.095	0.053	0.088
Business failure rate, 1917-1920			
Presence of deposit insurance (excluding Nebraska)	-0.194	0.171	0.267
$R^2 = 0.405$			
$R^2 = 0.262$			
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) × (national bank growth)	0.130	0.133	0.337
Ratio of farm to nonfarm population	-0.593	0.465	0.214
Growth in land values, 1920-1930	-0.065	0.641	0.920
Business failure rate, 1921-1929	-0.094	0.052	0.079
Business failure rate, 1917-1920			
Presence of deposit insurance (including Nebraska)	-0.240	0.155	0.134
$R^2 = 0.429$			
$R^2 = 0.292$			

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 a change from a 19 percent to a 24 percent slowdown in growth during the decade. Other variables generally have the expected signs—higher business 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 to the reliability of the regression equation once these other control variables are taken into account.

Insured banks were not the only ones that saw a decline in growth during the crisis. Many states experienced a considerable decline as agricultural earnings fell and bankruptcies rose. There was, however, substantial variation in the rate of recovery from the crisis across states, and across banks within states. As Table 5.8 shows, in the period 1927-1929 the uninsured state systems of Arizona, Idaho, and Wyoming saw high growth rates that essentially reversed the negative growth of the previous seven years. In all three cases, the state-chartered banking growth for the period 1920-1929 exceeded the growth of national-chartered banks in those states.²⁰

Furthermore, within states the growth of state-chartered banks was not identical across banks. With the exception of the insured systems, the average size of state-chartered banks was somewhat stationary or even increased from 1920 to 1929 (Table 5.7). In some extreme cases assets per bank approximately doubled (Arizona, Illinois, Michigan, Ohio, and Wyoming).

Growth of bank 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 correspondence suggests that, as small rural banks failed, they were not likely to be replaced by similar institutions, but rather by larger banks. White (1985) found that the surge in bank mergers 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 (for example, a reduction in the perceived desirability of rural farm loans and a change in emphasis toward industry located in cities and towns where larger unit banks operate), this variation may also reflect different regulations across states—in particular, laws governing branch banking.²¹

In states that allowed branch banking, the acquisition of small rural banks that failed or their replacement with new branches should have been easy because the cost (including risk) of establishing branches was lower than that of opening a bank.²² Chapman (1934: Chapter 11) 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 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.

Branch banking and banking system recovery. Table 5.17 summarizes data on the growth in the number of total banks, branching banks, and branches of national and state banks for 1924 (the earliest available data) and 1928 (the last disaggregated data available for the 1920s), categorized according to state banking laws on branching in the thirty-two 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 total legal prohibition of branching.²³

National banks were often permitted to maintain any branches that existed at the time of their conversion to national charters; thus

TABLE 5.17
Growth in Branch Banking (in thirty-two "agricultural crisis" states)

	National Banks			
	1924		1928	
	Total facilities	Branching banks	Branches	Total facilities
Statewide branching allowed				
Arizona	19	0	0	15
North Carolina	86	2	3	83
South Carolina	84	2	3	66
Virginia	352	7	11	182
Limited branching allowed				
Kentucky	145	3	7	155
Louisiana	41	1	8	41
Michigan	144	10	23	181
Ohio	363	4	4	338
Tennessee	110	2	2	122
Preexisting branching allowed				
Alabama	105	0	0	107
Arkansas	88	0	0	79
Georgia	101	2	7	97
Indiana	248	0	0	229
Minnesota	345	3	11	285
Mississippi	36	1	1	37
Nebraska	177	2	2	160
Washington	114	1	2	111
Wisconsin	157	1	2	159
No branching				
Colorado	141	0	0	123
Iaho	70	0	0	46
Illinois	502	0	0	484
Iowa	347	0	0	270
Kansas	260	0	0	250
Missouri	134	0	0	134
Montana	93	0	0	70
Nevada	11	0	0	10
New Mexico	33	0	0	29
North Dakota	165	0	0	136
Oklahoma	421	0	0	333
South Dakota	116	0	0	97
Texas	573	0	0	638
Wyoming	37	0	0	26

(continued on next page)

TABLE 5.17 (continued)

	State Banks			
	1924		1928	
	Total facilities	Branching banks	Branches	Total facilities
Statewide branching allowed				
Arizona	64	6	20	53
North Carolina	535	39	64	437
South Carolina	347	7	17	247
Virginia	216	24	34	376
Limited branching allowed				
Kentucky	483	1	5	480
Louisiana	303	33	85	299
Michigan	906	53	309	989
Ohio	947	47	199	960
Tennessee	512	19	51	446
Preexisting branching allowed				
Alabama	276	5	19	269
Arkansas	400	2	3	361
Georgia	608	19	46	394
Indiana	863	4	8	808
Minnesota	1,081	0	0	855
Mississippi	346	10	24	313
Nebraska	925	0	0	746
Washington	272	4	5	247
Wisconsin	839	6	7	817
No branching				
Colorado	201	0	0	164
Idaho	107	0	0	94
Illinois	1,408	0	0	1,337
Iowa	1,438	0	0	1,169
Kansas	1,033	0	0	864
Missouri	1,478	0	0	1,231
Montana	155	0	0	132
Nevada	23	0	0	25
New Mexico	43	0	0	29
North Dakota	523	0	0	354
Oklahoma	388	0	0	337
South Dakota	437	0	0	315
Texas	1,046	0	0	816
Wyoming	79	0	0	60

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TABLE 5.17 (continued)

