

Why Do Banks Fail? Evidence from the 1920s*

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This paper examines the causes of rural bank failures during the 1920s using a newly created state-level data series. By focusing on rural banks we are able to investigate the impacts of agricultural distress and government policies on the class of banks accounting for 80% of the failures in the decade. Failure rates were highest where farm acreage and land values had increased the most before 1920 because these regions suffered the worst agricultural distress subsequently. Agricultural distress caused more bank failures in states with deposit insurance systems, suggesting that insurance encouraged banks to increase risk as their net worth declined. © 1994 Academic Press, Inc.

In the 20th century the United States has experienced high numbers of bank failures in three decades: the 1920s, the 1930s, and the 1980s. Because of the depth and longevity of the Great Depression, bank failures during the 1930s have been the subject of considerable study. Similarly, the causes of bank failures in the 1980s have also been intensively in-

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vestigated.¹ The bank failures of the 1920s have been less thoroughly researched, however, with most studies done for comparison with the causes and impact of failures during the Depression.²

Recently, economic historians have increased their study of banking distress in the 1920s because of apparent similarities with the experience of the 1980s. Like the 1980s, the 1920s began with a sharp, but short-lived, recession, followed by a significant increase in bank failures. In both decades failures were confined largely to regions suffering severe economic distress. Sharp declines in commodity and real estate markets explain why bank failures were high in the Southwest in the 1980s; similar declines explain the high number of bank failures in the Midwest and South during the 1920s. In the 1920s, farming regions accounted for the overwhelming majority of bank failures, with nearly 80% occurring in rural communities. In both decades government policies, such as deposit insurance and branch banking restrictions, have also been blamed for raising the number of failures.³

Previous researchers have highlighted the fact that a high proportion of failing banks during the 1920s were small, rural banks and thus identified changes in agricultural income as a leading cause of bank failure. But none has focused on the particular channels through which agricultural distress caused rural bank failures, captured the changing impact of agricultural distress over time, or tested its impact under different regulatory environments. We have compiled a new data set, consisting of rural bank failure rates for each state from 1921 to 1929, which enables us to examine closely the importance of agricultural distress and government policy on the largest class of bank failures during this decade. We find that in the early 1920s failure rates were highest in states where agricultural acreage had expanded the most during World War I because they tended to experience the worst agricultural distress subsequently. Later in the decade, bank failures were highest in agricultural regions in the South and

¹ Studies of bank failures in the 1930s include Friedman and Schwartz (1963), Temin (1976), Wicker (1980), and White (1984). Among those investigating the causes of depository institution failures in the 1980s are Garrison *et al.* (1988), Kane (1989), and Kaufman (1989).

² Friedman and Schwartz (1963) argue that, unlike the 1920s, during the 1930s many solvent banks were closed by runs because the Federal Reserve failed to act as lender of last resort. Failures were thus caused by a failure of monetary policy, rather than falling borrower income, which seems to have been the root cause of failures in the 1920s. Temin (1976), however, contends that like the 1920s, bank failures in the 1930s were caused by falling agricultural income, though the pattern of failures was unlike that of previous years. White (1984) also finds that the characteristics of banks failing in 1930 were not different from those of previous years. By contrast, Wicker (1980) traces the origins of the Banking Panic of 1930 to the collapse of Caldwell and Company, and suggests that the banking panic was independent of the decline in economic activity.

³ White (1984) and Calomiris (1989a,b, 1990) discuss the effects of deposit insurance and restrictions on branch banking during the 1920s.

Midwest. We also find that bank failure rates were systematically higher in states with deposit insurance systems, and that deposit insurance worsened the impact of agricultural distress on bank failures. We find, however, that competition from new federal agricultural lenders and changes in rural trade centers did not increase rural failure rates, nor were failure rates affected by the relative prevalence of national banks.⁴

BANK FAILURES IN THE TWENTIES

Small banks in small towns covered the United States in the twenties. Of the 28,885 banks in operation on June 30, 1920, two-thirds were in towns of less than 2500 population (Federal Reserve Board, 1937, p. 906). By the end of the decade many of these banks had failed. Despite over 3200 new entrants, by the end of 1929 the number of banks had declined to 23,712 (Federal Reserve Board, 1932, p. 53). The number of banks in towns of less than 2500 people fell by 27% over the twenties, even though the population of those communities increased marginally over the period (Ely, 1986, p. 33). The corresponding decline for banks in cities greater than 50,000 population was less than 0.4%.

Banks began to fail with the general economic downturn of 1920. For the United States as a whole, 505 banks failed in 1921. Failures continued to rise in the early twenties, averaging over 680 from 1923 to 1929 and peaking in 1926 at more than 950 failures.

The national averages obscure the considerable regional and urban/rural variation. Figure 1 highlights the disproportionate share of rural bank failures: of the 5712 bank suspensions during the 1920s, 4515 (79%) occurred in towns of less than 2500 population, and the failure rate of rural banks (2.5%) was nearly twice that of banks in larger cities (1.3%).⁵ Rural failures, however, accounted for just 47% of the loans and investments of all failing banks in the 1920s. Still, the importance of rural failures in the twenties is evident from comparison with the Great Depression, when rural banks accounted for 68% of failures, but only 19% of the loans and investments of failing banks (Federal Reserve Board, 1937, p. 901).

⁴ We know of two previous econometric studies of interstate variation in bank failure rates during the 1920s. Gambs (1977) found that differences in agricultural income help explain differences in failure rates, as did variables that capture "overbanking." His study included the Great Depression, however, and he did not test whether the causes of failure in those years differed from those of the 1920s. Gambs also did not identify the possible causes of excess capacity and, importantly, he omitted deposit insurance as a possible failure cause. Thies and Gerlowski (1989), however, include little besides deposit insurance in their failure rate regressions.

⁵ These rates are calculated by taking the ratio of the total number of bank suspensions from 1921–1929 to the total number of banks operating on June 30, 1920, and dividing by 9. The figures thus exclude new entrants. They also omit unincorporated banks.

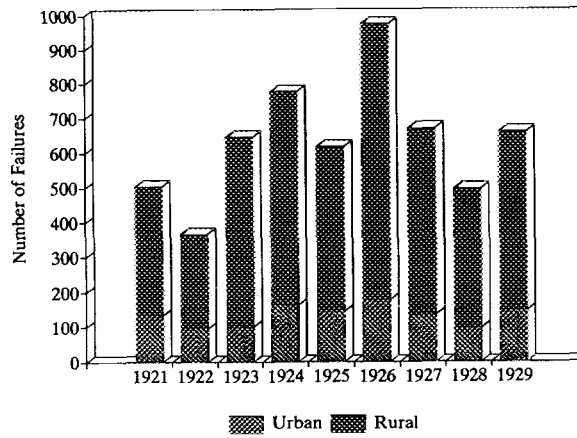


FIG. 1. Rural and urban bank failures, 1921-1929.

