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Banking on the Boom, Tripped by the Bust: Banks and the World War I Agricultural Price Shock

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ABSTRACT

Bank lending booms and asset price booms are often intertwined. Although possibly triggered by a fundamental shock, rising asset prices can stimulate lending that pushes asset prices higher, leading to more lending, and so on. Such a dynamic seems to have characterized the agricultural land boom surrounding World War I. This paper examines i) how banks responded to the boom and were affected by the bust; ii) how various banking regulations and policies influenced those effects; and iii) how bank closures contributed to falling land prices in the bust. We find that rising crop prices encouraged bank entry and balance sheet expansion in agricultural counties (with new banks accounting disproportionately for growth in lending and banking system risk). State deposit insurance systems amplified the impact of rising crop prices on bank portfolios, while higher minimum capital requirements dampened the effects. When farmland prices collapsed, banks that had responded most aggressively to the asset boom had a higher probability of closing, and counties with more bank closures experienced larger declines in land prices.

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1. Introduction

Asset price booms and busts are often intertwined with lending booms and busts. Although possibly triggered by a fundamental shock, rising asset prices can stimulate lending and higher leverage, which in turn causes asset prices to rise further, generating more lending, and so on. Similarly, falling asset prices can force debt contraction and deleveraging that reinforce the decline in asset prices. Large declines in asset prices can be disruptive, especially when preceded by rapid credit growth or involve real estate or other highly-leveraged assets (e.g., Kindleberger 1978; Minsky 1986; Borio and Lowe 2002; Eichengreen and Mitchener 2004; Reinhart and Rogoff 2009; Schularick and Taylor 2012).[1] The interrelationship between asset prices and lending booms thus raises important questions, including how various regulations and policies might affect the vulnerability of the banking system to asset price shocks, and how bank lending and instability can exacerbate asset price movements.

Many studies have investigated these questions in the context of the U.S. house price boom of the early-to-mid 2000s and financial crisis of 2008-09. For example, researchers have highlighted the outsized role of the "shadow" banking system in supplying credit that fueled the boom (e.g., Loutskina and Strahan 2009; Mian and Sufi 2009), while others focused on credit demand (e.g., Glaeser et al. 2010; Dell'Arricia et al. 2012). Still other studies have examined the impact of the financial crisis and bank distress on economic activity during and after the crisis (e.g., Campello et al. 2010; Ivashina and Scharfstein 2010; Chodorow-Reich 2014; Gertler and Gilchrist 2018). However, the complexity of modern financial systems, which include banks with international operations and off-balance sheet activities as well as shadow banks and other forms of intermediation, can obscure fundamental relationships. Thus, detailed examinations of episodes when such factors were not in play can be especially useful for identifying key relationships between asset booms and the banking system, as well as the effects of different policies that are hard to discern in more complex environments.

This paper studies the interplay of bank lending and asset prices in the boom-bust cycle affecting U.S. agricultural land prices during and after World War I. Unlike the recent U.S. house price boom, where the underlying shock or set of shocks that triggered the boom has proved difficult to identify conclusively, the farmland boom of the 1910s had a clearly

[1] Theoretical descriptions of how credit cycles can amplify real shocks include Rajan (1994), Kiyotaki and Moore (1997), Geanakoplos (2010), and Nuño and Thomas (2017).

identifiable trigger.[2] The wartime collapse of European agriculture drove commodity prices sharply higher and constituted an external demand shock that sparked the boom in U.S. farmland prices. However, the boom was short-lived. European production bounced back quickly when the war ended, driving down crop prices and land values in the United States, and initiating a wave of farm foreclosures and bank failures in the early 1920s (Alston 1983; Alston, et al. 1994).

The historical episode is particularly advantageous for studying the interrelationships between lending and asset price booms and busts because bank lending at the time was decidedly local. Federal law prohibited interstate branch banking, and most states either prohibited or severely restricted branching within their borders. Moreover, with the automobile still in its infancy and paved roads almost nonexistent in rural areas, it would have been impractical for most farmers to obtain services from a bank located more than a few miles from their home. Thus, the balance sheet information we observe for individual banks reflects their lending to local farmers, and we can approximate local income shocks using detailed information about crop production in a bank's county.[3] Specifically, we calculate a county-specific farm output price shock by applying the annual nation-wide price changes of 11 major crops to the county output shares of each crop before the war. This provides exogenous variation both across time and within a state to identify the effects of the price shock.

In two important studies of the episode, Rajan and Ramcharan (2015a, 2016) find that counties with more banks experienced larger increases in farmland prices and mortgage debt during the boom and suffered larger price declines and more bank failures during the bust. Whereas Rajan and Ramcharan examine the effects of credit availability (as reflected in the number of banks present in a county) and bank suspensions on county-level land prices, here we use biennial balance sheet data for individual banks in 18 agricultural states for 1908-20 to examine how the price shock affected i) the establishment of new banks, ii) bank portfolio decisions, and iii) the determinants of bank closures when farm prices and incomes ultimately collapsed. The bank-level data enable us to test whether state banking policies amplified or mitigated the impact of asset price shocks on the banking system, and to use an instrumental

[2] Studies attribute the U.S. housing boom to, among other things, loose monetary policy (Taylor 2010), a savings "glut" and heightened demand for safe U.S. financial assets (Bernanke 2005), a bubble (Case and Shiller 2003), and financial market innovations including securitization of subprime mortgages (Loutskina and Strahan 2009; Mian and Sufi 2009).

[3] The county is a reasonable approximation of the area constituting a rural banking market at the time. Most empirical studies define banking markets at the MSA or rural county level even in modern times.

variables approach to identify the impact of bank closures on county-level farmland values during the early 1920s. Our study thus provides insights about the channels by which the asset boom-bust affected the banking system and supply of credit, the role of government policies, and how banking instability contributed to the collapse of asset prices when commodity prices began to fall.

Our results show that rising crop prices encouraged entry of new banks and balance sheet expansion of new and previously established banks. While all banks expanded their assets and loans, those established during the war were especially aggressive lenders. New banks accounted for some one-third of the total increase in bank loans in our sample states between 1914 and 1920, and many increased their portfolio risk in response to rising crop prices. Similar to shadow banks in modern times, state-chartered banks responded more strongly to the boom than did more tightly regulated national banks. Further, we find that deposit insurance amplified the effects of rising crop prices on bank loan volumes, whereas higher minimum capital requirements deterred entry and dampened the effects of crop prices on loan growth and risk.

When farm prices and incomes collapsed in the early 1920s, we find that a bank's probability of closing was higher, the larger the increase in its loan portfolio during the boom. Recently established banks were especially likely to close, as were banks with insured deposits, higher leverage, or larger shares of their portfolios devoted to loans. Further, banks located in counties with large increases in land values during the boom were more likely to close when prices fell. Finally, we find that bank closures exacerbated the collapse of farmland values during 1920-25. Thus, our research provides new evidence of how banks can both be affected by and contribute to asset price booms and busts, and how banking policies can influence the feedback loop around such events.

The paper proceeds as follows: Section 2 provides historical background about the farmland boom-bust and the U.S. banking system at the time. Section 3 describes the data we use to estimate the interrelationship between banks and asset prices. Sections 4 and 5 examine the impact of the agricultural boom and bank regulation on the establishment of new banks and the balance sheets of new and previously established banks. Section 6 examines the determinants of bank closures during the bust. Section 7 estimates the contribution of bank closures to the collapse of farmland values in the 1920s. Section 8 concludes.

2. Background

In agricultural regions, fluctuations in farm output prices and incomes importantly influence the demand for funds and profit opportunities for local banks. The early 1900s were generally good years for farmers. Prosperity brought more land under cultivation and rising farm populations, as well as substantial growth in the number of commercial banks in farming communities. Because most states prohibited or severely restricted branch banking, market entry was almost solely in the form of new banks.[4] Across the United States, the total number of banks more than doubled from 13,053 in 1900 to 27,864 in 1914; the South and Great Plains regions experienced increases of more than 200 percent (Board of Governors 1959, p. 33).

World War I transformed good years for farmers and their banks into boom years as the wartime demand for U.S. agricultural products caused prices to soar. Figure 1 shows that the unweighted average of 11 crop prices rose by 160 percent between 1914 and 1919, but also that the extent and timing of increases in the prices of individual crops varied. Whereas the prices of cotton, flaxseed, Irish potatoes, and tobacco rose by more than 200 percent, those of oats, rye, sweet potatoes, and buckwheat increased by less than 100 percent.

The wartime boom in farm output prices and incomes drove increases in land prices and mortgage debt, and drew still more banks to farming communities. Farmland value per acre rose by 51.4 percent on average between 1910 and 1920, with larger increases in the Midwest (60.6 percent), South (84.5 percent), and Great Plains (52.9 percent).[5] As one might expect, land values increased most in agricultural regions where the principal crops had the largest price gains and where there was less available land to bring into production. Farmers often financed land and equipment purchases through banks and other lenders.[6] Across all states, mortgage debt rose by an average of 83 percent between 1910 and 1920. Southern states experienced the largest increases (116 percent) while Northeastern states had the smallest increases (54 percent).

[4] Banks with federal charters, i.e., national banks, were prohibited from opening branch offices, as were state-chartered banks in most states, which hampered diversification and tied banks to the fortunes of their local communities. Calomiris (2000) argues that northern farmers opposed branching to ensure that local banks would continue to lend to them bad times as well as during prosperous periods, and in a 1924 referendum, voters in Illinois soundly rejected branch banking (White 1984). Indeed, fewer than 175 new branches were established outside head office cities in the Great Plains, Midwest, and South between 1910 and 1920 (Board of Governors 1959)

[5] Throughout this section, the regional data are unweighted averages of state-level observations.

[6] Loans during the period typically were a short-term with balloon payment rather than long-term with self-amortizing payments. The average term of farm mortgage loans recorded by banks during 1917-21 was 2.7 years, ranging from 1.4 years in the South to nearly 5 years in New England (Horton, Larsen, and Wall 1942, Table 74).

More than 3,000 banks were chartered across the United States during or shortly after the war, bringing the total to an all-time high of more than 31,000 banks, or about one bank for every 3,500 persons, in 1921. Relative to population, banks were especially prevalent in the Midwest and Great Plains, where states had as many as one bank for every 756 persons residing in the state.[7] Many banks opened in towns that previously had no bank. For example, among states in the Midwest, Great Plains and South that make up our sample, 61 percent of new banks were established in towns that had no bank in 1910, and 30 percent were in towns that had only one bank. In total, bank loans rose by an average of nearly 100 percent across all states, though states in the Great Plains and South experienced somewhat larger increases (119 percent and 112 percent, respectively) than those in the Northeast (71 percent).

Most studies of the period conclude that farmers and their lenders expected crop prices to remain high after the war and thereby justify higher land prices. For example, Horton, Larsen and Wall (1942, p. 3) argue that "farm owners incurred debts and lenders made loans with the expectation that present or future increases in income and land values would support the debt." However, contrary to those expectations, European production recovered quickly when the war ended, and by 1921, crop prices were some 50 percent below their 1919 levels. The marked drop in commodity prices in 1920-21 and resulting decline in farm incomes caused farmland values to also collapse. Land values fell by an average of 27 percent between 1920 and 1925. Western states saw the largest average decline at 43 percent, but states in the South, Midwest, and Great Plains also experienced substantial declines of between 24 and 39 percent.

The post-war collapse of crop prices also brought a sharp increase in bank failures, voluntary liquidations, and mergers, producing the first sustained decline in the number of U.S. banks since the Civil War. After peaking in 1921, the number of banks fell by some 5,000, or 16 percent, over the 1920s. Bank suspension rates were especially high in states of the Pacific, Great Plains, and South regions where many new banks had opened during the prior decade.[8] Suspension rates were also generally higher among state-chartered banks (state banks) than among banks with federal charters (national banks). Differences in the composition and regulation of banks likely contributed to these differences. National banks were subject to

[7] North Dakota had one bank for every 756 persons. Other states with similar numbers included Iowa (1,257), Nebraska (1,073), and South Dakota (914). The ratio is calculated by dividing the number of banks in 1921 (Board of Governors 1959) by state population in 1920.

[8] Suspensions include banks that failed or otherwise suspended operations because of financial difficulties. Some banks that suspended later reopened, though most did not.

uniform and relatively strict standards across all states, whereas state banks were subject to the laws, regulations, and policies established by the state in which they were located. In particular, state banking regulations were more liberal toward mortgage loans for farmland, building, and equipment purchases.[9] Both federal and state banking laws prohibited interstate branching. National banks were prohibited from operating any branches, and most states either prohibited or severely limited intrastate branching. Thus, entry nearly always took the form of a new bank, rather than a new branch of an established bank. State legislatures often set low minimum capital requirements to encourage state-chartered banks to open in rural communities, however, whereas national banks faced higher minimums, which held down their numbers in small towns. Thus, while both bank types were present in large numbers in farming communities, national banks were more prevalent in larger cities and less heavily involved in farm lending than state banks.