	All Banks			
	1924		1928	
	Total	Branching banks and branches	Total	Branching banks and branches
Statewide branching allowed				
Arizona	83	26	68	31
North Carolina	621	108	520	122
South Carolina	431	29	313	66
Virginia	568	76	558	102
Limited branching allowed				
Kentucky	628	16	635	82
Louisiana	344	127	340	154
Michigan	1,050	395	1,170	486
Ohio	1,310	254	1,298	309
Tennessee	622	74	568	88
Preexisting branching allowed				
Alabama	381	24	376	24
Arkansas	488	5	440	5
Georgia	709	74	491	56
Indiana	1,111	12	1,037	13
Minnesota	1,426	14	1,140	8
Mississippi	382	36	350	36
Nebraska	1,102	4	906	4
Washington	386	12	358	10
Wisconsin	996	16	976	16
No branching				
Colorado	342	0	287	0
Idaho	177	0	140	0
Illinois	1,910	0	1,821	0
Iowa	1,785	0	1,439	0
Kansas	1,293	0	1,114	0
Missouri	1,612	0	1,365	0
Montana	248	0	202	0
Nevada	34	0	35	0
New Mexico	76	0	58	0
North Dakota	688	0	490	0
Oklahoma	809	0	670	0
South Dakota	553	0	412	0
Texas	1,619	0	1,454	0
Wyoming	116	0	86	0

SOURCES: See Data Appendix.

national banks operated branches in some states. In no states before 1927, however, did 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 was little variation across states in national bank branching during the 1920s.

Several patterns are visible in Table 5.17. Because of switching between national and state charters, let us focus on branching within the states for national and state banks in aggregate. Of the eighteen states that allowed branches to exist, only three saw a reduction in the number of total branch-banking facilities from 1924 to 1928. All these reductions 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 departure (failure or closing) of a single bank accounts for the reduction.²⁴ In the other six states that allowed branching to continue but prohibited the establishment of new branches, the number of branching facilities remained the same. In the nine 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.

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 (Table 5.8) in the late 1920s relative to other states. These were also the states that experienced the largest increases in the average size of banks (Table 5.7). 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 5.18 I report regressions of bank asset growth from 1920 to 1926 and 1926 to 1930 on the same variables used in Table 5.16, with the addition of branching dummies for city-restricted and out-of-city branching. Out-of-city branching includes statewide branching systems and Ohio, which allowed limited out-of-city branching. I also report regressions using the change in

TABLE 5.18

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

Independent variable	Coefficient	Standard	
		error	Prob > T
Intercept	0.544	0.450	0.239
National bank growth	0.602	0.235	0.018
(Reserve center) × (national bank growth)	0.178	0.098	0.084
Ratio of farm to nonfarm population	-0.404	0.346	0.254
Growth in land values, 1920-1925	0.037	0.541	0.946
Business failure rate, 1921-1925	-0.040	0.038	0.308
Business failure rate, 1917-1920	-0.190	0.126	0.146
Presence of deposit insurance (excluding Nebraska)	0.179	0.124	0.163
Out-of-city branch banking	0.204	0.132	0.136
Within-city branch banking			
$R^2 = 0.601$			
$R^2 = 0.462$			
Dependent variable: Growth in total assets of state-chartered banks, 1920-1930			
Independent variable	Coefficient	Standard error	Prob > T
Intercept	1.539	0.449	0.002
National bank growth	0.124	0.200	0.539
(Reserve center) × (national bank growth)	0.078	0.115	0.502
Ratio of farm to nonfarm population	-0.0936	0.405	0.030
Growth in land values, 1920-1930	-0.386	0.551	0.490
Business failure rate, 1921-1929	-0.072	0.044	0.118
Business failure rate, 1917-1920	-0.065	0.140	0.647
Presence of deposit insurance (excluding Nebraska)	0.398	0.150	0.014
Out-of-city branch banking	0.428	0.161	0.014
Within-city branch banking			
$R^2 = 0.625$			
$R^2 = 0.495$			

(continued on next page)

TABLE 5.18 (continued)

Dependent variable: Assets per bank for state-chartered banks, 1926			
Independent variable	Coefficient	Standard error	Prob > T
Intercept	1341.96	739.24	0.082
National bank growth	0.101	0.115	0.385
(Reserve center) × (national bank growth)	0.084	0.072	0.256
Ratio of farm to nonfarm population	-1782.05	580.74	0.005
Growth in land values, 1920-1925	-160.61	884.00	0.857
Business failure rate, 1921-1925	-40.55	60.60	0.510
Business failure rate, 1917-1920	593.49	198.93	0.007
Out-of-city branch banking	540.64	257.51	0.047
Within-city branch banking			
$R^2 = 0.688$			
$R^2 = 0.597$			
Dependent variable: Assets per bank for state-chartered banks, 1930			
Independent variable	Coefficient	Standard error	Prob > T
Intercept	1866.64	847.17	0.037
National bank growth	0.072	0.128	0.577
(Reserve center) × (national bank growth)	0.100	0.079	0.219
Ratio of farm to nonfarm population	-2642.12	725.33	0.001
Growth in land values, 1920-1930	-375.72	952.96	0.697
Business failure rate, 1921-1929	-24.39	75.20	0.749
Business failure rate, 1917-1920	876.91	244.74	0.002
Out-of-city branch banking	736.32	330.63	0.036
Within-city branch banking			
$R^2 = 0.700$			
$R^2 = 0.612$			

average bank size as the dependent variable. While the availability of the few degrees of freedom in the regressions prompts a cautious interpretation of the results, both branching indicator variables were relatively large and statistically significant. Indeed, branching indicators have a larger, more significant, and more persistent effect on total asset growth than deposit insurance indicators in the regression. These results indicate that, from the standpoint of *long-run* 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 time that the insurance fund was dissolved; then the state systems as well as other unit banking systems gradually recovered. In contrast, the effect of branching on banking growth and average bank size increases with time.