Figures 2 and 3 illustrate the regional variation in rural bank failures. In the first part of the decade the Mountain, Plains, and Southeastern states suffered the most banking distress. Banks on the West Coast, those north of the Mason/Dixon Line, and those east of the Mississippi River fared well. Failure rates ranged from 0 in New Hampshire, Vermont, Massachusetts, and Connecticut to 12 per hundred in Montana. The in-

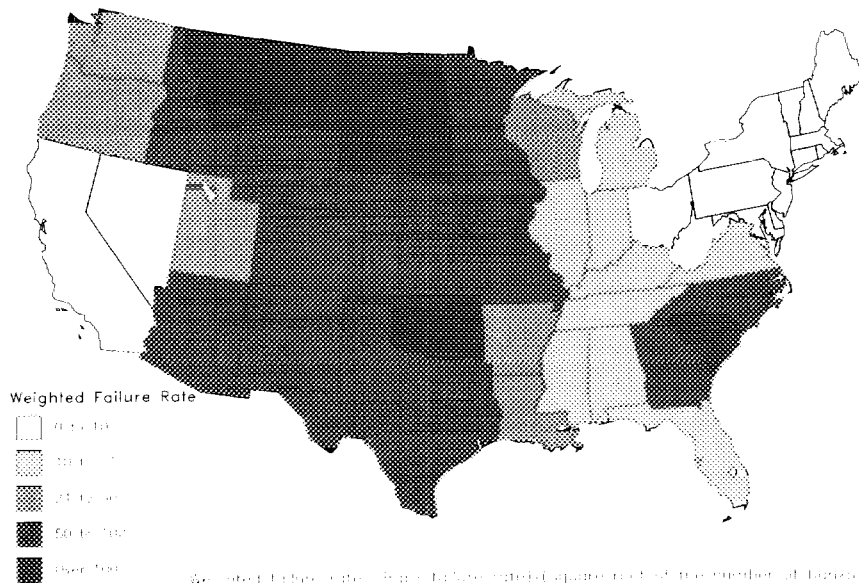


FIG. 2. Rural bank failure rates, 1921-1925.

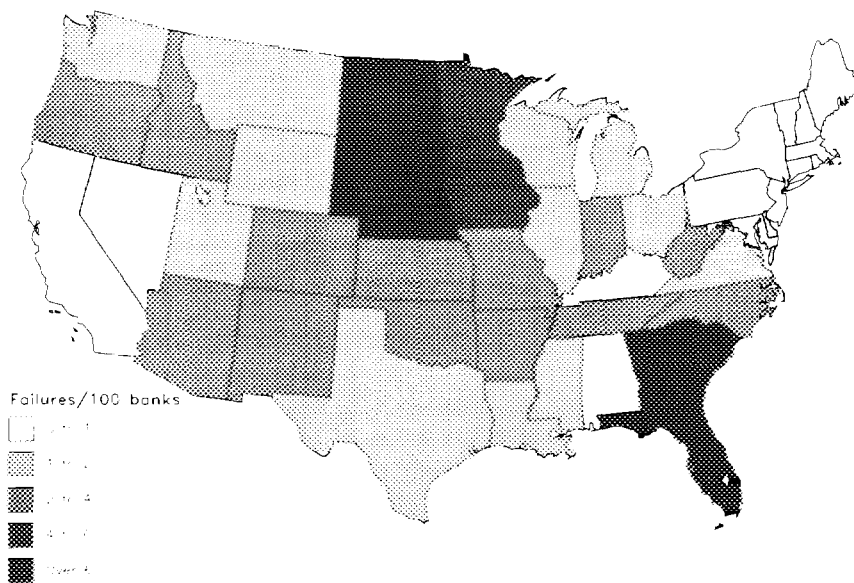


FIG. 3. Rural bank failure rates, 1926-1929.

idence of bank failures moved eastward over the decade, and in the latter part of the twenties the West North Central and Southeastern states experienced the highest failure rates. Again the Northeastern states suffered little. Failure rates ranged from 0 in seven Northeastern states to over 14 per hundred in Florida.

THE CAUSES OF RURAL BANK FAILURES

Contemporary observers and historians have suggested several causes of rural bank failures during the twenties. Adverse conditions in agriculture in the twenties, or overly optimistic expectations of future agricultural prices in the late teens, are usually cited as the leading cause of the increase in bank failures after 1920. For example, in a study of bank failures prepared for a presidential report in the late 1920s, O. M. W. Sprague, professor of banking and finance at Harvard, and W. Randolph Burgess, an officer of the Federal Reserve Bank of New York, wrote (*United States House of Representatives*, 1930, p. 446):

[T]he great majority of banks failed because they were unable to withstand the stress exerted by the persistence of unprofitable prices for the products of agriculture and animal husbandry—stress that was particularly severe because it was experienced after years of a bounding prosperity and extreme appreciation in value of farm property, and a large increase in the number of farms mortgaged and the amount of mortgage indebtedness.

Whether agriculture was depressed in the twenties is still debated; it depends on one's standards. If the late teens are used as the base then agricultural income in the twenties was depressed, but if one compares agricultural income or its growth with the prewar period then conditions in the twenties appear normal. Our view is that there was no general agricultural depression and that the majority of farmers fared well in the twenties. This view was held by at least one contemporary banker who wrote that "any farmer who did not load up with an excess of livestock and did not take on much land in the inflation period, is, or should be, making money."⁶ Those who had borrowed heavily in the late teens, however, experienced systematic distress in the twenties that put pressure on rural lenders.

In addition to indebtedness, farmers were squeezed by increased real estate taxes: an index of real estate taxes of 100 in 1920 rose to 114 by 1929 (Hughes 1987, p. 432). Wholesale prices also fell during the 1920s, reversing a long-standing favorable relationship between farm output prices and prices paid for inputs and consumer goods.