State banking policies likely also affected banks' ability and incentives to engage in high-risk lending. Deposit insurance, which eight states adopted during the 1910s and early 1920s, was one such policy. Calomiris and Jaremski (2018) find that, during the boom, insured banks generally had faster loan growth rates than uninsured banks, especially those located in regions with the largest increases in farm output prices. Deposit insurance also seems to have exacerbated the impact of the post-war collapse of farm prices and incomes on bank loan growth and suspension rates (e.g., Calomiris 1992, Alston, et al. 1994, Wheelock 1992, Wheelock and Wilson 1995, and Dehejia and Lleras-Muney 2007).

Minimum capital requirements, extended liability laws, and Federal Reserve membership were among other banking policies that might have affected how banks in different locales responded to changes in asset prices. Capital requirements, in the form of either higher minimum capital amounts required to obtain a bank charter or extended liability on bank shareholders were entry barriers that might have discouraged risk taking and the formation of new banks.[10] The effects of Federal Reserve membership are less obvious. Member banks were generally subject

[9] Before 1914, national banks were generally prohibited from real estate lending. However, the Federal Reserve Act (38 Stat. 251, 273), Section 24, specified "Any national banking association not situated in a central reserve city may make loans secured by improved and unencumbered farm land … but no such loan shall be made for a longer time than five years, nor for an amount exceeding fifty per centum of the actual value of the property offered as security. Any such bank may make such loans in an aggregate sum equal to twenty-five per centum of its capital and surplus or to one third of its time deposits…." A 1916 amendment clarified that farm mortgages made by national banks against property other than farmland could have a term of no more than one year.

[10] Carlson et al. (2018) find that national banks in markets with low minimum capital requirements supplied more credit, chose higher leverage, and were more likely to fail during or soon after the Panic of 1893, than were banks in markets with higher minimum capital requirements.

to tougher regulations and supervision than non-member state banks, which might have deterred risk taking, but the availability of the Fed's discount window provided a liquidity backstop that might have encouraged risk taking. Regardless, few state banks chose to become Fed members, likely because they perceived that the costs of membership outweighed the benefits.[11]

The remainder of this paper attempts to fill out the story of the World War I agricultural price shock by examining how banks responded to the boom, how banks fared during the bust, and how the presence and lending of banks influenced the course of farmland values.

3. Data

To examine the effects of the World War I agricultural boom and subsequent bust on the banking system, we merge county-level census data with bank-level balance sheet data. Our sample includes only states in the South, Midwest, and Great Plains that published bank-level information so as to focus on a balanced sample of locations where farming was a large share of economic activity. And, to focus further on farming areas within those regions (rather than urban and manufacturing centers) we include only counties that had (1) no city with a population over 25,000, (2) at least 250 farms, and (3) over 15,000 improved farm acres.[12]

The county-level census dataset contains economic and demographic information for 1900, 1910, 1920, and 1925.[13] Of particular interest is the county-level output of each farm crop. Combining output data for 1910 with annual information on prices for 11 individual crops (corn, wheat, oats, barley, rye, buckwheat, flaxseed, cotton, tobacco, Irish potatoes, and sweet potatoes) from Carter et al. (2006), we form a county-specific crop price index for each year:

$$CropIndex_{c,t} = \frac{\sum_{i=1}^{11} Q_{i,c,1910} * P_{i,t}}{\sum_{i=1}^{11} Q_{i,c,1910} * P_{i,avg}}$$

where $Q_{i,1910}$ is the output of crop *i* in county *c* in 1910, $P_{i,t}$ is the price of crop *i* in year *t*, and $P_{i,avg}$ is the average price of crop *i* between 1908 and 1914. Essentially, the index is the value of a basket of crops at market prices in a given year normalized by the value of that same basket of

[11] Federal Reserve membership was compulsory for national banks. However, even as late as 1929, fewer than 10 percent of state banks had joined the Federal Reserve System. Anderson et al. (2018) find that larger state banks and those which provided services for other banks were more likely to join. Carlson and Wheelock (2018) find that national banks were less liquid after the Fed's establishment than before, suggesting that banks responded to the Fed's founding by shifting toward less liquid loans and securities.

[12] We chose the cutoff points for farms and improved acres to eliminate the bottom 5 percent of the distribution. We chose the population cutoff because the Census provided the number of people living in places with more than 25,000 for every county.

[13] The data were assembled by Haines (2004). We aggregate counties to their 1910 boundaries so as to have consistent county definitions over time.

crops at their pre-war prices, where the fixed basket is defined by the county-specific crop output shares in 1910. The normalization is important to control for differences in the geographic size of counties, as well as in the relative size of each county's agricultural sector before the boom. The measure takes an average value of 1 before World War I and rises throughout the war years.

As the county-level basket of crops is held constant in 1910 and the crop prices are national averages, $CropIndex_{c,t}$ has the benefit of being exogenous to the actions of local banks. Of course, output levels and crop mix likely changed in response to rising farm incomes and changes in relative prices.[14] Our approach misses these shifts, but avoids any reverse causality that local lending or changes in land values might have had on the measured crop price shock.

Figure 2 illustrates the county-level geographic variation in the crop price index and the percentage change in farmland value during the war. The top panel shows that the South, where cotton and tobacco were dominant crops, and the upper Midwest, where buckwheat and Irish potatoes were widely grown, generally experienced larger price gains than the Midwest and Great Plains, where corn and wheat were major crops. The bottom panel shows that the change in land value per acre followed a similar pattern: the largest gains in land values were in the cotton growing portions of the South, and the smallest gains were in the corn growing regions of the Midwest. The correlation is not perfect, however. For example, northwestern Iowa and southeastern South Dakota experienced large gains in farmland values despite relatively modest increases in the prices of the region's principal crops (corn and wheat). The two maps also illustrate the substantial within-state variation in average crop price and land value increases, which we rely on to identify differential effects of the price shock on banks and farmland values.

Our bank data consist of biennial, bank-level balance sheet information for 1908-20, obtained from *Annual Report of the Comptroller of the Currency* and reports published by state banking departments. The Comptroller published balance sheets for every national bank annually, but many states did not publish balance sheets for their state-chartered banks before 1908, and most only published information every other year (see Mitchener and Jaremski 2015). We digitized data from the available state reports for Alabama, Florida, Georgia, Illinois, Iowa, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, North Carolina,

[14] The crop index using the 1920 basket of crops has a 0.92 correlation with that for the 1910 basket, suggesting there was not a substantial change in the distribution of crop production during the war. The lack of a change should not be surprising as soil, climate, and market infrastructure largely determined the cash crops that could be grown profitably in a given location.

Ohio, Oklahoma, South Dakota, and Wisconsin, and interpolated values for the few reporting gaps using the midpoint of data for the immediately surrounding years. The resulting biennial dataset consists of 72,547 observations on 11,914 state banks and 2,989 national banks.[15]

4. Responding to the Price Shock: Establishment of New Banks

One impact the price shock might have had on the banking system was to spur bank entry. Federal and state prohibitions on branching meant that the establishment of new banks, rather than new branches of existing banks, was the dominant form of entry. Researchers have documented that de novo banks generally have much higher failure rates than established banks (e.g., DeYoung 2003). Thus, the agricultural boom might have contributed to banking system instability by encouraging the establishment of new banks, many of which ultimately closed.[16]

We estimate a linear regression to investigate the impact of the agricultural price shock and various bank regulations on the rate of bank entry at the county-level. The dependent variable is the number of new banks established during a two-year period divided by the number of banks present in the county at the end of the prior period. The main explanatory variable is the crop price index measured at the end of the prior period.[17] We estimate the following model using biennial data from 1908 to 1920 (where entry during 1908-09 is the first observation):

$$NewBanks_{c,t} = a + \beta_1 CropIndex_{c,t-1} + \beta_2 Regulation_{c,t} + \beta_3 Regulation_{c,t} * CropIndex_{c,t-1} + \beta_4 X_{c,t} + t_t + c_c + e_{c,t} \quad (1)$$

where $NewBanks_{c,t}$ is the rate of bank entry in county *c* during the biennial period *t*, $CropIndex_{c,t-1}$ is the crop price index in county *c* at the end of the previous biennial period, $Regulation_{c,t}$ is a vector of bank regulations in county *c* in biennial period *t* including a dummy variable for whether the state had an active deposit insurance system, a dummy variable for whether the state imposed double liability on state bank shareholders, and a dummy variable for

[15] We interpolate less than 6 percent of observations. The results are similar if we instead drop these observations. Throughout the paper, the term "state banks" refers to state-chartered commercial banks, trust companies, and savings banks. All of these financial intermediaries took deposits and made loans. At the time, banking reports did not include income statements or information about the interest rates paid on deposits or loans, thereby making it impossible to calculate profit rates. We add 1 to the number of banks to avoid missing values for the few counties that did not have any banks. Appendix Table A1 reports summary statistics for both the county and bank-level data.

[16] The early 2000s housing boom was not associated with growth in the number of commercial banks. However, the boom did increase both the demand for and supply of credit, and was associated with growth of the shadow banking system and easing of lending standards (e.g., Loutskina and Strahan 2009; Mian and Sufi 2009; Dell'Arricia et al. 2012; Gorton and Metrick 2012).

[17] In Appendix Tables A.2 and A.3, respectively, we show that the effects of the crop price index are similar if we use the lagged change in the crop price index or a cross-section from 1914 to 1920.

whether the state had a minimum capital requirement of more than \$10,000 on state banks. $X_{c,t}$ is a vector of county-specific census control variables for county c in the biennial period t, t_t is a vector of year fixed effects, c_c is a vector of county fixed effects, and $e_{c,t}$ is a robust error term clustered by county. As the county fixed effects control for location characteristics that are constant over time, Equation (1) includes only those census control variables that vary over time: the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, and the numbers of state and national banks in the county at the beginning of the period.[18]

Studies of bank entry in other settings find that local economic opportunities, market size, and legal barriers all affect entry (e.g., Adams and Amel 2016; Adams and Gramlich 2016). The crop price index observed at the beginning of a two-year period captures the economic opportunities that encouraged entry. Both the level of each policy variable and its interaction with the crop price index reflect the effects of regulation and other banking policies. The presence of county-fixed effects in the model implies that the coefficients on the levels only capture the effects of any changes in the policy. While these effects are important, there were few changes during our period of study and the asset boom does not seem to have caused them.[19] Hence, we treat the levels of the regulatory variables as controls for the type of institutions and political environment the bank was operating in, and we focus on the interactions, which indicate how the particular policy affected the impact of the crop price shock on bank entry rates.

[18] We assume that the census variables grew linearly over time to construct annual estimates from the decennial observations.

[19] Among our sample states, deposit insurance systems were established in Kansas, Mississippi, Nebraska, Oklahoma, and South Dakota. State banks were required to join the deposit insurance systems in all of these states except Kansas, where membership was voluntary. National banks were not permitted to join state deposit insurance systems. While all national bank shareholders were subject to double liability, several of our sample states also imposed double liability on state banks, including Florida, Georgia, Illinois, Iowa, Kansas, Michigan, Nebraska, North Carolina, Oklahoma, South Dakota, and Wisconsin, but only Mississippi and Ohio adopted double liability during our sample period. Finally, nine states set minimum capital requirements for their state banks at \$10,000 (or \$5000 in the case of North Carolina), while three had minimums above \$10,000 (\$15,000 in Alabama, Florida and \$25,000 in Ohio). Six states changed their minimums between 1910 and 1920, but only four crossed the \$10,000 threshold: Illinois decreased from \$25,000 to \$10,000; Michigan decreased from \$20,000 to \$10,000; Nebraska increased from \$10,000 to \$15,000; South Dakota increased from \$10,000 to \$15,000. The identities of states that imposed double liability are from Grossman (2001). Information on minimum capital requirements is from White (1983) and *Rand McNally Bankers' Directory*. See Benmelech and Moskowitz (2010), Mitchener and Jaremski (2015), Rajan and Ramcharan (2015b), Calomiris and Jaremski (2016) for studies on the political economy of various bank regulation during the period.