These comparisons underscore 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 true chains from other banking conglomerates. Chains were defined as groups of corporately independent banks "under centralized control."²⁵ 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: 322-63). The potential for chains to allow member banks to diversify bank portfolios seems to have been more limited, as the high failure rates of chains relative to branching banks indicate.²⁶

As Table 5.19 indicates, the freedom to branch was inversely related to the prevalence of chain banking. Table 5.19 reports the number and proportion of chain banks in the state- and national-chartered systems for our sample of thirty-two 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 overall growth, average size, and membership patterns of banks during the 1920s indicates that the states can be grouped into three categories according to the

TABLE 5.19
Chain Systems and Participating Banks by State (as of June 30, 1929)

	Number of chain systems	Banks in chain systems	
		National	State
Staterwide branch banking permitted			
Arizona	1	1	5
California	4	20	10
Delaware			
District of Columbia			
Maryland			
North Carolina			
Rhode Island	1	1	2
South Carolina			
Virginia			
Total	6	22	17
Branches restricted as to location			
Kentucky	1	4	4
Louisiana	2	6	4
Maine	1	2	3
Massachusetts	4	19	14
Michigan	11	3	68
Mississippi			
New Jersey	12	22	27
New York	17	58	53
Ohio	1	3	3
Pennsylvania	9	12	26
Tennessee	3	6	4
Total	61	135	202

(continued on facing page)

banking systems in use at the time: 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 extensive swings in aggregate growth; and states with branch banking systems (restricted or statewide) that managed to respond most successfully to the challenges brought by the declining terms of trade in agriculture.

How can one reconcile the fact that deposit insurance created

TABLE 5.19 (continued)

	Number of chain systems	Banks in chain systems	
		National	State
Branches prohibited by law			
Alabama	3	11	11
Arkansas	4	13	50
Colorado	2	8	5
Connecticut			
Florida	4	13	19
Georgia	6	8	15
Idaho	3	7	16
Illinois	11	20	61
Indiana	1	2	1
Iowa	12	33	59
Kansas	10	15	40
Minnesota	34	130	149
Missouri	4	7	19
Montana	2	4	11
Nebraska	9	15	48
Nevada	2	2	12
New Mexico	1	4	2
Oregon	6	14	18
Texas	6	7	30
Utah	5	12	38
Washington	11	26	36
West Virginia			
Wisconsin	5	14	21
Total	141	365	661
Branches prohibited in practice			
New Hampshire			
North Dakota	7	20	40
Oklahoma	8	41	18
South Dakota	5	10	20
Vermont			
Wyoming	2	3	7
Total	22	74	85
Grand Total	230	596	965

SOURCES: See Data Appendix.

moral hazard during the boom but did not protect depositors ultimately? I would argue that the precipitous collapse of agricultural prices was a small-probability event with major consequences. Insurance would have protected (at least the first few) individual banks from individual failures absent cataclysmic declines, and thus depositors may have been less mindful of bank risk taking before the bust. The large withdrawals of assets from insured banks after insurance was removed are certainly consistent with the notion of depositor discipline through withdrawals from troubled banks.

Bank Failure Costs and the Role of Regulation

Combined data on numbers of banks and their assets over time do not distinguish voluntary exits by banks from bank failures. In particular, one might conceive that the decline in insured banking was primarily the result of voluntary exit in response to rising assessments once a few banks had failed, in conjunction with laws that permitted banks to switch charters. If this were the case, skeptics regarding 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 the previous section. A study of the characteristics of bank failures permits one to distinguish exits from failures and supplies further direct evidence on the extent of risk taking during the boom under different regulatory regimes.

The American Bankers Association (1933), Calomiris (1989), and Thies and Gerlowski (1989) provide evidence that insured banks were more likely to fail than (a) national banks in the same state, (b) uninsured state banks in the same state, and (c) uninsured state banks in other states. While the within-state comparisons made by these authors of the failure propensities of insured and uninsured state banks in Kansas (summarized later) are compelling, the other evidence is less so. One must control for differences in states' product specialization, and differences across states in the relative agricultural risk exposure of national and state banks (because of

other regulatory differences between national and state banks) if one wants to isolate the role of deposit insurance regulation in promoting risk taking.²⁷

Furthermore, the definitions of bank failure may differ across these studies in ways that are not always clear. In analyzing bank failures, I restrict attention to involuntary liquidations. Some banks suspended operations and reopened; other banks were acquired by other institutions; some banks chose to close while still solvent. Suspensions, consolidations, and voluntary closings have social costs—consolidations and closings may reduce the supply of banking services in some areas, and suspensions disrupt the payments system. I focus on liquidations because they offer a clearer index of the costs of the crisis—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 have explanations other than bank insolvency.²⁸ I also focus on average failure rates for several years rather than year-by-year comparisons across states. Differences in state closure rules (in particular, the long delay in closing insolvent banks by the Nebraska Guaranty Fund) argue for this approach.²⁹

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 5.20 presents data on average annual bank failure rates, by state and type of banking system, for various subperiods from 1918 to 1929 for the sample of thirty-two agricultural crisis states.³⁰ These data echo the wide variation in economic fundamentals and banking system responses across states and types of banks evidenced in earlier tables. Clearly, the Cotton Belt and the grain-producing states suffered disproportionately during the 1920s. Table 5.20 illustrates the pitfalls of using the difference

TABLE 5.20
Average Annual Percentage Bank Failure Rate, 1918-1929 (in thirty-two "agricultural crisis" states)