In a sense, some farmers had trouble in the twenties because times were too good from World War I to 1920. Livestock prices and the prices for the cash crops of cotton, wheat, and corn were high and rising. Land values soared in states where most of the land was already under the till. In Iowa, for example, the value of farm land was 220% higher in 1920 than it had been in 1912 (Regan and Johnson, 1942, pp. 4-5). Land values also more than doubled in Minnesota, North Carolina, South Carolina, Georgia, Kentucky, Tennessee, Mississippi, Arkansas, and Louisiana. Improved acreage increased dramatically in formerly unfarmed or marginal farming areas. Crops were planted on much of the land west of the 100th meridian for the first time, prompted by more liberal homesteading provisions, high wartime prices, and relatively abundant rainfall. Farther west, cattle herds increased spectacularly during the boom years of the teens. The number of cattle in Wyoming, for example, nearly doubled between 1914 and 1918 (Huntoon, 1982). Improved acreage increased over 200% in Arizona and Montana, and, while the increases were most dramatic in the west, improved acreage more than doubled between 1910 and 1920 in 26 states (United States Department of Commerce, 1922a, pp. 39-43).

⁶ Alfred E. Van Petten, President of Pioneer Mortgage Company, quoted in the *Topeka Daily Capital* (September 13, 1925, p. 1). Van Petten was referring specifically to Kansas and Oklahoma. Holt (1977, p. 284) also observes that "the farmer was one of the few beneficiaries of the prosperity of the twenties."

For the view that depressed agricultural prices are in part to blame for rural bank failures, see United States House of Representatives (1930) and Bremer (1935). Johnson (1973/1974) argues that the World War I speculative bubble is to blame for farm failures and rural bank failures. Belongia and Gilbert (1987) attribute the high failure rate of agricultural banks in the 1980s to a similar boom in farm land prices in the late 1970s that was not followed by a proportional increase in agricultural income.

The agricultural expansion brought with it an increase in mortgage debt, much of which was held locally by banks and private individuals. Owner-operated farms having mortgage debt increased from 33% in 1910 to 37% in 1920 and to 42% in 1930 (Federal Reserve Board, 1932, pp. 30–31).⁷ The proportion of farms mortgaged was particularly great in western states: 71% of North Dakota owner-operated farms carried mortgages in 1920, as did 50 to 60% of farms in nearby states. Mortgage debt per acre increased 135% from 1910 to 1920, approximately the same rate of increase as the per acre value of the 10 leading crops (Federal Reserve Board, 1932, pp. 30–31). When the agricultural boom ended in 1920, indebted farmers had difficulty meeting their mortgage payments and farm failures reached historic highs (Alston, 1983). As farms failed, the value of farm debt in the portfolios of many banks fell, causing their insolvency. Small, rural unit banks with few resources, limited facilities, and restricted activities found it particularly difficult to cope.

Agricultural distress was not the only cause of bank failures. Various state and federal policies likely affected the extent of bank failure. At the federal level, in 1916 Congress passed the Federal Farm Loan Act, creating joint stock land banks, federal land banks, and the Federal Farm Loan Board to oversee the activities of the “federal” banks.⁸ The legislation was intended to foster competition among lenders and to make low-cost credit available to farmers in all regions.⁹ Yet, there may have been good reasons why some farmers had been unable to obtain credit from private sources: the loans would have been too risky. The timing of the legislation was also unfortunate. By encouraging the entry of banks into the farm lending market at the peak of the agricultural boom the legislation may have caused “excessive” competition, forcing marginal banks out of existence with the subsequent decline in loan demand. O’Hara (1983, p. 433) writes, “the new land banks, with their privilege of issuing tax-exempt bonds, did not enter as equal competitors. . . . The federal land banks forced existing intermediaries to either exit the field or change their behavior.” That is, rural commercial banks may have been forced to lower interest rates and relax standards below long-run profit-maximizing levels.

Joint stock land banks were private institutions, but had the privilege

⁷ Horton, *et al.* (1942, p. 4) give the percentages of owner-operated farms with mortgage debt as 41.1% in 1920 and 44.6% in 1930. We do not know what accounts for the discrepancy but take comfort that our figures agree with those in the 1930 Census of Agriculture (United States Department of Commerce, 1932, Vol. IV, p. 459). We are grateful to Carol Heim for pointing out to us the discrepancy between our reported figures and those in Horton *et al.*

⁸ The best discussion of the federal government’s role in farm lending is found in Horton *et al.* (1942).

⁹ O’Hara (1983) discusses the objectives of the Federal Farm Loan Act in greater detail.

of issuing tax-exempt bonds. In return they were subject to supervision by the Federal Farm Loan Board and a cap was put on the interest rates they could charge. Many joint stock land banks arrived on the scene at, or just following, the peak of agricultural prosperity: of the 83 banks chartered in the first 10 years, 21 were created in 1919 and 40 in 1922 (Horton *et al.*, 1942, p. 125). The lending presence of joint stock land banks varied considerably across states: as an average yearly percentage of total newly issued farm mortgage loans, joint stock bank lending was most concentrated in South Carolina (11%), North Carolina (11%), Illinois (9%), Kentucky (9%), West Virginia (8%), Ohio (7%), Indiana (7%), Wyoming (7%), and Oregon (7%).¹⁰ Joint stock bank lending was completely absent in 17 states.

Federal land banks held an even greater share of the outstanding farm mortgage debt and therefore posed a greater competitive threat in more states. In 1920 federal land banks held 3.5% of total farm mortgage debt whereas joint stock banks held less than 1% (Horton *et al.*, 1942, p. 222). The federal land banks were nonprofit farm cooperatives and like joint stock banks their presence varied regionally. Federal land banks made relatively more loans in the Southern, Mountain, and far Northwest Coast states. From 1921 to 1925 the average yearly percentage of farm mortgage debt issued by federal land banks varied from 2% in New Jersey and California to 18% in Utah (United States Department of Agriculture, 1940).¹¹

The link between the new federal lending institutions and commercial bank failures was fairly direct, whereas the impact of state policies on bank failures was less so. Branch banking restrictions and deposit insurance were state policies that researchers have recently argued were important causes of bank failures in the 1920s.¹² Branching may reduce a bank's susceptibility to failure for any given downfall in assets prompted by distress in a particular location. To the extent that farm failures were somewhat localized, branch banking would allow a troubled bank to draw on funds from other branches within its system that were unaffected by

¹⁰ These figures are for 1925 and calculated from United States Department of Agriculture (1940).

¹¹ Smith (1987, p. 32) argues that competition from federal lenders also contributed to the relatively high failure rate of agricultural banks in the 1980s: "Bank lending to agriculture was sorely pressed by intense competition from the cooperative Farm Credit System, particularly during the 1970s and early 1980s."