Because they faced substantially different regulations, we estimate Equation (1) separately for state and national banks. The results, shown in Table 1, indicate that crop prices had a positive and statistically significant impact on the entry rate of state banks, but not of national banks. The coefficients shown in the first column of each set indicate that a doubling of the crop price index would lead to a 7.1 percent increase in the state bank entry rate and an insignificant 2.5 percent decrease in the national bank entry rate. Because they generally faced higher minimum capital requirements and tighter restrictions on mortgage lending than state banks, national banks were more likely to open in larger cities, and less likely to lend directly to farmers in rural areas. Hence, the larger impact of the agricultural price shock on the establishment of state banks than on national banks is not surprising.

We also find some evidence that banking policies affected how the shock affected bank entry rates. Specifically, we estimate that in counties located in a state with a minimum capital requirement above $10,000 (the median among our sample states), the effect of a given change in the crop price index was approximately one-half of the effect on entry in states with a lower minimum capital requirement. Further, we find a negative correlation between the national bank entry rate and the interaction of the crop price shock with deposit insurance, perhaps because deposit insurance provided state-chartered banks with a competitive advantage over national banks during boom years. However, the effect on state bank entry was small and not statistically significant.[20] Finally, double liability statutes do not appear to have affected the impact of crop prices on the establishment of either bank type.

5. Responding to the Price Shock: Loan Growth and Balance Sheet Risk

In addition to encouraging the formation of new banks, rising farm prices and incomes likely affected bank growth rates and portfolio allocations. Using bank-level balance sheet data, we examine how the agricultural price shock affected the growth of total assets and loans, as well as ratios of loans to assets (loans/assets), paid-in capital, surplus, and undivided profits to assets (capital/assets), liquid reserves to assets (cash/assets), and bonds and stocks to assets (bonds/assets) of banks. Many studies across many settings find that bank failure risk is correlated with these measures. Thus, the analysis provides evidence about whether banks' response to the boom contributed to instability in the banking system by increasing failure risk.

[20] Calomiris and Jaremski (2018) also find that deposit insurance did not significantly affect the number of banks at the state-level, but did not examine bank entry rates explicitly or examine the number of banks at the county-level.

The model, which we estimate using biennial bank-level observations from 1908 to 1920, is as follows:

$$Y_{i,c,t} = a + \beta_1 CropIndex_{c,t} + \beta_2 Regulation_{c,t} + \beta_3 Regulation_{c,t} * CropIndex_{c,t} + \beta_4 X_{c,t} + \beta_5 CropIndex_{c,t} * Yr1918 + t_t + u_i + e_{i,c,t} \quad (2)$$

where $Y_{i,c,t}$ is one of the specified balance sheet variables for bank *i* in county *c* during biennial period *t*, $Yr1918$ is a dummy variable that takes the value 1 in 1918 and 0 otherwise, u_i is a vector of bank-fixed effects, $e_{i,c,t}$ is the error term clustered by county, $X_{c,t}$ now contains all the previous variables with the addition of the numbers of state and national banks in the current year, $Regulation_{c,t}$ now contains a dummy variable for Federal Reserve membership during biennial period *t*, and the rest of the variables retain their previous definitions. In these regressions, we include the interaction between the crop price index and the 1918 dummy to control for any differential effects of the price shock on banks when the United States was at war. During the war, the U.S. government and Federal Reserve encouraged banks to purchase government bonds and to provide funds to help their customers buy bonds (Meltzer 2003, pp. 84-90). This pressure might have altered how banks responded to rising crop prices in those years.

Because of differences between state and federal regulation and other banking policies, we again estimate Equation (2) separately for state banks (Table 2) and national banks (Table 3).[21] Focusing first on state banks, the specification in the first column of each set reveals a positive and statistically significant impact of the crop price index on total assets and loans. We estimate that a doubling of the crop price index increased a state bank's assets by 23.0 percent and loans by 23.7 percent. Further, the coefficients on the crop price index are positive for loans/assets and cash/assets, and negative for capital/assets and bonds/assets. Specifically, we estimate that a doubling of the crop price index increased loans/assets by an insignificant 0.4 percentage points and cash/assets by 1.3 percentage points, while reducing both capital/assets and bonds/assets by 3.0 percentage points. The effects are quantitatively modest, though statistically significant (except for loans/assets), and somewhat ambiguous about whether banks in general responded to the boom by increasing their overall risk.

[21] In the Appendix, we report estimates of the balance sheet regressions in several different ways to show that the results are robust to the modeling choices. Table A.4 reports a cross-sectional regression for 1914-20 to show a total effect. Tables A.5 and A.6 report the results when including an autoregressive term to account for any serial correlation in the balance sheet items. Table A.7 adds the lagged value of total assets to the balance sheet ratios models to control for bank size. Table A.8 combines state and national banks into a single model to show that the effect on state banks was much larger than that on national banks.

Next we test whether banks established during the war responded differently to the boom than did older banks. Berger and Udell (2004) find that in general, the quality of a bank's loans is lower when a higher proportion of the bank's loan officers have never experienced severe loan losses, or when the time since the bank last experienced a bust is long, which they argue contributes to the tendency for loan growth to be procyclical. Thus, conceivably, banks that opened during the boom were more aggressive lenders than older banks because older banks were more likely to have encountered economic distress in the past, or had higher charter values to protect. To test this hypothesis, we include an interaction of the crop price index with a dummy set equal to 1 for banks that were established between 1914 and 1920 in the second and third regressions in each set.

For state banks, the coefficients on the young bank interaction term indicate that for a given increase in the crop price index, the total loans and loans/assets of newer banks increased much more than those of older banks. Specifically, we estimate that the loan volumes of newer banks increased approximately 17 percent more for a given increase in the crop price index than did the loans of established banks. Moreover, whereas the impact of the crop price index on loans/assets of older banks was small and not statistically significant, the impact on the ratio for new banks is positive and significant. A doubling of the crop price index increased loans/assets by 2.5 percentage points for young banks, compared with an increase of 0.1 percentage points for older state banks. Similarly, the impact of the crop price shock on capital/assets was nearly 50 percent larger for young banks than it was for older banks. We estimate that a doubling of the crop price index caused capital/assets of young banks to decline by 4.1 percentage points, compared with a decline of 2.8 percentage points for older banks. Finally, the regressions indicate that whereas an increase in the crop price index increased the cash/assets ratio for older banks, it had no effect on the ratio for young banks. Thus, the evidence indicates that newer state banks responded more aggressively to the agricultural price shock than did older state banks.

The third column of each set of regressions includes the interactions between the banking policy variables and the crop price index to test whether specific regulation altered banks' response to the shock. The negative coefficients on the interaction of the minimum capital requirement dummy variable with the crop price index indicate that the impact of a given crop price index value on total loans, total assets, and loans/assets was smaller in states with relatively high minimum capital requirements. To the extent that higher minimums gave rural banks a

degree of local monopoly power, they likely encouraged conservative behavior and hence less asset and loan expansion as well as higher reserves and lower leverage in response to a local price shock. The positive coefficients on the interaction of double liability with the crop price index indicate that double liability boosted the impact of crop prices on assets, loans, and loans/assets, suggesting that it did not deter banks from responding aggressively to rising crop prices. Grossman (2001) finds that double liability generally reduced risk taking except in periods of heightened financial distress, including the early 1920s, and notes that double liability was widely viewed as ineffective at containing banking system risk and eventually eliminated in the 1930s. Finally, deposit insurance seems to have amplified the impact of crop prices on total loans and assets of banks in state deposit insurance systems. Moreover, the results indicate that insured banks increased their total loans and assets, and reduced their capital/assets ratios, more in response to a given price shock than did uninsured state banks.

The results reported in Table 3 indicate that national banks were less responsive to rising crop prices, particularly in terms of the extensive growth measures. The baseline regressions, which exclude policy interactions, reveal no evidence that national banks systematically increased their total loans or loans/assets in response to crop prices. Further, we find no differences in the balance sheet ratio responses of newer national banks and those established before the boom.

The national bank results suggest some policy effects, however. Rising crop prices had a larger impact on national bank assets, cash/assets, and bonds/assets after banks had become Fed members, but less impact on total loans and loans/assets. However, because all national banks became Fed members when the System was established in 1914, the interaction cannot clearly separate the effect of becoming a member from the effect of the beginning of World War I. The results also indicate that higher minimum capital requirements on state banks dampened the impact of crop prices on loans, assets and loans/assets for national banks, similar to their effect on state banks. Thus, minimum capital requirements appear to have been an especially effective brake on bank expansion in response to fundamental shocks. By contrast, the effects on national banks of double liability or deposit insurance regimes for state banks are more mixed. However, as with state banks, deposit insurance tended to amplify the impact of crop prices on total loans and assets, suggesting that even though national banks were not eligible for insurance, they responded in a manner consistent with their insured state bank competitors.

Our results reveal several dynamics about the boom. First, the agricultural price shock produced large increases in the assets and loans of state banks that were established before 1914, and even larger increases for banks that opened during the boom. Newly-established banks accounted for one-third of total loan growth between 1914 and 1920 in our sample counties. Moreover, the contribution of younger banks to total growth was larger in states with deposit insurance and smaller in states with high minimum capital requirements. Furthermore, while the results are somewhat ambiguous as to whether older banks responded to rising crop prices by taking on greater balance sheet risk, state banks established during the boom seem to have responded more aggressively to rising agricultural prices by increasing their loans/assets and leverage (i.e., by reducing capital/assets).

Second, crop prices had much less impact on the loans and assets of national banks, likely because of their more limited role in financing agricultural investment and production. Moreover, unlike the more aggressive response of newer state banks than older banks, we find no evidence of differences in the responses of national banks based on when they were established. The fact that state banks responded much more strongly than national banks to agricultural fundamentals indicates that our crop price index reflects the agricultural price shock rather than other factors correlated with World War I.

Third, bank regulations and policies affected the response of state banks to the price shock (and even the response of national banks to some extent). High minimum capital requirements lessened the impact of rising farm output prices on the growth of bank assets and loans, and balance sheet ratios correlated with risk, whereas deposit insurance amplified those effects. Double liability statutes, however, were apparently not a deterrent to an aggressive response to rising crop prices.

6. Which Banks Closed During the Bust?

Farm output prices collapsed in 1920 and farmland values quickly followed. With much lower incomes, many farmers were unable to repay mortgages and other loans incurred during the boom, resulting in the failures of hundreds of banks in farming regions. Across the United States, 1,787 commercial banks suspended operations during 1921-24, representing about 6 percent of active banks in 1921. Suspensions were highly concentrated in farm states; Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska and Kansas combined for 947

suspensions (Board of Governors 1943, p. 284). Our bank-level data enable us to test various hypotheses about the causes of individual bank closures during the bust.[22]

We estimate a probit model to examine the determinants of bank closures between 1920 and 1924. Our specification is similar to those estimated in other settings, such as the Great Depression (White 1984), 1980s-90s (Wheelock and Wilson 1995, 2000), and Great Recession (Cole and White 2012), in which the closure outcome is regressed on bank age as well as various balance sheet measures intended to capture bank performance and risk. Larger banks might have more opportunities for diversification or scale economies, and thus we anticipate that banks with more total assets are less likely to close. We anticipate that higher loans/assets would increase the likelihood of closure because loans are typically a bank's most risky assets. By contrast, we expect that greater liquidity (reflected in higher cash/assets) or capital (reflected in higher capital/assets) would reduce the probability of closure. Finally, older banks might be better managed or have more stable funding, and thus we expect that the closure probability was lower for older banks, even leaving aside their less aggressive response to the boom noted previously.

We also test whether the asset boom affected closure rates directly, rather than simply through their observable impact on bank balance sheets. We include the percent changes in farmland value per acre, mortgage debt per acre, and improved farm acreage between 1910 and 1920, as well as the log of mortgage debt per acre in 1920 to capture the boom.[23] We do not include measures of the bust, such as the change in farmland value during 1920-25, because they might be determined in part by local bank closures. The model takes the form:

$$\begin{aligned} Closure_{i,c} = \; & a + \beta_1 \Delta LandValue_{c,1910-20} + \beta_2 \Delta ImpAcres_{c,1910-20} + \beta_3 \Delta MtgDebt_{c,1910-20} \\ & + \beta_4 MtgDebt_{c,1920} + \beta_5 Regulation_{c,t} * \Delta LandValue_{c,1910-20} + \beta_6 X_{c,1920} \\ & + \beta_7 B_{i,1920} + s_s + e_{i,c} \quad (3) \end{aligned}$$

where $Closure_{i,c}$ is a dummy variable set to 1 if bank *i* in county *c* closed before 1924, $\Delta LandValue_{i,1910-20}$ is the percent change in farmland value per acre in county *c* between 1910 and 1920, $\Delta ImpAcres_{c,1910-20}$ is the percentage growth in improved acres in county *c* between

[22] A bank might close because it failed, voluntarily liquidated, merged with another bank, or changed its name or charter type (e.g., a state bank that switched to a national charter), and neither state reports nor *Rand McNally* provide consistent information about why individual banks closed. Because mergers, acquisitions, and name changes were often undertaken for reasons correlated with bank distress, this should not bias the results in any particular direction.