	1918-1920		1921-1924		1925-1929		1921-1929	
	National banks	State banks	National banks	State banks	National banks	State banks	National banks	State banks
Alabama	.00	1.4	0.25	0.70	0.07	1.17	0.44	0.97
Arizona	.00	.00	3.75	7.09	0.50	3.11	1.67	4.31
Arkansas	.50	.34	0.30	1.05	1.36	2.92	0.94	2.06
Colorado	.00	.29	0.71	2.96	1.56	2.49	1.18	2.37
Georgia	.00	.31	0.27	3.10	1.91	5.80	1.19	4.02
Idaho	.00	.00	4.32	5.67	2.86	2.80	3.29	3.70
Illinois	.00	.16	0.05	0.39	0.44	0.48	0.28	0.43
Indiana	.00	.18	0.10	0.53	0.56	1.22	0.35	0.96
Iowa	.00	.04	0.28	1.06	4.32	2.78	2.45	1.89
Kansas	.00	.17	0.40	1.43	0.54	2.19	0.49	1.78
Kentucky	.00	.07	0.00	0.67	0.00	1.14	0.00	0.96
Louisiana	.00	.16	0.66	1.64	0.00	1.47	0.29	1.50
Michigan	.00	.05	0.00	0.17	0.17	0.10	0.10	0.14
Minnesota	.12	.46	0.53	1.95	3.11	3.96	1.98	2.89
Mississippi	.00	.00	0.83	1.41	0.57	1.47	0.74	1.43
Missouri	.00	.22	0.00	1.02	0.75	2.33	0.41	1.72
Montana	.00	.00	6.72	10.14	3.23	4.14	4.14	5.09
Nebraska	.00	.07	1.73	1.81	4.27	1.60	2.98	2.98
Nevada	.00	.00	0.00	1.09	0.00	0.00	0.00	0.48
New Mexico	.00	.00	7.98	8.89	1.82	5.12	4.26	5.56
N. Carolina	.00	.00	0.86	1.88	1.93	2.40	1.40	2.20
N. Dakota	.00	.10	3.59	7.10	3.64	6.69	3.44	5.87
Ohio	.09	.04	0.14	0.13	0.17	0.59	0.15	0.37
Oklahoma	.10	.18	1.72	4.82	1.47	2.89	1.76	3.16
S. Carolina	.00	.00	0.00	2.31	3.70	7.94	2.03	4.87
S. Dakota	.00	.07	4.04	5.99	4.83	5.86	4.09	5.28
Tennessee	.00	.00	0.00	0.39	0.37	2.12	0.23	1.38
Texas	.00	.20	0.58	1.69	0.63	1.40	0.62	1.47
Virginia	.00	.34	0.15	0.98	0.11	0.92	0.13	0.97
Washington	.00	.23	0.57	1.96	1.07	1.13	1.02	1.42
Wisconsin	.00	.00	0.33	0.36	0.52	0.96	0.44	0.69
Wyoming	.00	.00	4.26	6.20	1.62	5.06	2.60	4.72
Average	.03	.12	1.41	2.71	1.42	2.65	1.37	2.43

SOURCES: See Data Appendix.

between state and national bank failure rates for a given state (as in Calomiris, 1989) to measure the role of deposit insurance. While the differences 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), in all but one state (Iowa) the failure rate for national banks was less than for state banks, presumably because of the smaller average bank size and more liberal real estate lending regulations of the latter.

Similarly, comparisons between states across state-chartered systems reveal several cases where uninsured systems fared worse than insured. The difference in annual failure rates between the 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 less experience of failure than uninsured state-chartered banks. For example, one could define Texas and Oklahoma as being in the same region as Arizona and New Mexico, or define Mississippi as being in the same region as Alabama, Georgia, Louisiana, and South Carolina.

Regional distinctions, of course, are intended as rough classifications of economic environments under which banking systems operate. Thus, rather than experiment with different definitions of economic regions, I included measures of economic environment directly in weighted-least-squares regressions to capture the marginal effects of deposit insurance on bank failure propensities.³¹ I do not report these results because I found that, depending on the precise mix of control variables one uses, the calculated impact of deposit insurance (and of the control variables) varied greatly and was typically positive and insignificant.³² 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 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 the failure tendencies of insured and uninsured state-chartered banks operating in Kansas. Kansas provides a unique "controlled experiment" because it was the only state with a large number of both insured and uninsured state-chartered banks. The annual failure rate for insured banks in Kansas from 1921 to 1924 (before the mass conversions of banks to uninsured charters) is 1.90, compared to an annual failure rate of 0.67 percent for uninsured banks.³³

The severity of bank failure for insured and uninsured systems. It would be a mistake to place too much emphasis on rates of bank failure 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 tendency to fail, which may show relatively little variation.

Data exist with which to perform cross-state and cross-system comparisons of asset shortfalls of insolvent banks in the 1920s as a means to measure the average severity of bank failures across states. Complete data for insured banking systems are provided in FDIC (1956), but data for the rest of the U.S. banking systems are available only for banks whose liquidations were completed by 1930 (see Data Appendix). As Table 5.21 shows, for some state-chartered systems only a small percentage of liquidations that had occurred during the 1920s were processed by 1930. 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.

Despite this problem, there is little 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 (Table 5.21). Regional comparisons are particularly telling. Consider the low ratios of repayments from assets to total claims of North and South Dakota (17 and 24 percent, respectively) and their neighbors' ratios: Montana (52), Idaho (49), Wyoming (54), Colorado (68), and Minnesota (48). A comparison of insured banking in Nebraska (35) with that in Iowa (54), Missouri (53), Colorado, and Wyoming is similarly revealing.

Kansas, Oklahoma, Texas, and Mississippi showed ratios more similar to the average experience of their neighbors. Note that two of these were voluntary insurance states, and the exceptionally high required capital ratio of Texas may have played a role here as well.

Oklahoma's compulsory insurance system lasted only until 1923 and thus should have had relatively little influence on failure propensity for the 1920s as a whole. As current critics of deposit insurance emphasize, many of the losses that occur in an insured system reflect bank responses to adverse shocks that reduce bank capital and magnify the incentives for risk taking (see Kane, 1988; and Horvitz, this volume). 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 by far of bank failure for that group for the period 1921–1929. Mississippi's special experience may reflect, in part, the circumstances for the creation of its compulsory-insurance system. 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 (Table 5.20) and degree of asset shortfall (Table 5.21) in Mississippi during the 1920s may indicate simply that many of the most vulnerable banks in that state had collapsed before the period of deposit insurance coverage. The surviving banks on average were larger and more urban and thus were less likely to use deposit insurance protection to promote high-risk agricultural expansion. Entry by new banks seeking to take advantage of deposit insurance was notoriously difficult in Mississippi as

TABLE 5.21
Bank Liquidations, 1921-1930 (as of 1930)