¹² Other state specific regulations, such as minimum capital requirements and lending restrictions, as well as differences in the extent of supervision, may have contributed to variation in failure rates among states. We limit our consideration to branch banking and deposit insurance since they are most typically cited as causes of interstate differences and leave the impacts of other regulatory differences to future study.

farm distress. This would most likely be the case where branches covered both rural and urban areas.¹³

Branch banking was quite limited in the United States during the 1920s, although its prevalence increased over the decade.¹⁴ In 1920, 547 banks operated 1455 branches, and in 1929, 763 banks operated 3349 branches (Studenski and Krooss, 1952, p. 336). Nevertheless, over half the branches in the country were located in California, New York City, and Detroit (Federal Reserve Board, 1932, p. 28). Only 10 states permitted statewide branch banking, most in New England, but also a few Southern states and California. Others limited branches to certain large cities. The majority of banks with branches had only one branch, most of which were located in the same town as the head office.

Deposit insurance was even less prevalent than branch banking, with just eight states having deposit insurance systems during the twenties. The Great Plains states along the 100th meridian favored deposit insurance. North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas had deposit insurance, along with Mississippi and Washington.¹⁵

Because precise information about the quality of a bank's portfolio is costly to acquire, prior to the introduction of federal deposit insurance in 1934 the failure of individual banks sometimes triggered general deposit runs that brought down numerous otherwise healthy banks. Deposit insurance deters runs because depositors do not fear losing their funds in the event of bank failure. Hence even if they perceive an increase in the probability of their bank failing, depositors have little incentive to withdraw their funds.

Although deposit insurance may prevent widespread banking panics, the U.S. experience with deposit insurance has not been altogether successful. In essence, most deposit insurance schemes have failed precisely because they remove the incentive for depositors to monitor the perfor-

¹³ Wheelock (1992b) finds that the extent of agricultural distress varied considerably across counties in Kansas during the 1920s and concludes that intrastate branching could have limited failures. A number of studies have also contrasted the U.S. unit banking experience with Canada's system of nationwide branch banking. During the 1920s, there was just one bank failure in Canada (in 1923), although through mergers the number of banks fell from 18 to 10. Many branch offices closed during the 1920s and early 1930s, as business declined in depressed areas, but there were no general bank runs or panics (Haubrich, 1990).

¹⁴ While fairly common before the Civil War in the South, branch banking disappeared almost entirely after passage of the National Bank Act of 1863, and the majority of branch banks existing in the 1920s had been established since 1900. White (1982) examines the evolution of bank regulation during the National Banking era, including the inability of branch banking proponents to overcome the opposition of the unit banking lobby.

¹⁵ National banks were prohibited from joining state deposit insurance systems. See Calomiris (1989b) or Federal Deposit Insurance Corp. (1956) for descriptions of the various state insurance plans.

mance of their banks. Because bankers have little of their own capital exposed, the absence of monitoring by depositors encourages banks to undertake more risky investments than they would otherwise. Indeed, fraud may become more prevalent as bankers find it easier to escape immediate detection. Fraud or incompetence are frequently cited as causes of bank failures in the twenties (Calomiris and Kahn, 1991; Gambs, 1977, p. 14).¹⁶

Ex post, fraud and incompetence are difficult to untangle, as is incompetence and overly optimistic expectations. Incompetence as judged with hindsight is more likely to occur in areas typified by booms and busts. For example, in Montana it was noted that there was a lack of bankers to run the rapidly growing number of banks (Groth, 1970, p. 32). Incompetence ex ante should not vary across regions unless one assumes a constraint on the human capital necessary for banking.

Deposit insurance alone may not be sufficient to lead to fraud or mismanagement. The incentive to undertake excessive risks is reduced to the extent that bank owners have their own capital exposed.¹⁷ Insurance encourages banks to substitute debt for capital, however, and if net worth is further eroded by an exogenous shock such as farm distress, then bankers have an incentive to take on still greater risk and may have little to lose by engaging in fraud. Deposit insurance may thus have affected bank failures by interacting with farm distress, in that farm distress should have had a larger impact on bank failures in states with deposit insurance systems.

A further regulatory factor has been suggested as contributing to interstate differences in bank failure rates during the 1920s. The failure rate of state-chartered banks was nearly twice that of national banks during the 1920s, which Gambs (1977, pp. 14–15) suggests may have resulted from relatively lax supervision by state banking authorities. If true, states that had few state-charted banks relative to national banks would have had lower overall bank failure rates.¹⁸

In addition to farm distress and government policy, a dramatic reduction

¹⁶ It has been suggested that the twenties was a period of "too many banks and not enough bankers." A Federal Reserve study of bank failures in the twenties indicates that failed banks had a higher proportion of questionable assets and loans to officers, directors, and their interests than did banks that did not fail (Federal Reserve Board, 1932 (cited in Benston 1975, p. 21).

¹⁷ Banks maintained higher capital/asset ratios in the twenties than they do today, which lessened the incentive to invest in risky portfolios. Regulators could also reduce, or eliminate entirely, the incentive to take excessive risks by charging risk-adjusted insurance premiums. But, as with FDIC insurance until 1993, none of the state systems of the 1920s charged risk-adjusted premiums.

¹⁸ Gambs, however, does not find that this was a significant cause of interstate variation in bank failure rates during the twenties. As noted above, we make no attempt to compare the supervision of state chartered banks in different states.

in the cost of transportation has often been cited as a cause of bank failures during the 1920s. For example, in testimony before the Senate Banking Committee in 1931, Federal Reserve Bank of New York Governor George Harrison explained (United States Senate, 1931, p. 44):

[W]ith the automobile and improved roads, the smaller banks . . . with nominal capital, out in the small rural communities, no longer had any reason really to exist. Their depositors welcomed the opportunity to get into their automobiles and go to the larger centers where they could put their money.

Beginning in the middle teens, many rural residents purchased automobiles and country roads were improved dramatically. Both factors made it easier to bank farther from home at banks in larger towns that could offer better terms.¹⁹ In the language of central place theory, the automobile changed the network of interdependent cities that were based on a hierarchy of central services. Transportation costs determine the minimum and maximum sizes of a city's market area and growth potential. Moreover, with the automobile and improved roads, the cost of monitoring borrowers fell, enlarging the area a bank could service profitably. Because of scale economies in banking, larger banks could force out the previously isolated small rural lenders.

In addition to economies of scale in banking there are most likely economies of scope in shopping. There is a given fixed cost associated with going to town. Once there, the marginal cost of additional shopping declines. Banking may not have been the sole or even primary reason for changing a trade center, but it was a part of the transactions that rural residents had to get done while in town.²⁰ As one contemporary statement makes clear, "people who formerly did their business in the local small town can now get to the country seat or a larger town in a few minutes. They go there because there is a movie there and better stores, etc. Naturally their banking has followed" (quoted in Ely, 1986, p. 58).