[23] Throughout the paper, our measures are in nominal dollars because mortgages and other loans were not indexed for inflation, and bank failures reflected the performance of bank assets in nominal, rather than real terms.

1910 and 1920, $\Delta MtgDebt_{c,1910-20}$ is the percentage growth in mortgage debt per acre in county c between 1910 and 1920, $MtgDebt_{c,1920}$ is the value of mortgage debt per acre in county c in 1920, $X_{c,1920}$ is the vector of county census variables used before with some additions noted below, $B_{i,1920}$ is a vector of bank-specific control variables for bank i in 1920, $e_{c,t}$ is the robust error term, and the rest of the values retain their previous definitions. Because the asset price boom measures are observed at the county level, we cannot include county-fixed effects and instead expand on the county-level controls to include a vector of Federal Reserve district fixed effects, the logarithm of crop value in 1920, average rainfall in the county, the standard deviation of rainfall in the county, the logarithm of county land area (in square miles), logarithm distance in miles to the Mississippi River, logarithm distance in miles to the Atlantic Ocean, logarithm distance in miles to the Great Lakes, and logarithm distance in miles to the Pacific Ocean (Rajan and Ramcharan 2015; Haines 2004). The vector of bank-specific variables includes dummies for the entry year of the bank, the logarithm of total assets, loans/assets, capital/assets, and cash/assets in 1920.

We estimate the model on the full sample of banks present in 1920 as well as on a reduced sample of banks that were present in 1914 and survived through 1920. The latter sample allows us to include each bank's percentage increase in total loans from 1914 to 1920 to test whether rapid loan growth affected closure probability over and above the location-specific factors. Fahlenbrach et al. (2018) document that rapid loan portfolio growth is generally associated with lower average loan quality and lower future stock returns, while other studies have found that rapid loan growth increases a bank's failure risk (e.g., Federal Deposit Insurance Corporation 1997). Thus, even after controlling for bank age, we anticipate that banks with more loan growth during the boom would have been more likely to close during the bust since rapid growth might reflect aggressive lending associated with less screening of borrowers or lower lending standards.

The marginal effects of Equation (3) reported in Table 4 indicate that the probability of a bank closing during 1920-24 was positively correlated with the increase in county farmland value during the 1910s even after controlling for the balance sheet measures. We estimate that a doubling of farmland value over the 1910s increased a state bank's probability of closing during 1920-24 by 10.8 percentage points and a national bank's probability of closing by 7.2 percentage points. We find no impact of changes in mortgage debt per acre or improved acreage, or of the

level of mortgage debt per acre in 1920, on closure probabilities for state banks. However, national banks located in counties with larger improved acreage increases during the 1910s had higher probabilities of closing during 1920-24. Further, our results indicate that for state banks, larger size (measured by the log of total assets), higher capital/assets, and higher cash/assets reduced closure probability, whereas higher loans/assets increased the probability of closing. The results for national banks go in the same directions but are not always statistically significant, likely due to their lower closure rates and fewer observations.

Finally, for both bank types, the year of entry dummies indicate that older banks were much more likely to survive than banks that entered between 1918 and 1920 (i.e., the excluded group). Compared with a bank that opened between 1918 and 1920, a state bank that opened between 1916 and 1918 was 3.3 percent less likely to close, a state bank that opened between 1914 and 1916 was 6.7 percent less likely to close, and a state bank that opened before 1914 was between 4.7 and 8.2 percent less likely to close.

The results for the sample of banks established before 1914 are generally similar to those for all banks present in 1920. The age dummies are no longer statistically significant, indicating that the year of establishment mattered little for banks that opened before 1914. We also find that rapid loan growth during the boom increased a bank's probability of closing during the bust. The estimates indicate that a 76.9 percent increase in loans during 1914-20 (i.e., the average percentage change in bank loans in the sample) would have increased the probability of closure by 1.38 percentage points even after controlling for the increase in county farmland value during 1910-20 and bank balance sheet composition in 1920.

We also examine whether state banking regulations and policies affected closure rates directly (rather than through their effects on bank balance sheets) using interactions with the change in farmland value during 1910-20. If access to the Federal Reserve's discount window provided member banks with a reliable source of liquidity, then they might have been better able to withstand the decline in farmland prices.[24] Deposit insurance might have increased the probability of bank closure during the 1920s by encouraging greater risk-taking during the boom or as losses eroded bank net worth during the bust. The effect of double liability on the closure probability is unclear *a priori*. Although conceivably a deterrent to risk-taking, Grossman (2001)

[24] White (2015) argues that the Federal Reserve Bank of Atlanta lent aggressively to reduce bank distress during the early 1920s. Our inclusion of Fed District fixed effects accounts for these types of differences.

speculates that double liability gave bankers an incentive to close sooner in order to avoid hitting shareholders with larger losses when banks inevitably failed. Finally, higher capital requirements might be associated with greater buffers for losses as well as higher franchise values.

The results reported in the second and third columns indicate that of the policy variables, only deposit insurance had a statistically significant impact on closure probability. The coefficient estimates indicate that the impact of the increase in land prices during 1910-20 on bank closure probability during 1920-25 was four times larger for banks with insured deposits than for uninsured state banks. The insignificant coefficients on the other regulatory variables suggest that their effects, if any, are captured by the bank balance sheet variables in the model (e.g., higher dollar minimum capital requirements prevented the formation of very small banks as well as new banks, both of which had higher closure rates). The inclusion of these interactions greatly reduces the size and statistical significance of the coefficient on the change in farmland value during 1910-20, however, indicating that the effect of the land boom worked through its impact on bank balance sheets and their interactions with regulation.

We did not include the change in farmland value during 1920-25 in our regressions because of the possibility that bank closures had an impact on local land prices. However, with the explicit understanding that the coefficients are not necessarily causal estimates, we add the percent change in farmland value per acre for 1920-25 and its interaction with the percent change in farmland value per acre 1910-20 to Equation (3), reported in Appendix Table A.9. The level variable allows us to observe whether bank closures were sensitive to the farmland price bust, whereas the interaction allows us to test whether the impact of the decline in land prices on bank closure probability depended on the size of the preceding land price boom. The results provide some evidence that the larger the increase in farmland value during the boom, the greater the impact of a given decline in local farmland value per acre on the probability of closing during the bust. Comparing two counties with the average change in farmland value during 1920-25 (i.e., –34.9 percent), a state bank in a county that experienced a 25 percent larger rise in farmland value during the 1910s was 0.8 percentage points more likely to close in the early-1920s than a state bank located in the other county.

The bank-level analysis provides insight into the dynamics surrounding the interplay of bank and agricultural distress during the 1920s. On a macroeconomic level, the interaction between the boom and the bust made things even worse, at least for state-chartered banks. That

said, microeconomic and regulatory factors also played a role. Banks that were established during the war, expanded their loans during the boom, had higher loans/assets, lower capital/assets, or lower cash/assets were more likely to close during the bust. Deposit insurance appears to have made banks particularly vulnerable to the boom and bust in farmland values.

7. Bank Closures and the Bust

The previous sections have shown how banks responded to and were affected by the agricultural price shock. In this section, we explore the impact of banking instability on the decline of farmland values after commodity prices collapsed in 1920. Rajan and Ramcharan (2015a) show that, for a given shock to commodity prices, counties with more banks experienced larger increases in farmland value than counties with fewer banks, and subsequently, those counties experienced larger declines in land value through the 1930s and a lower level of land prices as late as 1960.[25] Further, Rajan and Ramcharan (2016) find that bank suspensions depressed land values during the 1920s. To limit potential endogeneity, Rajan and Ramcharan employ an identification strategy that involves including suspension rates in both the reference county and in neighboring counties in another state in their regression, under the assumption that suspensions in out-of-state counties will capture the impact of economic activity and credit demand, whereas in-state suspensions reflect both credit demand and supply effects. By contrast, we exploit our microeconomic data on bank balance sheets to estimate predicted bank closure rates based on predetermined values, which enables us to include all counties (not just those along state borders) in the analysis. We also estimate separately the effects of state-chartered and national bank closures, as well as the dynamics of the boom-bust event.

We estimate the following model to examine how the growth and collapse of banks contributed to the land price bust between 1920 and 1925:

$$\Delta LandValue_{c,1920-25} = a + \beta_1 \Delta CropIndex_{c,1919-25} + \beta_2 SDistress_{c,1920} + \beta_3 NDistress_{c,1920} + \beta_4 \Delta LandValue_{c,1910-20} + \beta_5 X_{c,1920} + s_s + e_c \quad (4)$$

where $\Delta LandValue_{c,1920-25}$ is percentage change in farmland value per acre for county c from 1920 to 1925, $\Delta CropIndex_{c,1919-25}$ is the percentage change in the crop price index for county c from 1919 to 1925, $SDistress_{c,1920}$ and $NDistress_{c,1920}$ are one of several measures of state or

[25] In addition to showing similar results for the number of banks in our agricultural county sample, we show in Appendix Table A.10 that loan growth during the 1910s exerted a separate positive effect on farmland value.

national bank distress described below, and the rest of the variables retain their prior definitions. To capture the effect of the banking sector distress on farmland value over and above the crop price shock, we include three types of bank distress measures in the model. First, we include interactions of the crop price index with the numbers of state and national banks in the county in 1920. Second, we include the percent change in bank loan volume in the county from 1910-20. Finally, we include three direct measures of bank closures: the number of banks that closed between 1920 and 1924, the value of assets in 1920 of those banks, and the fraction of a county's assets in 1920 made up by the banks that subsequently closed.

The results, reported in Table 5, reveal a positive impact of changes in the crop price index during 1919-25 on changes in farmland values during the bust. We also find a negative impact of changes in farmland value per acre during the boom on changes in farmland value during the bust. That is, controlling for the fall in crop prices after 1919, counties with larger increases in farmland values during the 1910s suffered larger declines in land values during 1920-25. Our estimates indicate that a county with an additional 10 percentage point increase in farmland value during the 1910s had a 3.1 percentage point larger decline in land value in the 1920s (i.e., about 10 percent of the mean decline in the sample) relative to another county.

The presence of banks or the growth in bank loans might have had an impact to the extent that they contributed to rising farmland values during the boom. However, we find no direct impact of the number of banks in 1920, the interaction of the number of banks in 1920 with the crop price change 1919-25, or the growth in bank loans during 1910-20 on the change in farmland values during 1920-25.

By contrast, changes in local credit supply resulting from state bank failures or other closures do seem to have had an impact. Results reported in columns (3) through (5) indicate that the change in farmland value during 1920-25 is correlated with each of the three measures of state bank closures. For example, a one standard deviation higher number of state bank closures (i.e., 1.56 additional closures) is associated with 2 percentage point lower land value. Similarly, the decline in land value is negatively correlated with the amount of assets in closed state banks and the percentage of a county's banking assets in closed state banks. By contrast, we find no evidence of a link between farmland value and national bank closures during the bust. As previously noted, national banks generally did not respond with aggressive lending during the land price boom, and few closed during the subsequent bust.

The number of closures and assets in closed banks are the most accurate measures of bank distress, but are also likely endogenous to the decline in farmland value. Because of this, we report additional specifications in Table 6 that make use of the state bank closure regression reported in column (2) of Table 4 to generate an arguably exogenous measure of predicted state bank closure risk.[26] The bank closure regressions contain a variety of bank-level variables that reliably predict bank closure and should otherwise be uncorrelated with the decline in farmland values in the early 1920s. Specifically, the closure regressions include measures of each bank's balance sheet and age in 1920. The county-level model controls for changes in the crop price index, previous changes in farmland values, location-fixed effects, and the host of other county-level control variables included in the closure model. Hence, the remaining variation in the predicted probability of closure for each bank is driven exclusively by the bank's age and balance sheet composition in 1920. To move from the bank-level to the county-level, we sum the predicted closure probabilities for each bank in a county.

In column (2) of Table 6, we provide estimates from a reduced form model that replaces the number of state bank closures with the sum of the predicted closure probabilities.[27] The coefficient on the predicted closure probability is slightly larger but not significantly different from the OLS estimate in column (1). In column (3), we formalize the IV specification by utilizing a two-stage least squares model that instruments for the number of state bank closures using the sum of predicted closure probabilities of state banks in the county. The coefficient on the instrumented number of state bank closures in column (3) is larger than coefficient on raw number of state bank closures in column (1). The same one standard deviation increase the number of state bank closures is associated with a 4 percentage point decrease in farmland value. The IV approach thus yields the same result as the OLS regressions: counties experiencing more state banks closures saw additional reductions in farmland value during the 1920s.