	National banks			State banks		
	Number completely liquidated	Number in process of liquidation	Repayment ratio ^a	Number completely liquidated	Number in process of liquidation	Repayment ratio ^a
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 ^b	0 ^b	.53 ^b
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 ^b	0 ^b	.52 ^b
Missouri	2	10	.66	109	200	.53
Montana	38	15	.34	27	28	.52
Nebraska	13	15	.44	317 ^b	0 ^b	.35 ^b
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 ^b	0 ^b	.17 ^b
Ohio	3	7	.66	0	42	NA
Oklahoma	25	26	.43	139 ^b	0 ^b	.56 ^b
South Carolina	8	16	.51	16	189	.66
South Dakota	16	34	.51	242 ^b	0 ^b	.24 ^b
Tennessee	1	4	.93	12	61	.83
Texas	21	22	.58	138 ^b	0 ^b	.54 ^b
Virginia	1	3	.90	4	41	.57
Washington	4	5	.84	1 ^b	0 ^b	.75 ^b
Wisconsin	2	6	.30	20	40	.66
Wyoming	8	2	.70	15	13	.54

^aThe repayment ratio is defined as the ratio of deposits repaid from asset liquidation for banks that were completely liquidated.

^bInsured banks only. Includes liquidations completed after 1930.

SOURCES: See Data Appendix.

well, because of the strict chartering standards set by the state's regulators.³⁴ Thus Mississippi seems to have avoided the higher 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 comparatively large average size of banks in 1918 and 1920 in Mississippi relative to its neighbors or relative to other insured banking systems (see Table 5.7).

Inefficient bank liquidation procedures in insured states. A final interesting difference between insured and uninsured banking was the efficiency of bank liquidation procedures. Delays in winding up the operations of banks impose costs on depositors of illiquidity and forgone interest, apart from the ultimate larger losses due to asset shortfalls. Delays in closing banks, or in final liquidation of closed banks, may also 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 three years eleven months for state bank liquidations to be completed, and for national banks it took four years two months. For the agricultural crisis states for which data are available, state bank liquidations averaged four years four months, and national bank liquidations averaged three years eleven months (Table 5.22). In the five compulsory insurance states 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 5.22). In Nebraska, state-chartered banks that were liquidated before 1930 took an average of six years four months to be liquidated, compared to four years nine months for national banks. In North and South Dakota, state-bank liquidation delays averaged six years three months and five years seven months, respectively, compared to four years and four years eight months for national banks in the respective states. In Oklahoma, delays averaged five years, compared to three years eight months for national banks. Voluntary insurance state systems had

TABLE 5.22
Average Time between Closing and Completed Liquidation of Banks, 1921-1930 (in thirty-two "agricultural crisis" states)

	National banks		State banks	
	Years	Number of banks	Years	Number of banks
Alabama	3.17	2	3.25	8
Arizona	4.83	2	3.67	3
Arkansas	2.42	3	2.83	37
Colorado	4.42	8	2.92	60
Georgia	3.75	5	3.67	113
Idaho	4.17	17	4.50	28
Illinois	3.25	2	3.83	8
Indiana	7.50	1	4.33	5
Iowa	3.67	14	3.58	179
Kansas	3.25	4	3.33	117
Kentucky	n.a.	n.a.	3.33	17
Louisiana	7.17	1	4.25	14
Michigan	n.a.	n.a.	6.25	2
Minnesota	4.00	13	5.58	48
Mississippi	1.08	2	6.00	2
Missouri	3.50	2	3.17	109
Montana	4.50	38	4.33	23
Nebraska	4.75	13	6.33	15
Nevada	n.a.	n.a.	n.a.	n.a.
New Mexico	4.42	12	5.00	17
North Carolina	2.92	4	7.08	1
North Dakota	4.00	21	6.25	35
Ohio	3.42	3	n.a.	n.a.
Oklahoma	3.67	25	5.00	64
South Carolina	3.83	8	3.92	8
South Dakota	4.67	16	5.58	22
Tennessee	0.92	1	3.92	6
Texas	4.00	21	3.75	19
Virginia	4.67	1	3.92	4
Washington	4.17	4	4.08	32
Wisconsin	3.67	2	3.17	20
Wyoming	4.83	8	3.33	10

n.a. = not available.

SOURCES: See Data Appendix.

average delays roughly comparable to those of national banks operating within the same states, as did virtually all other agricultural crisis states.³⁵

What can explain this phenomenon? That deposit insurance systems redeemed the losses of depositors slowly and partially, owing in part to the limited resources of the funds, is well established (see American Bankers Association, 1933; FDIC, 1956). The present analysis reveals 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 the liquidation of insolvent bank assets 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. That lag is akin to the FSILC'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.³⁶ State politicians of the 1920s may have acted similarly; and solvent banks had a motive for encouraging delays, to give themselves 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 the previous section I established that branch banking flourished in response to the crisis of the 1920s. Although it is likely that the physical costs of entry of branches was lower than that of unit banks in many cases, another dimension of the advantage to branching—one that was noted even in the 1920s—was that branching banks suffered lower risk of failure.

References to this phenomenon were quite common (for example, Cartinhour, 1931). The congressional hearings of 1930 on "branch, chain, and group" banking provided data that allow some quantification of the lower risks of branch banking in the United

States during the 1920s. From 1921 to 1929, only thirty-seven branching banks, operating seventy-five branches, were liquidated. More than two-thirds of these banks operated a single branch, and no more than six of them operated three or more branches.³⁷ In 1924 714 banks were operating 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 thirty-two agricultural crisis states contained 1,312 of the 3,007 branch banking facilities. Breakdowns of failures by type of bank and by state are not readily available; but even if all branching failures had been concentrated in these states during the 1920s, the annual rate of failure for branch banking facilities would have been only 0.85 percent. This is a very low rate of failure compared with those of state systems on the whole (see Table 5.20). Only four state-chartered systems had failure rates lower than 0.85 percent—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 for the sample of thirty-two agricultural crisis states (see Table 5.3).