For the United States as a whole the estimated average percentage of farmers purchasing automobiles for the first time was 37% for 1915–1919, 20% for 1920–1924, and 15% for 1925–1929 (McKibben and Griffin, 1938, p. 109). In 1920 automobile ownership ranged from 5.5% in Mississippi to over 75% in Nebraska and in 1930 from 26% in Louisiana to 92% in Nebraska (United States Department of Commerce, 1932, p. 535). The

¹⁹ An examiner report for a bank that failed in 1925 remarked that the small town bank could not compete with the practice of banks in a nearby city that were "handling farm paper at 8 per cent, it being customary for small country banks to charge 10 per cent" (Federal Reserve Board, 1932, p. 209).

²⁰ Numerous studies conducted by sociologists and researchers at state agricultural experiment stations highlight the impact of the automobile on rural trade centers. A bibliography of such studies is Manny (1956).

TABLE 1
Descriptive Statistics

	Mean	Standard deviation	Minimum	Maximum
Bank suspension rate 1921-1925	2.47	2.96	0	12.01
Bank suspension rate 1926-1929	2.65	3.08	0	14.30
Land value	1.71	0.31	1.30	2.30
Improved acreage	1.11	0.38	0.71	3.02
Farm/rural population	0.57	0.16	0.21	0.83
Government banks 1921-1925	11.51	5.11	1.00	21.00
Index of branch banking 1924	1.05	0.11	1.00	1.43
Deposit insurance	0.15	0.36	0	1.00
Automobile 1921-1925	2.13	0.51	1.17	3.31
Population density 1921-1925	0.15	0.11	0.02	0.63
National/total banks	0.26	0.18	0.02	0.83
Farm foreclosures	14.20	7.50	4.18	34.12
Government banks 1926-1929	9.53	4.91	0.80	22.75
Index of branch banking 1930	1.06	0.17	1.00	2.03
Automobile 1925-1929	1.40	0.26	0.97	2.13
Population density 1926-1929	0.17	0.11	0.02	0.53

absolute percentage increase from 1920 to 1930 ranged from 12% in Arizona to 40% in Delaware, and in all but seven states the increase was at least 20%. If the increase in automobile ownership among farmers caused a rise in bank failures, we expect to find higher bank failure rates in states where the increase in automobile ownership was greatest.

RURAL BANK FAILURES DURING THE TWENTIES: TESTING THE HYPOTHESES

Hypotheses abound to explain why so many banks failed in the twenties but there is a lack of empirical testing, in part because the data on rural banks are not easily obtainable. We have computed annual suspension rates for commercial banks located in towns of less than 2500 population for each state from 1921 to 1929 (Tables 1 and 2).²¹ Bank failure was primarily a rural phenomenon during the twenties and by focusing on bank suspensions in small towns only, we identify more clearly the channels through which agricultural distress and government policy affected the likelihood of failure.²²

²¹ Table 1 provides descriptive statistics for each variable, and Table 2 presents data sources and details on the construction of each variable.

²² Calomiris (1989a) argues for studying bank liquidations, which exclude suspended banks that eventually reopened, rather than all suspensions. Our interest, however, is in the underlying causes of banking distress. We feel that it is important to include all banks closed because of financial difficulties, whether or not they eventually reopened.

TABLE 2
Data Sources and Variable Definitions

Bank suspension rates: the number of rural bank suspensions per 100 rural banks averaged from 1921 to 1925 and 1926 to 1929. The location and year of each bank suspension are from United States House of Representatives (1930, pp. 314–418). The United States Department of Commerce (1922b, Vol. 1, Table 51, pp. 178–319) was used to determine which incorporated towns had fewer than 2500 people. March issues of Bankers Encyclopedia Co. were used to determine the total number of banks located in each town.

Improved farm acreage: improved farm acreage in 1920 divided by the amount of improved farm acreage in 1910. Source: United States Department of Commerce (1922a, Vol. 5, Table 7, pp. 39–43).

Land value: index of the value per acre of farmland in 1920 as a percentage of the index in 1912. Source: Regan and Johnson (1942, pp. 4–5).

Farm foreclosures: average number of farm foreclosures per thousand farms for 1926–1929. Source: Stauber (1931). Foreclosures are measured as the number of farm foreclosures per thousand farms in the preceding 12 months ending March 15. The method for collecting the data and the adjustments made to approximate more closely ownership units rather than the census definition of operating units for farms are described in Wiecking (1927, p. 35).

Government banks: average percentage of newly issued farm mortgages made by Joint Stock Land Banks and Federal Land Banks. Source: United States Department of Agriculture (1940). The term “farm mortgage” refers to any legal document making farm real estate security for the repayment of a loan. The predominant legal instrument used in different parts of the country varied with local custom and law. Only those mortgage recordings that constituted a new lien on farm real estate, or the renewal of an old lien, were included. Mortgages arising out of the refinancing of existing mortgages, where the old liens were released of record or where no release was recorded but an extinguishment in fact was apparent, were considered in the same classification as new mortgages for the purpose of this study.

Branch banking: the ratio of total banks and branch offices located outside the home office area to total banks. The home office area for the first period, 1924, is the home office city, while in the second period, 1930, it is the home office county. Source: Federal Reserve Board (1930, pp. 811–812).

Deposit insurance: a dummy variable in which a “1” indicates the presence of state deposit insurance while a “0” indicates its absence. The following states had deposit insurance: Kansas, Mississippi, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas. The Washington deposit insurance program effectively ended in 1921 and was not included. Sources: Calomiris (1989a,b) and Federal Deposit Insurance Corp. (1956, pp. 47–73).

Automobile: the number of farms with automobiles and trucks at the end of each period divided by the number at the beginning of the period. Sources: United States Department of Commerce (1932, Vol. 3, Table 17, p. 535). The 1925 Agricultural Census did not collect data regarding farm-owned automobiles so we use estimates of the numbers of farm-owned automobiles in 1925 and 1929 from the Department of Market Analysis of *The Farm Journal* which were published in *Facts and Figures of the Automobile Industry* (1926 and 1930, respectively). The number of farms comes from United States Department of Commerce (1973, Part 1, Series K 17–81, p. 459).

Farm/rural population: farm population divided by the total rural population in 1920. Sources: farm population, Banks and Beale (1973, Table 3, pp. 18–19); rural population,

TABLE 2—Continued

United States Department of Commerce (1972, Vol. 1, Part A, Sect. 1, Table 18, pp. 64–71).

Rural population density: rural population divided by improved acreage. Sources: rural population, United States Department of Commerce (1972, Vol. 1, Part A, Sect. 1, Table 18, pp. 64–71); improved acreage, United States Department of Commerce (1922, Vol. 5, Table 7, pp. 39–43).