8. Conclusion

Banks are often intertwined with asset price booms and busts, as the financial crisis of 2008-09 and the preceding subprime mortgage boom demonstrated (e.g., Mian and Sufi 2009;

[26] We focus on state bank closures because we found that changes in farmland value were not correlated with national bank closures. Also, because few national banks closed during the bust, the explanatory power of the balance sheet items and regulatory interactions are much weaker. The results are similar if we restrict the sample to older state banks and include the percentage growth in loans 1914-20 (as in column (3) of Table 4) or if we include regulatory interactions (as in column (2) of Table 4).

[27] As shown in Appendix Table A.11, the results are similar if we simply count the number of state banks that had a predicted closure probability over 5 percent.

Glaeser et al. 2010; Gorton and Metrick 2012). Historical studies can be valuable for revealing fundamental relationships and the effects of different policies that might not be apparent in complex modern environments, however, and for evidence about the generality of relationships observed in the recent past. The World War I agricultural boom and post-war bust is a particularly useful episode for studying the interrelationship between banks and asset prices. Triggered by the collapse of European agriculture during the war, rapidly rising commodity prices ignited a farmland price boom in the United States. Rajan and Ramcharan (2015a) show that the availability of credit contributed to the boom in land values and mortgage debt at the county-level. Here, using bank-level data, we show how the banking system became enmeshed in the boom. While older banks increased their lending to accommodate rising credit demand, new banks were established and expanded even more aggressively. Similar to the "shadow" banks of the modern era, state-chartered banks responded more strongly to the asset boom than did more tightly regulated national banks. State banking regulations and policies influenced the extent to which banks of both types responded to the boom, however, with higher minimum capital requirements deterring bank entry and loan growth, and deposit insurance encouraging more aggressive lending. The World War I asset price boom thus provides supporting evidence for studies of modern crises as well as a micro-level view of the macroeconomic dynamics found in broader studies of asset booms and busts.

The collapse in land values also affected banks. When farm output and land prices collapsed after the war, banks that opened during the boom, banks with weak balance sheets, and banks that had lent most aggressively during the boom were more likely to fail or be acquired than other banks. Deposit insurance was destabilizing in that it amplified the effect of the boom in land values on bank closure probabilities when farm prices subsequently collapsed. Bank closures, and by extension banking policies, also played a role in exacerbating the collapse of farmland prices in the 1920s. Controlling for the change in crop prices, counties with more bank closures saw larger declines in land prices. Thus, banking instability made the collapse of asset prices worse than it would have otherwise been.

The historical episode offers many lessons for policymakers. First, draconian restrictions on branch banking and other policies that inhibit bank scale and diversification can make a banking system prone to instability in the face of asset price shocks. Throughout much of the 19th and 20th centuries, anti-branching laws gave the United States an unstable, crisis-prone banking

system comprised of small unit banks, unlike the more stable banking system of Canada and other countries with large, diversified banks (e.g., Bordo et al. 1994; Grossman 2010). Although the United States now permits interstate branch banking, the lingering effects of past limits were apparent in the high failures rates of banks located in regions with relatively extreme fluctuations in house prices during the financial crisis of 2008-09 (Aubuchon and Wheelock 2010).

Second, regulators need to be mindful of the tendency for aggressive lending among newly-established banks and avoid policies that encourage excessive risk taking, especially among new entrants. Third, our results indicate that entry barriers in the form of high minimum capital required to obtain a bank charter promoted a more stable banking system, while mispriced deposit insurance had the opposite effect. Our research thus supports studies finding that erosion of entry barriers reduces bank charter values and promote instability, especially when coupled with deposit insurance (e.g., Keeley 1990; Laeven and Levine 2009). Finally, the episode provides evidence of how banking system instability can exacerbate asset price booms and busts, and serves as a reminder that regulations and other policies that influence the stability of banking systems can ultimately affect the stability of asset prices and hence real activity.

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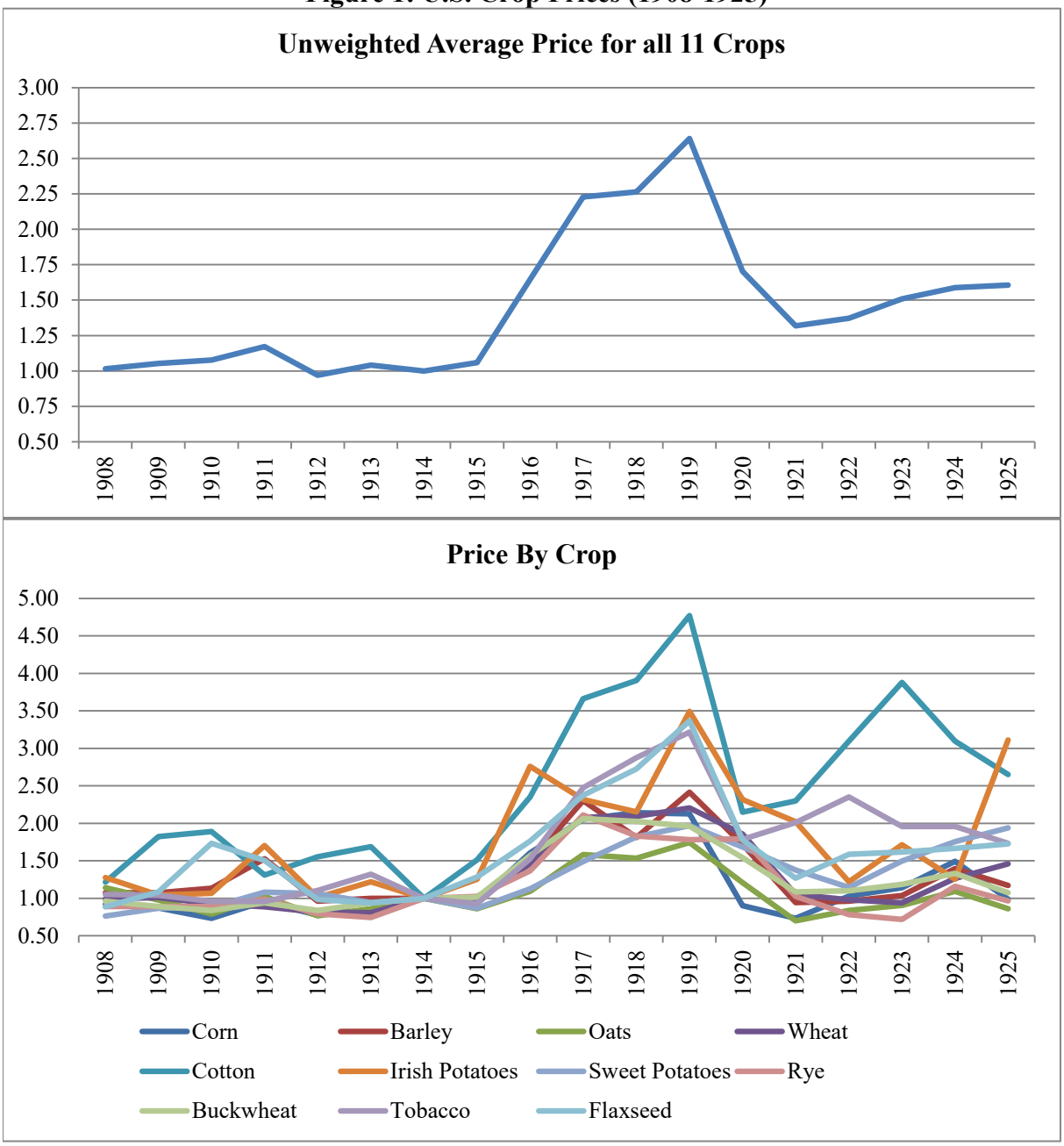
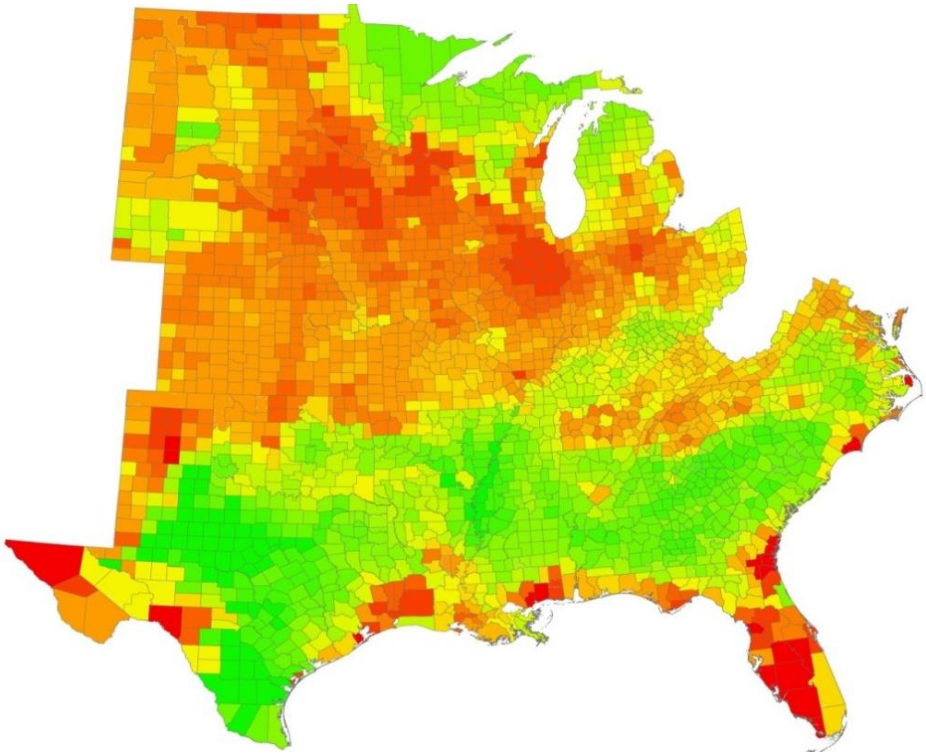
Figure 1: U.S. Crop Prices (1908-1925)



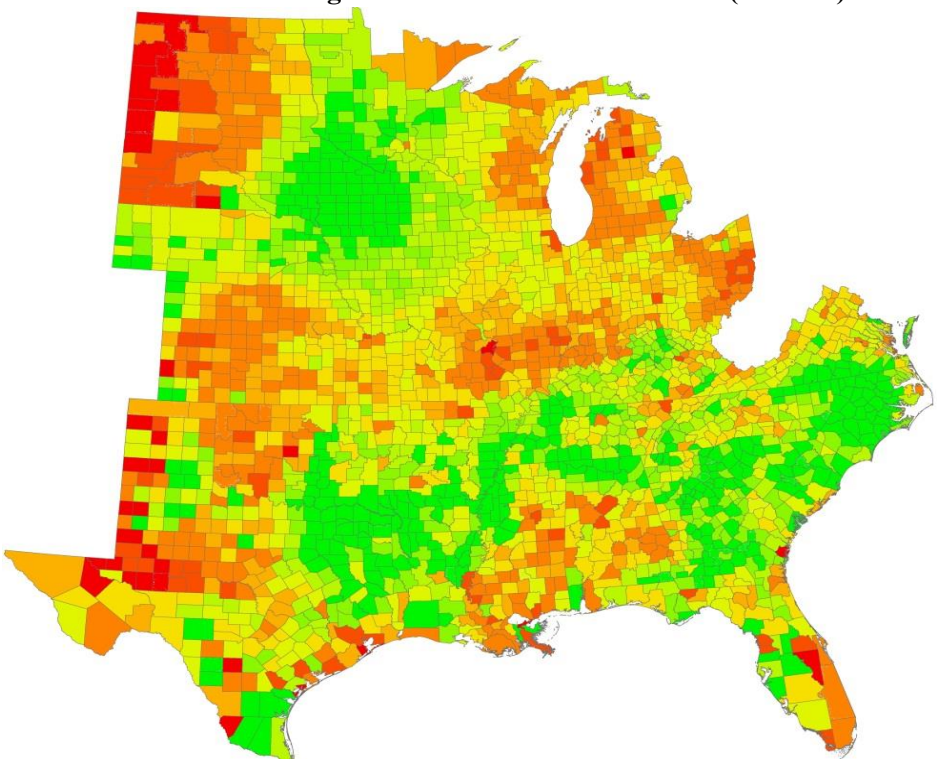
Notes: The figure shows nation-wide prices of 11 major crops. The top panel plots an unweighted annual average of all crops; the bottom panel plots the individual prices of each crop. All prices are normalized to "1" in 1914. Price data are from Carter et al. (2006).