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 branches (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 1924.³⁸ In this sample of seven states, twenty-eight branching banks operated fifty-eight branches in 1924, and twenty-six branching banks operated fifty-three 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: Mississippi, Arizona, and South Carolina. I chose these states because they experienced high rates of bank failure, they had a small number of branching banks (making data collection easier), and branching banks in these states operated branches mainly outside their home city. In Mississippi, all twenty-four branches in operation in 1920 were located outside their banks' home cities. The same was true of Arizona's twenty branches in operation in 1920. In South Carolina, thirteen out of fifteen 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 1920, eight Arizona banks operated twenty branches. By 1929, two 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, thus explaining the stability in the total number of these banks (see Table 5.17). The average annual failure rate for total branching facilities was therefore 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 ten branching banks operating twenty-four branches failed, whereas the average annual failure rate for state-chartered banks as a whole was 1.4 percent.

In South Carolina from 1920 to 1929, four out of eight branching banks in operation in 1920 closed, but all of these were banks that operated a single branch, and two of the four operated branches within their home city. Thus, of the twenty-three towns or cities in

which branch banking facilities were located, nineteen retained them. This fact 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 transaction 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 People's Bank of South Carolina and the South Carolina Savings Bank—entered during the 1920s and established eighteen and nine 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 5.17 shows, and these examples confirm, in states where it was allowed, branching flourished and increasingly took the form of multibranch banks, where that was allowed. Four of the eight states that had enacted deposit insurance legislation before 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 United States as a whole by 1939, nineteen states allowed full branch banking, and seventeen allowed limited branching, compared to twelve statewide and six limited branching systems in operation in 1924.³⁹

Unfortunately, policy makers in many agricultural unit banking states did not change their regulations with respect to branch banking after the debacle of the 1920s and 1930s. Thus, the same patterns of high failure rates of unit banks repeated 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, where branching dominated, despite relatively high farm

loan delinquency rates and loan charge-offs, only one bank (a unit bank) failed during the crisis (see Calomiris, Hubbard, and Stock, 1986: 469).

Lessons for Policy in Price-sensitive Less-Developed Countries

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

Voluntary insurance systems provided less coverage than compulsorily 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 fact explains the differences between the observed growth and loss rates under voluntary and compulsory insurance.

During the boom, voluntary insurance systems grew less than compulsory insurance systems but more than unit banking state systems without insurance plans. Voluntary insurance states also showed intermediate 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. 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 (recall that branching was not permitted in insured states).⁴⁰

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 stability in the banking system, without sacrificing banking services in remote areas, during the years of active bank regulatory reform after the Panic of 1907 (White, 1982 and 1983).⁴¹ 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, deposit insurance represented an added cost because it was incorrectly perceived as an alternative to branch banking and thereby helped to perpetuate 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 premiums, 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 organizational scheme for deposit insurance would be a mutual guarantee system of self-regulating branching banks in which the government's main role would be to provide an antitrust policy to define membership for mutually insuring groups of banks. Mutual-guarantee systems were extraordinarily successful in dealing with financial panics during the pre-Civil War years in the United States, while providing access to affordable loans in geographically peripheral areas. Unlike almost all governmental 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.⁴² Evidence of similarly successful self-regulating systems in other countries is provided in Bordo and Schwartz (1989).

A possible objection to this approach is that limited aggregate banking capital can make it difficult for banks as a group to insure themselves against very large disturbances. 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, deposit insurance may be 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 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 devastated by a terms-of-trade shock to attempt a rescue of the banking system, particularly in a developing economy that relies on indirect (often financial) taxation to finance such bailouts. It might be more advisable to act in advance to subsidize new industries in an attempt to diversify the economy, rather than focus on the solvency of the banking system as a panacea. The fundamental problem of such an economy, after 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, total 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 5.23 reports total deposits of suspended banks (deposits of failed banks are not available) by state from 1921 to 1930 for national and state banks in the thirteen 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 5.21, although 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 5.21 (One minus the repayment rate) and multiply this product by the ratio of failed banks to suspended banks. As Table 5.23 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 placed in receivership. A comparison of the average size of failed banks (estimated from data on completed liquidations) and the average size of suspended banks revealed that larger banks were more likely to avoid liquidation after suspension. I thus adjusted for the average difference in size 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 from data on completed liquidations), and the ratio of the average size of liquidated banks to the average size of suspending banks (again, estimated from data on completed liquidations).

These estimates appear in Table 5.23 for national and state-chartered banks. The level of bank capital plus surplus (bank book equity) of solvent banks in 1930 is provided for comparison. Only three of the thirteen 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.

TABLE 5.23
 Estimated Asset Shortfalls of Failed Banks (relative to equity of remaining banks in "severe failure" states)

	National banks						Total bank equity June 1930 ^a
	Deposits of suspended banks 1921-1930 ^a	Ratio of liquidations to suspensions	Average size ratio of liquidated banks to suspended banks	Rate of asset shortfall ^b	Estimated shortfall ^a		
Arizona	1,256	.67	.83	.50	349	3,815	
Colorado	11,003	.94	.45	.40	1,862	13,776	
Georgia	16,538	.84	.09	.49	613	39,064	
Idaho	10,601	.81	.65	.53	2,958	4,612	
Iowa	55,984	.79	.50	.31	6,855	35,750	
Minnesota	28,338	.97	.59	.42	6,812	69,387	
Montana	16,287	.87	.44	.66	4,115	9,999	
Nebraska	13,695	.80	.94	.56	5,767	26,083	
North Dakota	17,438	.84	.80	.55	6,445	9,210	
Oklahoma	27,364	.72	.70	.57	7,861	41,251	
South Carolina	12,153	.92	.57	.49	3,123	11,665	
South Dakota	21,109	.93	.60	.49	5,772	8,477	
Wyoming	9,154	.91	.45	.30	1,125	4,819	