National/total rural banks: ratio of federally chartered rural banks to total rural banks in 1922. Sources: nationally chartered banks, United States Department of the Treasury (1923, pp. 406–663); rural bank totals, March 1923 issue of Bankers Encyclopedia Co.

To test the hypotheses developed in the previous section we use state-level data to estimate the parameters of the following regression equation: Rural Bank Failure Rate = $\beta_0 + \beta_1$ Agricultural Distress + β_2 Farm Population as % of Rural Population + β_3 Federally Sponsored Banks + β_4 Branch Banking + β_5 Deposit Insurance + β_6 Improved Transportation + β_7 Rural Population Density + β_8 National/Total Rural Banks. We divide the twenties into two periods, 1921–1925 and 1926–1929, to allow us to test whether different factors influenced failures in the early twenties as compared to the later twenties. Alston (1983) shows that farm distress was distributed unevenly across the country during the 1920s, and that it struck different regions at different times, just as Fig. 2 and 3 reveal about bank failures. While breaking the sample at the end of 1925 is of course arbitrary, and in part dictated by the availability of data,²³ we believe that the relative importance of the factors influencing bank failures likely changed between the first and second halves of the decade.²⁴

If agricultural distress caused banks to fail we expect $\beta_1 > 0$. For the earlier period we have two proxies for agricultural distress: the expansion of improved acreage from 1910 to 1920 and the increase in land values from 1912 to 1920.²⁵ We use these variables in part because we do not have state-level data on farm failures until 1926. Alston (1983) finds, however, that increases in improved acreage and land values during the

²³ Specifically, state-level data on farm foreclosures, a key measure of agricultural distress, is available only for 1926 onward.

²⁴ Because the data for several of our independent variables are not available annually, but rather at census, or mid-census, years only, we have elected against estimating a pooled time-series cross-section model. Further arguing against such an approach is the fact that in some states, Nebraska and Texas, for example, banking authorities sometimes delayed the closure of insolvent banks for more than one year.

²⁵ One might suspect that these variables are highly correlated. In fact, their correlation is -0.06 (not statistically different from zero). Improved acreage increased most in states west of the 100th meridian, where new land was brought under the till or grazed for the first time during the teens. Land value rose the most in states further east, like Iowa and Illinois, where there was relatively little expansion in improved acreage.

teens and early twenties explain a considerable amount of the interstate variation in farm failures during the late 1920s. The relationship between agricultural expansion in the teens and agricultural and financial distress in the twenties is explained best by Johnson (1973–1974). He argues that the dramatic increases in agricultural prices during World War I, which unexpectedly continued to increase after the war, led to expectations about agricultural incomes that proved too optimistic *ex post*. Consequently, “the pre-1920 land market mania was a major cause of the foreclosure crisis of the twenties” (Johnson, 1973/1974, pp. 184–85). Johnson argues further that the agricultural boom/bust cycle caused rural bank failures. Our model thus provides a direct test of his hypothesis.

For the late twenties our proxy for agricultural distress is the yearly average farm foreclosure rate. We also include the ratio of farm to total rural population in 1920 to control for the varying importance of the farm sector across rural areas. We expect that the more concentrated in farming the rural population was, and hence the more affected by agricultural distress, the greater the likelihood of bank failures. If true, we expect $\beta_2 > 0$.

If federally sponsored banks crowded out private banks then we expect $\beta_3 > 0$. Alternatively, private lenders might have had higher average borrower quality, and hence lower failure rates, in areas where federal land banks were more prevalent if the lending criteria of federal land banks, which were nonprofit cooperatives, was less stringent than that of private lenders. In this case, $\beta_3 < 0$. Our proxy for federally sponsored banks is the percentage of new farm mortgage debt held by joint stock land banks and by federal land banks.

If branch banking spread risks sufficiently to prevent rural banks from failing, then we expect $\beta_4 < 0$. To measure the extent of branching in the first period, we have computed the ratio of total branch offices located outside the home-office city to total banks in each state as of December 1924. For the second period we use the ratio of branch offices outside the home-office county to total banks as of June 1930. If deposit insurance increased risk taking or fraudulent banking practices, and hence increased bank failure rates, then we expect $\beta_5 > 0$. On the other hand, if deposit insurance limited bank runs, thus reducing failures, then $\beta_5 < 0$. Our proxy for deposit insurance is a dummy variable, 1 in states with deposit insurance and 0 otherwise.

If improvements in transportation made some small rural banks no longer economically viable, then we expect $\beta_6 > 0$. Our proxy for improvements in transportation is the percentage increase in automobiles on farms from 1920 to 1925 for the first period regressions and from 1925 to 1929 for the second period regressions. Prior to the widespread adoption of the automobile, small banks could prosper in sparsely settled areas. But once transportation costs fell, particularly in the mid-teens and early twenties, rural residents in sparsely settled areas could have shifted their

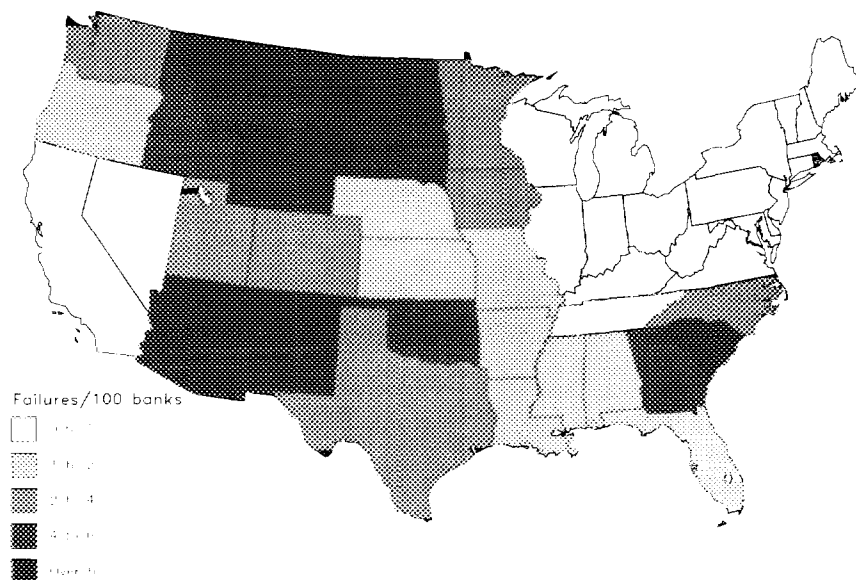


FIG. 4. Rural bank failure rates, 1921–1925 (weighted by the square root of open rural banks).

banking to larger towns to capture the benefits of the economies of scale associated with larger banks. We also suspect that bank failure was related to the density of the rural population. Our measure—rural population per improved acre—controls to some extent for the size of rural banks. Because the likelihood of bank failure seems to have been inversely related to bank size, and presumably the average size of rural banks was smaller in less densely populated areas, we suspect that the failure rate was higher in states with less densely settled rural areas.²⁶ If true, then $\beta_7 < 0$. Finally, we include the ratio of rural national banks to total rural banks in each state to control for the fact that federally chartered banks were subject to different regulations and supervision than state chartered banks. If closer supervision or other factors made national banks less likely to fail than state banks, we expect $\beta_8 < 0$, i.e., that states having a larger percentage of rural banks holding national charters would have lower rates of bank failure.