Figure 2: County-Level Changes in Crop and Farm Value

Panel A: Crop Price Index By County in 1919



Panel B: % Change of Farmland Value Per Acre (1910-20)



Notes: The map in the top panel displays the county-level crop price index in 1919. The map in the bottom panel displays the percentage change in farmland value per acre (1910-20) from Haines (2004). In both maps green denotes higher values whereas red denotes lower values. Boundaries were obtained from Minnesota Population Center (2004). We provide information on all states (not just those in our sample) in order to show that states with available data display similar patterns to those that do not.

Table 1: Determinants of Bank Entry (1910-1920)

	Rate of Banks Established			
	State Banks		National Banks	
Crop Price Index At Start of Period	0.071*** [0.016]	0.117*** [0.018]	-0.025 [0.015]	0.003 [0.018]
Double Liability * Crop Price Index At Start of Period		-0.017 [0.013]		-0.017 [0.015]
Min Cap>$10,000 * Crop Price Index At Start of Period		-0.057*** [0.012]		-0.017 [0.013]
Deposit Insurance * Crop Price Index At Start of Period		-0.017 [0.014]		-0.029* [0.015]
County Controls?	Yes	Yes	Yes	Yes
County Fixed Effects?	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes
Observations	7199	7199	7199	7199
R-squared	0.181	0.185	0.127	0.130

Notes: The table presents the results of an OLS regression. The dependent variable is the rate of new banks entering the county in each year where the numerator is the number of entering banks and the denominator is the number of banks at the beginning of the period. Each observation is a county and each county is observed every two years. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with cities over 25,000 population, fewer than 250 farms, or fewer than 15,000 improved farm acres. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county at the beginning of the period, and the number of state banks in the county at the beginning of the period. Regulation controls include the presence of double liability, deposit insurance, or minimum capital above $10,000 for state banks. Robust standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level

Table 2: Effect of Crop Price Shock on State Bank Balance Sheets (1908-1920)

	Ln(Assets)			Ln(Loans)			Loans/Assets		
Crop Price Index	0.230***	0.230***	0.220***	0.237***	0.232***	0.215***	0.004	0.001	-0.005
	[0.019]	[0.018]	[0.020]	[0.021]	[0.021]	[0.022]	[0.006]	[0.006]	[0.007]
Crop Price Index * Young Bank		-0.001	0.001		0.039***	0.041***		0.024***	0.024***
		[0.009]	[0.009]		[0.012]	[0.011]		[0.003]	[0.003]
Fed Member * Crop Price Index			-0.024			-0.001			0.021**
			[0.022]			[0.028]			[0.009]
Double Liability * Crop Price Index			0.062***			0.098***			0.019***
			[0.011]			[0.014]			[0.005]
Min Cap>$10,001 * Crop Price Index			-0.122***			-0.168***			-0.021***
			[0.011]			[0.012]			[0.004]
Insured Bank * Crop Price Index			0.099***			0.085***			-0.004
			[0.010]			[0.013]			[0.004]
Crop Price Index * Yr=1918	0.074**	0.074**	0.042	-0.276***	-0.277***	-0.302***	-0.206***	-0.206***	-0.204***
	[0.036]	[0.036]	[0.037]	[0.046]	[0.046]	[0.044]	[0.018]	[0.018]	[0.018]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	57038	57038	57038	57038	57038	57038	57038	57038	57038
R-squared	0.756	0.756	0.763	0.694	0.694	0.703	0.142	0.143	0.146
	(Capital+Surplus)/Assets			**(Cash+Due from Bank)/ Assets**			**Bonds and Stocks/Assets**		
Crop Price Index	-0.030***	-0.028***	-0.029***	0.013**	0.015***	0.026***	-0.030***	-0.031***	-0.010**
	[0.004]	[0.004]	[0.004]	[0.005]	[0.005]	[0.006]	[0.006]	[0.006]	[0.005]
Crop Price Index * Young Bank		-0.013***	-0.014***		-0.016***	-0.016***		0.002	0.003
		[0.002]	[0.002]		[0.003]	[0.003]		[0.002]	[0.002]
Fed Member * Crop Price Index			0.008**			-0.019***			-0.004
			[0.004]			[0.006]			[0.005]
Double Liability * Crop Price Index			0.003			-0.021***			-0.009***
			[0.002]			[0.004]			[0.002]
Min Cap>$10,001 * Crop Price Index			0.005**			0.007**			-0.036***
			[0.002]			[0.003]			[0.004]
Insured Bank * Crop Price Index			-0.021***			0.016***			-0.006***
			[0.002]			[0.003]			[0.002]
Crop Price Index * Yr=1918	-0.048***	-0.047***	-0.040***	0.080***	0.080***	0.075***	0.104***	0.104***	0.112***
	[0.006]	[0.006]	[0.007]	[0.012]	[0.012]	[0.013]	[0.015]	[0.015]	[0.013]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	57038	57038	57038	57038	57038	57038	57038	57038	57038
R-squared	0.419	0.420	0.425	0.188	0.189	0.191	0.202	0.202	0.231

Notes: The table presents the results of an OLS regression. The dependent variable is provided in the column heading. Each observation is a bank and each bank is observed every two years. Only state-chartered financial institutions (i.e., commercial banks, trust companies, and savings banks) are included in the regression. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,001 persons, fewer than 250 farms, or fewer than 15,001 improved farm acres. "Young Bank" is an indicator variable for whether the bank was established in 1914 or later. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, and the number of state banks in the county. Regulation controls include the presence of double liability, deposit insurance, minimum capital above $10,001, and Fed membership for state banks. Standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table 3: Effect of Crop Price Shock on National Bank Balance Sheets (1908-1920)

	Ln(Assets)			Ln(Loans)			Loans/Assets		
Crop Price Index	-0.052***	-0.049***	-0.198***	-0.033	-0.031	0.021	0.009	0.008	0.135***
	[0.018]	[0.018]	[0.060]	[0.024]	[0.024]	[0.074]	[0.008]	[0.008]	[0.021]
Crop Price Index * Young Bank		-0.044*	-0.044**		-0.031	-0.033		0.006	0.005
		[0.023]	[0.022]		[0.028]	[0.027]		[0.008]	[0.008]
Fed Member * Crop Price Index			0.156**			-0.049			-0.130***
			[0.067]			[0.083]			[0.023]
Double Liability * Crop Price Index			0.032*			0.002			-0.018***
			[0.017]			[0.022]			[0.006]
Min Cap>$10,001 * Crop Price Index			-0.037**			-0.066***			-0.016***
			[0.015]			[0.020]			[0.006]
Deposit Insurance * Crop Price Index			0.058***			0.075***			0.009
			[0.016]			[0.021]			[0.006]
Crop Price Index * Yr=1918	0.296***	0.300***	0.244***	0.167***	0.170***	0.179***	-0.067***	-0.067***	-0.026
	[0.044]	[0.044]	[0.045]	[0.056]	[0.056]	[0.057]	[0.017]	[0.017]	[0.017]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15450	15450	15450	15450	15450	15450	15450	15450	15450
R-squared	0.776	0.776	0.779	0.706	0.706	0.711	0.139	0.139	0.150
	(Capital+Surplus)/Assets			**(Cash+Due from Bank)/ Assets**			**Bonds and Stocks/Assets**		
Crop Price Index	0.010***	0.010***	0.003	-0.021***	-0.021***	-0.104***	0.012*	0.012*	-0.028*
	[0.003]	[0.003]	[0.013]	[0.006]	[0.006]	[0.015]	[0.006]	[0.006]	[0.015]
Crop Price Index * Young Bank		0.002	0.002		-0.009	-0.009		0.002	0.003
		[0.005]	[0.005]		[0.008]	[0.008]		[0.006]	[0.006]
Fed Member * Crop Price Index			0.013			0.090***			0.035**
			[0.014]			[0.018]			[0.017]
Double Liability * Crop Price Index			-0.004			0.006			0.014***
			[0.003]			[0.005]			[0.005]
Min Cap>$10,001 * Crop Price Index			0.004*			0.006			0.009*
			[0.002]			[0.005]			[0.005]
Deposit Insurance * Crop Price Index			-0.010***			0.012**			-0.022***
			[0.003]			[0.005]			[0.005]
Crop Price Index * Yr=1918	-0.065***	-0.065***	-0.064***	0.115***	0.116***	0.084***	-0.054***	-0.054***	-0.062***
	[0.007]	[0.007]	[0.007]	[0.013]	[0.013]	[0.014]	[0.014]	[0.014]	[0.014]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15450	15450	15450	15450	15450	15450	15450	15450	15450
R-squared	0.499	0.499	0.503	0.194	0.194	0.198	0.136	0.136	0.148

Notes: The table presents the results of an OLS regression. The dependent variable is provided in the column heading. Each observation is a bank and each bank is observed every two years. Only OCC-chartered financial institutions (i.e., national banks) are included in the regression. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,001 persons, fewer than 250 farms, or fewer than 15,001 improved farm acres. "Young Bank" is an indicator variable for whether the bank was established in 1914 or later. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, and the number of state banks in the county. Regulation controls include the presence of double liability, deposit insurance, for minimum capital above $10,001 for state banks. Standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table 4: Determinants of Bank Closure (1920-1924)

	Probability of Closing				
	All State Banks		State Banks Est. Before 1914	All Nat. Banks	Nat. Banks Est. Before 1914
	(1)	(2)	(3)	(4)	(5)
ΔLand Value Per Acre 1910-20	0.108***	0.027	0.021	0.072***	0.032
	[0.024]	[0.046]	[0.051]	[0.026]	[0.024]
ΔMortgage Debt 1910-20	-0.008	-0.012	-0.015	-0.005	0.005
	[0.011]	[0.012]	[0.012]	[0.014]	[0.013]
ΔImproved Acres 1910-20	0.001	-0.003	-0.006	0.044***	0.041***
	[0.011]	[0.010]	[0.008]	[0.014]	[0.014]
Ln(Mortgage Debt Per Acre)	-0.011	-0.005	-0.001	0.007	-0.004
	[0.013]	[0.013]	[0.014]	[0.017]	[0.015]
ΔLoans 1914-20			0.018**		0.017
			[0.008]		[0.014]
Fed Member *ΔLand Value Per Acre 1910-20		-0.002	0.022		
		[0.063]	[0.064]		
Double Liability * ΔLand Value Per Acre 1910-20		0.047	0.032		
		[0.054]	[0.060]		
Min Cap.>$10,000 * ΔLand Value Per Acre 1910-20		0.011	0.011		
		[0.038]	[0.040]		
Insured Bank * ΔLand Value Per Acre 1910-20		0.082**	0.084*		
		[0.041]	[0.044]		
Ln(Assets)	-0.049***	-0.050***	-0.046***	-0.028***	-0.015
	[0.007]	[0.007]	[0.008]	[0.011]	[0.010]
Loans/Assets	0.124***	0.130***	0.142***	0.068	-0.008
	[0.041]	[0.041]	[0.047]	[0.062]	[0.056]
(Capital+Surplus)/Assets	-0.078	-0.076	-0.131*	-0.080	-0.193
	[0.058]	[0.058]	[0.071]	[0.100]	[0.130]
Cash/Assets	-0.290***	-0.290***	-0.349***	-0.181*	-0.250**
	[0.062]	[0.062]	[0.074]	[0.108]	[0.100]
Entered in 1918	-0.033***	-0.032***		-0.022	
	[0.012]	[0.012]		[0.019]	
Entered in 1916	-0.067***	-0.066***		-0.034**	
	[0.011]	[0.011]		[0.015]	
Entered in 1914	-0.050***	-0.049***		-0.024	
	[0.011]	[0.011]		[0.019]	
Entered in 1912	-0.047***	-0.046***	0.013	-0.035**	-0.010
	[0.012]	[0.012]	[0.017]	[0.014]	[0.018]
Entered in 1910	-0.064***	-0.062***	-0.006	-0.043***	-0.019
	[0.010]	[0.010]	[0.014]	[0.013]	[0.018]
Entered in 1908 or Earlier	-0.082***	-0.080***	-0.006	-0.076***	-0.033
	[0.013]	[0.014]	[0.013]	[0.025]	[0.025]
County Controls?	Yes	Yes	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes	Yes	Yes
Regulation Fixed Effects?	Yes	Yes	Yes	Yes	Yes
Fed District Fixed Effects?	Yes	Yes	Yes	Yes	Yes
Observations	10052	10052	7857	2533	2176
R-squared	0.129	0.130	0.125	0.143	0.135