	State-chartered banks						All banks
	Deposits of suspended banks 1921-1930 ^a	Ratio of liquidations to suspensions	Average size ratio of liquidated banks to suspended banks	Rate of asset shortfall ^b	Estimated shortfall ^a	Total bank equity June 1930 ^a	Ratio of shortfall to equity
Arizona	15,056	.80	.06	.09	65	8,496	.03
Colorado	12,187	.95	.95	.32	3,520	10,273	.22
Georgia	46,318	.75	.70	.56	13,618	39,805	.18
Idaho	9,185	.85	.63	.51	2,509	4,983	.57
Iowa	138,995	.75	.66	.46	31,649	74,935	.35
Minnesota	80,634	.77	.47	.52	15,174	38,417	.20
Montana	31,361	.89	.47	.48	6,297	9,947	.52
Nebraska	78,093	.85	1.04	.65	44,872	27,760	.94
North Dakota	45,199	.92	1.05	.83	36,240	9,695	2.26
Oklahoma	38,986	.79	.28	.44	3,794	11,493	.22
South Carolina	50,970	.91	.58	.34	9,147	17,069	.43
South Dakota	91,619	.77	1.00	.76	53,615	10,848	3.07
Wyoming	7,536	.80	.48	.46	1,331	3,844	.28

^aIn thousands of dollars.

^bThe rate of asset shortfall is a product of (1) the total deposits of suspended banks; (2) the ratio of liquidations to suspensions; (3) the shortfall ratio; (4) the ratio of the average size of liquidated banks to the average size of suspended banks.

SOURCES: See Data Appendix.

Significantly, these were the *only* states that had compulsory 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 rates and land depreciation experiences comparable to several other states (see Table 5.3)—notably Montana, Georgia, and South Carolina—but none of the state-chartered systems in these other states approached the banking losses relative to remaining equity of the three long-lived, compulsory insurance systems.

This conclusion is supported by the evidence from balance sheet data and the evidence on failure rates and failure severity that has been reported here. Moreover, it agrees with the hypothesis that, absent compulsory deposit insurance (and free entry), the fundamental disturbances experienced in these states would have had 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) risk taking by banks 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.

Data Appendix

Income and Price Data. Data on indices of gross income by type of farm product reported in Table 5.1 are taken from Strauss and Bean (1940: 31). Data on income—farm and nonfarm, gross and net—and farm and nonfarm population are taken from Leven (1925: 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). Data on the value of crops sold, by state, were 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 5.4, 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: 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.

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

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

Number and deposits of suspending banks. The number and deposits of state and national bank suspensions are reported in Board of Governors (1943: 286-91). These are used to derive the average size of suspended banks in Table 5.23.

Data on liquidated banks. Data used in Tables 5.21-5.23 on the number, deposits, losses, and time taken to liquidate banks for which liquidations had been completed by 1930 are reported in Goldenweiser and colleagues (1932: vol. 5, 191-207).

Comment

Richard Webb

My immediate reaction when I first heard of the topic for this seminar and of the specific papers that were being planned was a complaint. Why had Phil Brock and Jerry Jenkins not done all this eight years ago, *before* I was ordered home from a quiet job in the World Bank and put in charge of the central bank in Peru and suddenly presented with banks failing to the left of me and to the right of me?

Of course, even eight years ago would have been too late. Whatever useful lessons for financial regulation are drawn from this seminar would have had to be applied some fifteen or twenty years ago to reduce the odds of bank failures in the early 1980s or to reduce the size of the resulting losses. The cards had been dealt long before I arrived at the central bank in 1980. And indeed, whatever new cards are dealt in IDCs over the next few years, the result of this seminar might make the life of the central bank governors some ten years from now somewhat easier.

I thought it an interesting idea to look at the experience of U.S.

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5. Charles W. Calomiris, "Do 'Vulnerable' Economies Need Deposit Insurance? Lessons from U.S. Agriculture in the 1920s"

Notes

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1. Recent research shows that banks perform unique roles in corporate finance (James 1987; Lumner and McConnell, 1989; Gilson, Kose, and Lang, 1990; Hoshi, Kashyap, and Scharfstein, 1990).

2. For a discussion of the behavior of Southern branching banks during the Panic of 1837 and the Panic of 1857, see Calomiris and Schweikart (1991).

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

4. Any government transfer program must be financed somehow, and this fact 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 disproportionate burden on the banking system. Reserve requirements and mandated loan subsidies are among the methods 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. 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.

5. 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.

6. 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 at least fifteen years.

7. Alston (1983: 886).

8. Foreclosure data are provided in Table 5.3. 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 meant to identify more clearly the relevant population of farmers subject to foreclosure risk, assuming that tenant-run farms are typically owned by individuals who operate their own farms as well.

9. It is also important to note that the extent of the threat to the financial survival of farms and farm lenders from a given decline in income or wealth depends in a nonlinear 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 one-year decline amidst intervening good years or a similar overall decline spread over a longer period. This fact 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 nonlinearities see Rucker and Alston (1987).

10. See Goldenweiser et al. (1932: Vol. 5, 205-207).

11. See, for example, the discussion of large urban bank reactions to deposit insurance in cities such as Chicago and Philadelphia in White (1983: 191-97).
12. 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 Guarantee Boards. Summary tables of these and other regulations are provided in White (1983: 210-11) and Calomiris (1989: 18).
13. Evidence of this phenomenon can be found in numerous historical studies of the operations of bankers under deposit insurance. For example, see Robb (1921).
14. In Oklahoma and Kansas, trusts were not admitted to the insured system. This action further discouraged large urban banks from joining.
15. 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: 50-53).
16. See Fenstermaker et al. (1984) and Schweikart (1987).
17. The data in Table 5.10 are end-of-year, unlike the other tables, which are end-of-June. Thus, the peak in Table 5.10 occurs in 1919 rather than 1920.
18. For the forty-eight 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).
19. See FDIC (1956: 55-58).
20. Some of the exceptionally high banking growth in these states reflects favorable economic fundamentals. As Table 5.1 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.
21. Lee Alston has suggested to me that the increased use of automobiles may also have permitted greater bank consolidation by reducing the need for banks to be located in thinly populated areas.
22. The reduced riskiness of branch, as opposed to unit, banks is established in the third section of this chapter, where I show that branching banks were less likely to fail during the 1920s than unit banks. See also Carlinhour (1931), Dori and Schweikart (1991: Chapter 3), and White (1983: 218-19).
23. According to the Federal Reserve Board of Governors (1926), Wyoming is an exceptional case in that it allowed statewide branch banking, but no banks opened branches during the 1920s. The Federal Reserve seems to be in error on this point. Maeda (1990) argues that the substantial presence of bank chains in Wyoming provides *prima facie* evidence that branches were prohibited. While state law implicitly allowed branches (see Board of Governors, 1925), existing unit bankers