Five states had no rural bank failures during 1921–1925 and seven had no failures during 1926–1929. The distribution of bank failure rates is thus censored, and so we estimate our models using the tobit procedure. Because some states also had few rural banks during the twenties, we weight the regression variables by the square root of the number of banks

²⁶ State-level averages of bank size for banks located in different sized towns have not been compiled, and thus we cannot test the effect of differences in average bank size on bank failure rates directly.

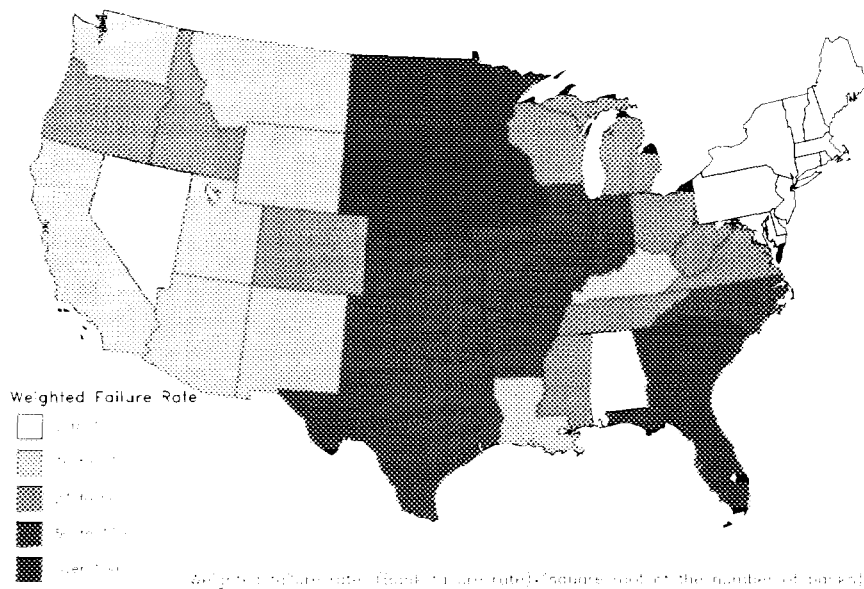


FIG. 5. Rural bank failure rates, 1926–1929 (weighted by the square root of open rural banks).

in each state as a heteroscedasticity correction. A comparison of Figs. 4 and 5 with Figs. 2 and 3 reveals how weighting affects the distribution of bank failure rates across states. Weighting gives Arizona and New Mexico somewhat less importance, for example, while giving Iowa, Minnesota, Illinois, and Wisconsin more importance because they had high numbers of banks.

Table 3 presents our regression estimates. We experimented with both linear and log-linear specifications. The results were not substantially affected by the choice of functional form and thus we report only the log-linear results. Equations (1) and (2) are the results for 1921 to 1925 and Eqs (3) and (4) are those for 1926 to 1929.

Farm distress was the principal determinant of bank failures in both periods. For the early twenties, states that had experienced the largest increases in land value or improved acreage during the teens had the highest rates of bank failure during the twenties. Our results thus support the views of Johnson (1973/1974) and Alston (1983) that unrealized expectations of continued high agricultural prices and incomes caused the failure of many farms and their lenders. Improved acreage is particularly important, and those states with the highest rural bank failure rates from 1921 to 1925 were among those with the largest increases in improved acreage during the teens: Arizona, New Mexico, Montana, Wyoming, and the Dakotas. Based on Eq. (1), a one-half standard deviation (17%)

TABLE 3
The Causes of Rural Bank Failures in the Early Twenties

	(1)	(2)
Dependent variable: suspension rate 1921-1925		
Intercept	-5.98 (4.74)	-5.64 (4.90)
Land value	4.83 (2.51)**	5.41 (2.72)**
Improved acreage	8.46 (1.54)***	8.80 (1.51)***
Farm/rural population	-1.09 (2.29)	-1.66 (2.32)
Government banks	0.40 (0.60)	0.27 (0.61)
Branch banking	0.04 (4.16)	-0.31 (3.99)
Deposit insurance	0.90 (0.65)	3.32 (2.72)
Automobile	0.66 (0.64)	0.38 (0.66)
Population density	-1.45 (0.86)**	-0.97 (0.87)
National/total banks	0.04 (0.41)	-0.15 (0.41)
Deposit insurance × land value		-4.78 (4.32)
Deposit insurance × improved acreage		7.87 (5.55)
Log likelihood value	-209.61	-207.75
Observations	48	48

Note. Standard errors are in parentheses; ***, **, * indicate statistically significant at the 0.01, 0.05 and 0.10 levels. As described in the text the coefficients on the intercept, government banks, deposit insurance, and deposit insurance interaction terms could be either positive or negative; hence we report two-tailed tests for these variables. We report one-tailed tests for the other variables.

increase from the mean in improved acreage would have produced a 0.45 standard deviation (54%) increase from the mean in rural bank failure rate. In contrast, a similar increase in land value would have produced just a 0.14 standard deviation increase in failure rate.

We also find that failure rates were higher in less densely settled states, suggesting that the negative relationship between bank size and failure rate remains after controlling for agricultural distress and other possible failure causes. Our estimate indicates that a one-half standard deviation (36%) increase in rural population density would reduce the value of the dependent variable by 0.15 standard deviation (18%).