Notes: The table presents the marginal effects from a Probit regression. The dependent variable is an indicator variable for whether the bank closed before 1924. Each observation is a bank in 1920. The column headings denote which banks are included in the regressions. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,000 persons, fewer than 250 farms, or fewer than 15,000 improved farm acres. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, the number of state banks in the county, the logarithm of the county's size in square miles, average rainfall in the county, the standard deviation of rainfall in the county, distances to Mississippi River, Atlantic Ocean, Great Lakes, and Pacific Ocean, and a set of Fed district fixed effects. Because of state fixed effects, tegulation controls include deposit insurance and Fed membership for state banks. Robust standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table 5: Determinants of the Agricultural Bust (1920-25)

	Change in Ln(Farmland Value Per Acre)				
	(1)	(2)	(3)	(4)	(5)
ΔCrop Price Index 1919-25	0.243***	0.289***	0.286***	0.284***	0.279***
	[0.061]	[0.056]	[0.056]	[0.056]	[0.056]
ΔFarmland Value 1910-20	-0.305***	-0.307***	-0.297***	-0.300***	-0.298***
	[0.040]	[0.041]	[0.040]	[0.041]	[0.040]
Number of State Banks in 1920	0.010	-0.001	0.001	-0.001	-0.001
	[0.008]	[0.001]	[0.001]	[0.001]	[0.001]
Number of National Banks in 1920	-0.019	-0.001	-0.001	-0.001	-0.001
	[0.017]	[0.003]	[0.003]	[0.003]	[0.003]
State Banks in 1920 * ΔCrop Price Index 1919-25	0.011				
	[0.008]				
National Banks in 1920 * ΔCrop Price Index 1919-25	-0.017				
	[0.015]				
ΔState Bank Loans 1910-20		0.002			
		[0.003]			
ΔNational Bank Loans 1910-20		-0.001			
		[0.001]			
Number of State Bank Closures 1920-25			-0.014***		
			[0.004]		
Number of National Bank Closures 1920-25			0.005		
			[0.009]		
Ln(Assets) of State Bank Closures 1920-25				-0.002*	
				[0.001]	
Ln(Assets) of National Bank Closures 1920-25				-0.001	
				[0.001]	
Fraction of Closed State Bank Assets 1920-25					-0.061**
					[0.030]
Fraction of Closed National Bank Assets 1920-25					-0.024
					[0.027]
County Controls?	Yes	Yes	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes	Yes	Yes
Fed District Fixed Effects?	Yes	Yes	Yes	Yes	Yes
Observations	1247	1246	1247	1247	1247
R-squared	0.627	0.626	0.629	0.626	0.627

Notes: The table presents the results of an OLS regression. The dependent variable is the percentage change in farmland value per acre 1920-25. Each observation is a county. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,000, fewer than 250 farms, or fewer than 15,000 improved farming acres. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, the number of state banks in the county, the logarithm of the county's size in square miles, average rainfall in the county, the standard deviation of rainfall in the county, distances to Mississippi River, Atlantic Ocean, Great Lakes, and Pacific Ocean, the percentage of unimproved land in the county, and a set of Fed district fixed effects. Robust standard errors are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table 6: Determinants of the Agricultural Bust - Instrumenting for State Bank Closures (1920-25)

	Change in Ln(Farmland Value Per Acre)		
	OLS	**OLS - Reduced Form**	**IV**
	(1)	(2)	(3)
ΔCrop Price Index 1919-25	0.285***	0.286***	0.286***
	[0.056]	[0.055]	[0.055]
ΔFarmland Value 1910-20	-0.296***	-0.291***	-0.289***
	[0.040]	[0.040]	[0.039]
Number of State Banks in 1920	0.001	0.002	0.003
	[0.001]	[0.002]	[0.002]
Number of National Banks in 1920	0.001	0.001	0.001
	[0.003]	[0.003]	[0.003]
Number of State Bank Closures 1920-25	-0.014***		-0.024**
	[0.003]		[0.010]
Sum of Predicted State Bank Closure Prob.		-0.019**	
		[0.008]	
Instrument Used?	None	None	Sum of Predicted State Bank Closure Prob.
County Controls?	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes
Fed District Fixed Effects?	Yes	Yes	Yes
Observations	1247	1247	1247
R-squared	0.629	0.627	0.627

Notes: The table presents the results of an OLS regression. The dependent variable is the percentage change in farmland value per acre 1920-25. Each observation is a county. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,000, fewer than 250 farms, or fewer than 15,000 improved farming acres. The "sum of Predicted State Bank Closure Probability" is obtained by summing the predicted probability of closure for each state bank from column (2) of Table 7. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, the number of state banks in the county, the logarithm of the county's size in square miles, average rainfall in the county, the standard deviation of rainfall in the county, distances to Mississippi River, Atlantic Ocean, Great Lakes, and Pacific Ocean, the percentage of unimproved land in the county, and a set of Fed district fixed effects. Robust standard errors are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table A.1: Summary Statistics

	Mean	Std Dev.
County-Level		
ΔCrop Price Index 1910-1919	159.1%	14.5%
ΔCrop Price Index 1919-1925	-103.3%	21.0%
Biennial Rate of State Bank Entry (1908-1920)	11.1%	25.2%
Biennial Rate of National Bank Entry (1908-1920)	4.4%	17.6%
ΔMortgage Debt 1910-1920	93.5%	54.7%
ΔImproved Acres 1910-1920	6.6%	32.4%
Ln(Mortgage Debt Per Acre) in 1920	1.50	0.74
ΔLand Value Per Acre 1910-1920	69.5%	28.7%
ΔLand Value Per Acre 1920-1925	-34.9%	25.2%
# of State Banks in 1910	6.046	4.508
# of National Banks in 1910	1.778	1.893
# of State Banks in 1920	7.973	5.534
# of National Banks in 1920	2.037	2.124
# of State Banks Closed 1920-1924	1.116	1.564
# of National Banks Closed 1920-1924	0.184	0.521
Bank-Level		
Ln(Assets) in 1920	12.705	0.890
Ln(Loans) in 1920	12.345	0.889
Loans/Assets in 1920	0.714	0.135
(Capital+ Surplus)/ Assets in 1920	0.157	0.077
(Cash+ Due from Bank)/Assets in 1920	0.139	0.079
Bonds and Stocks/Assets in 1920	0.090	0.104
Fed Member Dummy in 1920 (State Banks Only)	5.3%	22.5%
Insured Bank Dummy in 1920 (State Banks Only)	28.5%	45.1%
ΔLn(Assets) 1914-1920	76.3%	39.4%
ΔLn(Loans) 1914-1920	76.9%	48.7%
ΔLoans/Assets 1914-1920	0.005	0.122
Δ(Capital+Surplus)/Assets 1914-1920	-0.083	0.080
Δ(Cash+ Due from Bank)/Assets 1914-1920	-0.040	0.090
ΔBonds and Stocks/Assets 1914-1920	0.034	0.081
%Closed Between 1920-1924	11.1%	31.5%
Minimum State Bank Capital $10,000 or Below	39.2%	48.8%
Double Liability Requirement	81.3%	39.0%
Deposit Insurance Active in State	31.3%	46.4%

Notes: The table provides summary statistics for samples used in regressions. County-level data include all counties in the sample whether or not they had a bank. Bank-level data include all banks in the sample.

Table A.2: Determinants of Bank Entry - Using Lagged Crop Price Change (1910-1920)

	Rate of Banks Established					
	State Banks			National Banks		
Change in Crop Price Index Over Previous Period	0.050*** [0.011]	0.050*** [0.011]	0.094*** [0.017]	-0.018* [0.011]	-0.019* [0.011]	-0.001 [0.016]
Double Liability		-0.021 [0.020]	-0.037* [0.020]		0.015 [0.016]	0.013 [0.017]
Double Liability * Crop Price Index At Start of Period			0.023 [0.022]			0.005 [0.017]
Min Cap>$10,000		-0.159*** [0.043]	-0.125*** [0.038]		0.068*** [0.019]	0.081*** [0.020]
Min Cap>$10,000 * Crop Price Index At Start of Period			-0.102*** [0.023]			-0.026 [0.016]
Deposit Insurance		-0.001 [0.025]	0.013 [0.021]		-0.027 [0.018]	-0.012 [0.018]
Deposit Insurance * Crop Price Index At Start of Period			-0.051 [0.031]			-0.062*** [0.020]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes
County Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7199	7199	7199	7199	7199	7199
R-squared	0.172	0.181	0.185	0.124	0.127	0.129

Notes: The table presents the results of an OLS regression. The dependent variable is the rate of new banks entering the county in each year where the numerator is the number of entering banks and the denominator is the number of banks at the beginning of the period. Each observation is a county and each county is observed every two years. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with cities over 25,000 population, fewer than 250 farms, or fewer than 15,000 improved farm acres. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county at the beginning of the period, and the number of state banks in the county at the beginning of the period. Robust standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table A.3: Determinants of Bank Entry - Cross-Section (1914-1920)

	Rate of Banks Established	
	State Banks	**National Banks**
Change in Crop Price Index	0.157***	0.086
1914-20	[0.059]	[0.054]
County Controls?	Yes	Yes
State Fixed Effects?	Yes	Yes
Observations	1270	1270
R-squared	0.231	0.133

Notes: The table presents the results of an OLS regression. The dependent variable is the rate of new banks entering the county in each year where the numerator is the number of entering banks and the denominator is the number of banks at the beginning of the period. Each observation is a county and each county is observed every two years. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with cities over 25,000 population, fewer than 250 farms, or fewer than 15,000 improved farm acres. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county at the beginning of the period, the number of state banks in the county at the beginning of the period, and a set of Fed District fixed effects. Robust standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1%

Table A.4: Effect of Crop Price Shock on Bank Balance Sheets - Cross-Section (1914-1920)

	ΔLn(Assets)		ΔLn(Loans)		ΔLoans/Assets	
	State Banks	National Banks	State Banks	National Banks	State Banks	National Banks
ΔCrop Price Index 1914-19	0.140***	0.129***	0.085**	0.053	-0.035**	-0.043***
	[0.039]	[0.048]	[0.042]	[0.056]	[0.015]	[0.016]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7316	2176	7316	2176	7316	2176
R-squared	0.217	0.220	0.252	0.222	0.152	0.103
	Δ(Capital+Surplus)/ Assets		Δ(Cash+Due from Bank)/Assets		ΔBonds and Stocks/Assets	
	State Banks	National Banks	State Banks	National Banks	State Banks	National Banks
ΔCrop Price Index 1914-19	-0.035***	-0.027***	0.030***	0.048***	0.005	-0.009
	[0.007]	[0.008]	[0.011]	[0.013]	[0.007]	[0.014]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7316	2176	7316	2176	7316	2176
R-squared	0.217	0.237	0.082	0.104	0.247	0.102

Notes: The table presents the results of an OLS regression. The dependent variable is provided in the column heading. Each observation is the change in the balance sheet item from 1914 to 1920. Only state-chartered financial institutions (i.e., commercial banks, trust companies, and savings banks) are included in "State Banks" columns whereas only OCC-chartered financial institutions (i.e., national banks) are included in the "National Banks" columns. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,000 persons, fewer than 250 farms, or fewer than 15,000 improved farm acres. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, the number of state banks in the county, and a set of Fed district fixed effects. Standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table A.5: Effect of Crop Price Shock on State Bank Balance Sheets - Using a First Order Autoregressive Model (1908-1920)