- seem to have lobbied state regulators successfully to prevent branching (see Woods, 1985: 102-104). This gave Wyoming a particularly vulnerable nondiversified unit banking system. As Woods (1985: 101) point 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 state banks in 1920, thirty-one had a deposit base of under \$100,000 (see Woods, 1985: 96).
24. In Georgia, one of the largest banks in the state, operating thirty branches, failed. According to Carlinhour (1931: 307), the cause of this failure was "poor management."
25. This included, but was not limited to, banks owned by holding companies. 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 (December 1929: 766).
26. Data on failures of chain banks have not been collected in a consistent or thorough manner, but evidence reported in Chapman (1934) as well as 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 the third section of this chapter.
27. 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. Although the authors 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.
28. 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.
29. See FDIC (1956: 69).
30. These are calculated using the banks in existence immediately before the period of failure as the denominator in the calculation. (As noted in Table 5.15, insured banks sought to avoid rising assessments by converting to national charters.) This methodology avoids the 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 as the denominator. With 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 that are healthy to exit to the other available systems and thereby raise the subsequent observed failure rates for national and uninsured state banks. Observed differences in failure propensity would thus provide all the more 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 5.20 for the periods 1921-1924 and 1925-1929 for Kansas, Mississippi, North Dakota, Oklahoma, 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.

31. Weighted least squares is the appropriate regression technique in circumstances where aggregate failure rates are compared across different samples. To control for truncation bias in the regressions, I used the log of the odds ratio—the log of $p/(1-p)$ —as the dependent variable, 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: 28-30).

32. The variations with which I experimented included the following: 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.

33. See also American Bankers' Association (1933), Calomiris (1989), and Thies and Gerlowski (1989). The impossibility of separating 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.

34. American Bankers' Association (1933: 22) and Robb (1921: 165-70) 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."

35. For sources see Data Appendix.

36. For a discussion of the costliness of these delays in liquidating savings and loans see Barth et al. (1989).

37. U.S. House of Representatives (1930, 1: 462).

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

39. See Chapman and Westerfield (1942: 126-30).

40. 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.

41. Branching not only leads to a more stable banking system, but it also increases the ability of banks to meet the banking needs of peripheral areas. Using current county-level data from the United States, Evanoff (1988) shows that branch banks provide a far superior means of servicing remote areas than unit banks. If one holds demographic factors per square mile by 65 percent.

42. 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 provide 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 that encourages intergroup competition. For example, in a unit-banking mutual-guarantee system (where local monopolies may arise) groups should overlap geographically.

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Richard Webb: "Comment"

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6. Philip L. Brock, "The Macroeconomic Consequences of Loan-Loss Rollovers"

Notes

- For example, the International Monetary Fund, through its Compensatory and Contingency Financing Facility, assists member countries who face external shocks. Loans are given senior claim for repayment and must be repaid within five years. James (1989) analyzes the underinvestment problem at the level of a bank's financing decisions.
- Brock (1992a) develops an alternative model of government loan guarantees that relies on a single aggregate capital stock, rather than on a disaggregated capital stock of structures and equipment.
- To focus attention on the incentives created by the timing of the government's payment of its liability, the model abstracts from distortions normally created by tax collection by assuming that the government can finance the liability with nondistorting taxes.
- Figure 6.2 is drawn so that the adjustment path is the same for both immediate payment of the guarantee and delayed payment of the guarantee. In fact, delayed payment of the guarantee creates a real cost that lowers the agent's wealth, thereby shifting the adjustment path associated with delayed payment to the left of the adjustment path associated with immediate payment of the guarantee. To simplify Figure 6.2, this negative wealth effect has been suppressed.
- In the context of a world with deposit guarantees, such an action corresponds to a closure of the financial system that leaves the value of deposits intact so that depositors can then repurchase the structures at the lower, market-clearing price. In such a scenario, the government essentially buys the structures at a high price from depositors and sells the structures back at a low price.
- At point A in Figure 6.2 (prior to the annuity value of income from the stock of capital net of foreign debt plus the stream of labor income and rental income on land: $C^m + \bar{p}C^n = rLE + \bar{p}S - b$) and r^T is the rental rate on land.
- Following the external shock, $E_0 + P_0S_0 < b_0$ at point C, thereby placing the put option "in the money." At point B in Figure 6.2, the value of the stock of physical capital equals the value of the guaranteed debt, $E_1 + P_1S_0 = b_0$. Along the adjustment path $DE, P_1S_1 + E_1 > b_1$, and $\dot{p}_1S_1 + P_1S_1 + E_1 < b_1$. At time $T, P_T S_T + E_T = b_T$, and $\int_0^T [C_T^m + P_T C_T^n] e^{-r(T-t)} dt = \int_0^T [w_t L + r_t^T T] e^{-r(T-t)} dt$. This terminal condition, together with the requirement that the postintervention price lie on the saddlepath, pins down the endpoint of the trajectory DE (by determining the size of the jump in the relative price of nontradables that must take place at time T) and is analogous to the conditions employed by Abel (1982; Figure 3) and Brock (1988; Figure 2) in the connection with the analysis of temporary investment subsidies. One of the