The only other variable that seems to have affected bank failure rates during 1921-1925 is deposit insurance. Although not statistically significant at the 0.10 level (two-tail test), the coefficient estimate for insurance

suggests that a state's failure rate was higher by 0.90 per 100 banks (0.30 standard deviation or 36% above the mean) than it would have been in the absence of insurance, all else equal. Insurance might have limited failures by preventing bank runs, but on balance we find that insurance caused failure rates to be higher than they might otherwise have been. It may be that the success of deposit insurance in preventing runs enabled bankers to assume greater risks.²⁷

Next we consider whether insurance was interrelated with economic conditions. Deposit insurance might have caused bankers whose banks were weakened by agricultural distress to increase risk, and hence the impact of falling agricultural incomes on bank failures might have been particularly pronounced in insurance states. Alternatively, the presence of deposit insurance may have reduced the anxiety of depositors and thereby limited runs for any given level of agricultural distress. To test the competing hypotheses, we include in Eq. (2) interaction terms of deposit insurance and our two proxies for agricultural distress, the changes in land value and improved acreage. We find that the impact of a given increase in improved acreage during the teens on the failure rate in states having deposit insurance was nearly double that in other states.²⁸ Several of the states that had deposit insurance systems, including North and South Dakota, Nebraska, Oklahoma, and Texas, experienced large increases in improved acreage during the teens and then suffered significant farm distress in the twenties.²⁹

Table 4 shows equations (3) and (4) with the results for 1926 to 1929. Like the earlier period, agricultural distress provides much of the explanation. From Eq. (3) we estimate that a one-half standard deviation (26%) increase above the mean in the farm foreclosure rate would cause a 0.31 standard deviation (36%) increase above the mean rural bank failure rate. As in the early twenties, the coefficient estimate on deposit insurance in

²⁷ There were some differences among the eight deposit insurance systems that we do not capture with our dummy variable. We do not count Washington, whose insurance system collapsed in 1921, as having had insurance. Kansas had the most unusual system in that insurance was optional for state banks. Wheelock (1992a) finds that insurance increased the probability that a Kansas bank would fail, and so we treat Kansas as an insurance state in the reported results. If voluntary insurance limited risk taking, however, our coefficient estimates for insurance should be biased downward. If Kansas is treated as not having insurance, the coefficient on deposit insurance is indeed somewhat larger, although the coefficient on the interaction term of insurance and improved acreage is smaller.

²⁸ Like the coefficient on deposit insurance in Eq. (1) the coefficient on the deposit insurance-improved acreage interaction term in Eq. (2)—is statistically significant at the 0.15 level (two-tail tests).

²⁹ Calomiris (1989a) argues that deposit insurance encouraged rapid growth of banks during the teens. If so, it may have helped to fuel the agricultural boom and hence exacerbate the subsequent collapse in those states. Although the correlation coefficients between deposit insurance and the increases in land values and improved acreage are small (0.16 and -0.02), our finding of an interaction between insurance and improved acreage is consistent with this view.

TABLE 4
The Causes of Rural Bank Failures in the Late Twenties

	(3)	(4)
Dependent variable: suspension rate, 1926–1929		
Intercept	–0.93 (5.73)	4.47 (6.35)
Farm foreclosures	4.11 (1.38)***	2.37 (1.67)*
Farm/rural population	2.04 (2.65)	4.03 (2.82)*
Government banks	–1.15 (0.73)	–1.03 (0.71)
Branch banking	–0.76 (3.64)	–0.97 (3.52)
Deposit insurance	1.86 (1.28)	–7.15 (5.34)
Automobile	–1.24 (2.98)	–2.07 (2.92)
Population density	1.35 (0.82)	1.20 (0.80)
National/total banks	0.21 (0.67)	0.27 (0.64)
Deposit insurance × farm foreclosures		3.19 (1.83)*
Log likelihood value	–217.86	–216.41
Observations	48	48

Note. Standard errors are in parentheses; ***, **, * indicate statistically significant at the 0.01, 0.05 and 0.10 levels. As described in the text the coefficients on the intercept, government banks, deposit insurance, and deposit insurance interaction terms could be either positive or negative; hence we report two-tailed tests for these variables. We report one-tailed tests for the other variables.

Eq. (3) suggests that the presence of deposit insurance augmented rather than reduced failure rates: the presence of insurance caused a state's failure rate to be 1.86 per 100 banks (0.60 standard deviation or 70% relative to the mean) higher than it would have otherwise been. As during 1921–1925, we find that deposit insurance reinforced the impact of agricultural distress. Equation (4) includes an interaction of deposit insurance and farm foreclosures, and its coefficient estimate suggests that the impact of a given farm foreclosure rate on the bank failure rate was more than double in deposit insurance states than in other states.³⁰

In the second half of the twenties, the presence of federally sponsored lenders was associated with lower commercial bank failure rates, sup-

³⁰ If Kansas is treated as not having had insurance, the coefficients on the deposit insurance variables, including the interaction term, are not significantly different from those reported here.

porting the hypothesis that federal lenders left other banks with lower risk borrowers. For both halves of the twenties our results do not support the hypotheses that increased automobile use by farmers produced higher bank failure rates. The evidence also does not indicate that failures were higher where the prevalence of national banks was low. The positive coefficients on the ratio of farm to rural population and on rural population density in the results for 1926–1929 probably reflect the shifting of agricultural distress eastward to more populated farming areas in Midwestern and Southern states. And finally, although the coefficient on the branch banking index has the anticipated sign in three of the regressions, its value is insignificant, both statistically and economically, in both periods. The extent of branching increased over the twenties, but because it was quite limited throughout the period, cross-country comparisons, such as those which contrast the experiences of Canada and the United States, reveal more about the impact of branch banking restrictions than our study can.

CONCLUSION

The geographic dispersion of the U.S. banking system leaves it vulnerable to the sorts of regional and sectoral shocks experienced in the 1920s and the 1980s. We found that interstate differences in failure rates in the 1920s were due largely to differences in agricultural conditions. As such, the geographic and sectoral diversification made possible by widespread branching might have lessened the prevalence of bank failures, but branching as practiced in the 1920s was far too limited to account for differences in bank failure rates across states.

Deposit insurance appears to have been a second important cause of bank failures during the 1920s. Although insurance may limit failures by preventing bank runs, in the twenties states with deposit insurance systems had higher failure rates than other states. In a sense, deposit insurance cures one problem but creates another. The potential of a bank run forces bankers to hold adequate liquid assets and capital. By reducing the threat of runs, deposit insurance gives bankers an incentive to increase risk. We found that the effect of agricultural distress on bank failures was particularly great in the presence of deposit insurance, suggesting that insurance resulted in excess risk taking. Our estimates indicate that a given level of distress in deposit insurance states was associated with a bank failure rate approximately double that of other states.

Finally, our paper has failed to find evidence to support several oft-cited causes of bank failures in the twenties. Transportation improvements in rural areas and a growing federal lending presence, for example, appear not to have increased rural bank failure rates significantly across states. The high number of bank failures in the twenties resulted primarily from severe agricultural distress and its interaction with a government-imposed banking system structure.

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