	Ln(Assets)			Ln(Loans)			Loans/Assets		
Crop Price Index	0.177***	0.177***	0.184***	0.172***	0.167***	0.156***	0.002	0.002	-0.010**
	[0.009]	[0.009]	[0.009]	[0.010]	[0.010]	[0.011]	[0.004]	[0.004]	[0.004]
Crop Price Index * Young Bank		0.007	0.009		0.038***	0.036***		0.002	0.004
		[0.008]	[0.008]		[0.009]	[0.009]		[0.004]	[0.004]
Fed Member * Crop Price Index			-0.009			0.022			0.027***
			[0.018]			[0.021]			[0.009]
Double Liability * Crop Price Index			0.010*			0.050***			0.019***
			[0.006]			[0.007]			[0.003]
Min Cap>$10,000 * Crop Price Index			-0.040***			-0.058***			-0.007***
			[0.006]			[0.007]			[0.003]
Insured Bank * Crop Price Index			0.136***			0.138***			0.009***
			[0.006]			[0.007]			[0.003]
Crop Price Index * Yr=1918	0.152***	0.152***	0.093***	-0.163***	-0.163***	-0.229***	-0.203***	-0.203***	-0.208***
	[0.018]	[0.018]	[0.017]	[0.020]	[0.020]	[0.020]	[0.008]	[0.008]	[0.008]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45331	45331	45331	45331	45331	45331	45331	45331	45331
	(Capital+Surplus)/Assets			(Cash+Due from Bank)/Assets			Bonds and Stocks/Assets		
Crop Price Index	-0.018***	-0.018***	-0.018***	0.023***	0.023***	0.036***	-0.027***	-0.027***	-0.006**
	[0.002]	[0.002]	[0.002]	[0.003]	[0.003]	[0.004]	[0.002]	[0.002]	[0.002]
Crop Price Index * Young Bank		-0.000	-0.001		0.002	0.002		0.002	0.003
		[0.002]	[0.002]		[0.003]	[0.003]		[0.002]	[0.002]
Fed Member * Crop Price Index			0.003			-0.020***			0.010**
			[0.004]			[0.008]			[0.004]
Double Liability * Crop Price Index			0.004***			-0.017***			-0.016***
			[0.001]			[0.002]			[0.001]
Min Cap>$10,000 * Crop Price Index			-0.001			-0.004*			-0.024***
			[0.001]			[0.002]			[0.001]
Insured Bank * Crop Price Index			-0.023***			0.005**			0.003*
			[0.001]			[0.002]			[0.002]
Crop Price Index * Yr=1918	-0.052***	-0.052***	-0.045***	0.060***	0.060***	0.059***	0.084***	0.084***	0.083***
	[0.004]	[0.004]	[0.004]	[0.007]	[0.007]	[0.007]	[0.004]	[0.004]	[0.004]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45331	45331	45331	45331	45331	45331	45331	45331	45331

Notes: The table presents the results of a first-order autoregressive OLS regression. The dependent variable is provided in the column heading. Each observation is a bank and each bank is observed every two years. Only state-chartered financial institutions (i.e., commercial banks, trust companies, and savings banks) are included in the regression. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,000 persons, fewer than 250 farms, or fewer than 15,000 improved farm acres. "Young Bank" is an indicator variable for whether the bank was established in 1914 or later. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, and the number of state banks in the county. Regulation controls include the presence of double liability, deposit insurance, minimum capital above $10,001, and Fed membership for state banks. Standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table A.6: Effect of Crop Price Shock on National Bank Balance Sheets - Using a First Order Autoregressive Model (1908-1920)

	Ln(Assets)			Ln(Loans)			Loans/Assets		
Crop Price Index	-0.009	-0.008	-0.100**	-0.002	-0.002	0.045	0.001	0.001	0.114***
	[0.013]	[0.013]	[0.042]	[0.015]	[0.015]	[0.050]	[0.006]	[0.006]	[0.019]
Crop Price Index * Young Bank		-0.043***	-0.037***		-0.020	-0.014		0.018**	0.018**
		[0.014]	[0.014]		[0.017]	[0.016]		[0.008]	[0.008]
Fed Member * Crop Price Index			0.080*			-0.053			-0.113***
			[0.044]			[0.053]			[0.021]
Double Liability * Crop Price Index			0.002			-0.008			-0.008*
			[0.009]			[0.011]			[0.004]
Min Cap>$10,000 * Crop Price Index			0.022**			-0.005			-0.018***
			[0.009]			[0.010]			[0.004]
Deposit Insurance * Crop Price Index			0.127***			0.130***			0.003
			[0.010]			[0.012]			[0.005]
Crop Price Index * Yr=1918	0.197***	0.201***	0.134***	0.106***	0.109***	0.067**	-0.048***	-0.051***	-0.024*
	[0.026]	[0.026]	[0.027]	[0.030]	[0.030]	[0.032]	[0.012]	[0.012]	[0.013]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12516	12516	12516	12516	12516	12516	12516	12516	12516
	(Capital+Surplus)/Assets			(Cash+Due from Bank)/Assets			Bonds and Stocks/Assets		
Crop Price Index	0.008***	0.008***	0.003	-0.012**	-0.011**	-0.095***	0.001	0.001	-0.042***
	[0.002]	[0.002]	[0.008]	[0.005]	[0.005]	[0.017]	[0.004]	[0.004]	[0.014]
Crop Price Index * Young Bank		-0.007**	-0.008***		-0.011	-0.011		-0.004	-0.005
		[0.003]	[0.003]		[0.007]	[0.007]		[0.005]	[0.005]
Fed Member * Crop Price Index			0.010			0.087***			0.041***
			[0.008]			[0.019]			[0.015]
Double Liability * Crop Price Index			-0.005***			0.005			0.005*
			[0.002]			[0.004]			[0.003]
Min Cap>$10,000 * Crop Price Index			0.000			0.006*			0.008***
			[0.002]			[0.003]			[0.003]
Deposit Insurance * Crop Price Index			-0.011***			0.010***			-0.013***
			[0.002]			[0.004]			[0.003]
Crop Price Index * Yr=1918	-0.051***	-0.050***	-0.047***	0.081***	0.082***	0.059***	-0.013	-0.013	-0.018**
	[0.005]	[0.005]	[0.005]	[0.010]	[0.010]	[0.011]	[0.008]	[0.008]	[0.009]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12516	12516	12516	12516	12516	12516	12516	12516	12516

Notes: The table presents the results of a first-order autoregressive OLS regression. The dependent variable is provided in the column heading. Each observation is a bank and each bank is observed every two years. Only OCC-chartered financial institutions (i.e., national banks) are included in the regression. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,000 persons, fewer than 250 farms, or fewer than 15,000 improved farm acres. "Young Bank" is an indicator variable for whether the bank was established in 1914 or later. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, and the number of state banks in the county. Regulation controls include the presence of double liability, deposit insurance, and minimum capital above $10,001 for state banks. Standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table A.7: Effect of Crop Price Shock on Bank Balance Sheet Ratios - Including Lagged Assets (1908-1920)

	State Banks							
	Loans/Assets		(Capital+Surplus)/ Assets		(Cash+Due from Bank)/Assets		Bonds and Stocks/Assets	
Crop Price Index	0.005	-0.002	-0.019***	-0.019***	0.015***	0.027***	-0.034***	-0.013***
	[0.006]	[0.006]	[0.003]	[0.004]	[0.005]	[0.005]	[0.006]	[0.005]
Crop Price Index * Young Bank	0.006	0.007*	-0.003	-0.004**	0.000	0.001	0.002	0.004
	[0.004]	[0.004]	[0.002]	[0.002]	[0.003]	[0.003]	[0.002]	[0.002]
Fed Member * Crop Price Index		0.028***		0.004		-0.020***		-0.002
		[0.008]		[0.004]		[0.005]		[0.006]
Double Liability * Crop Price Index		0.011**		0.003		-0.014***		-0.010***
		[0.005]		[0.002]		[0.004]		[0.003]
Min Cap>$10,000 * Crop Price Index		-0.004		0.002		-0.007**		-0.036***
		[0.004]		[0.002]		[0.003]		[0.004]
Insured Bank * Crop Price Index		0.011**		-0.021***		0.005		-0.004
		[0.005]		[0.002]		[0.004]		[0.003]
Crop Price Index * Yr=1918	-0.208***	-0.212***	-0.066***	-0.057***	0.070***	0.069***	0.111***	0.117***
	[0.018]	[0.018]	[0.006]	[0.006]	[0.013]	[0.013]	[0.015]	[0.013]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45622	45622	45622	45622	45622	45622	45622	45622
R-squared	0.181	0.183	0.409	0.416	0.200	0.203	0.200	0.231

	National Banks							
	Loans/Assets		(Capital+Surplus)/ Assets		(Cash+Due from Bank)/Assets		Bonds and Stocks/Assets	
Crop Price Index	0.014*	0.195***	0.009***	0.003	-0.021***	-0.129***	0.006	-0.057***
	[0.007]	[0.031]	[0.003]	[0.016]	[0.006]	[0.023]	[0.006]	[0.021]
Crop Price Index * Young Bank	0.014	0.014	-0.000	-0.002	-0.012*	-0.011	-0.002	-0.002
	[0.009]	[0.009]	[0.003]	[0.003]	[0.007]	[0.007]	[0.007]	[0.007]
Fed Member * Crop Price Index		-0.187***		0.010		0.114***		0.061***
		[0.033]		[0.017]		[0.025]		[0.023]
Double Liability * Crop Price Index		-0.016**		-0.004*		0.008*		0.010*
		[0.006]		[0.002]		[0.004]		[0.005]
Min Cap>$10,000 * Crop Price Index		-0.014**		0.002		0.003		0.010**
		[0.006]		[0.002]		[0.004]		[0.005]
Insured Bank * Crop Price Index		0.012*		-0.012***		0.008*		-0.021***
		[0.006]		[0.002]		[0.005]		[0.005]
Crop Price Index * Yr=1918	-0.066***	-0.030*	-0.066***	-0.060***	0.102***	0.075***	-0.042***	-0.050***
	[0.017]	[0.017]	[0.006]	[0.007]	[0.012]	[0.014]	[0.014]	[0.014]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12719	12719	12719	12719	12719	12719	12719	12719
R-squared	0.169	0.181	0.547	0.554	0.192	0.196	0.176	0.192

Notes: The table presents the results of an OLS regression. The dependent variable is provided in the column heading. Each observation is a bank and each bank is observed every two years. Only state-chartered financial institutions (i.e., commercial banks, trust companies, and savings banks) are included in the top panel whereas OCC-chartered financial institutions (i.e., national banks) are included in the bottom panel. All regressions contain the lagged value of the logarthm of Assets. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,000 persons, fewer than 250 farms, or fewer than 15,000 improved farm acres. "Young Bank" is an indicator variable for whether the bank was established in 1914 or later. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, and the number of state banks in the county. Regulation controls include the presence of double liability, deposit insurance, minimum capital above $10,001, and Fed membership for state banks. Standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table A.8: Effect of Crop Price Shock on State Bank Balance Sheets Relative to National Banks (1908-1920)

	Ln(Assets)		Ln(Loans)		Loans/Assets	
Crop Price Index	0.162***	0.055***	0.168***	0.069***	0.003	0.011*
	[0.016]	[0.017]	[0.019]	[0.020]	[0.006]	[0.006]
Crop Price Index *		0.139***		0.128***		-0.010***
State Bank		[0.006]		[0.008]		[0.002]
Crop Price Index *	0.138***	0.127***	-0.153***	-0.164***	-0.171***	-0.170***
Yr=1918	[0.033]	[0.033]	[0.043]	[0.043]	[0.017]	[0.016]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	65281	65281	65281	65281	65281	65281
R-squared	0.751	0.755	0.688	0.691	0.134	0.134

	(Capital+Surplus)/ Assets		(Cash+Due from Bank)/Assets		Bonds and Stocks/Assets	
Crop Price Index	-0.020***	-0.010***	0.007*	0.006	-0.025***	-0.027***
	[0.003]	[0.003]	[0.004]	[0.005]	[0.005]	[0.005]
Crop Price Index *		-0.013***		0.002		0.003
State Bank		[0.001]		[0.002]		[0.002]
Crop Price Index *	-0.057***	-0.056***	0.080***	0.080***	0.074***	0.073***
Yr=1918	[0.006]	[0.006]	[0.011]	[0.011]	[0.014]	[0.014]
County Controls?	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Regulation Controls?	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	65281	65281	65281	65281	65281	65281
R-squared	0.408	0.410	0.180	0.180	0.167	0.167

Notes: The table presents the results of an OLS regression. The dependent variable is provided in the column heading. Each observation is a bank and each bank is observed every two years. The sample contains both state-chartered financial institutions (i.e., commercial banks, trust companies, and savings banks) and OCC-chartered financial institutions (i.e., national banks). "State Bank" is an indicator variable that denotes whether the bank was state-chartered. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,000 persons, fewer than 250 farms, or fewer than 15,000 improved farm acres. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, and the number of state banks in the county. Regulation controls include the presence of double liability, deposit insurance, minimum capital above $10,001, and Fed membership for state banks. Standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table A.9: Determinants of Bank Closure (1920-1924)

	Probability of Closing			
	All State Banks	State Banks Est. Before 1914	All Nat. Banks	Nat. Banks Est. Before 1914
	(1)	(4)	(6)	(8)
ΔLand Value Per Acre 1910-20	0.050*	0.034	0.081***	0.048
	[0.027]	[0.030]	[0.031]	[0.033]
ΔLand Value Per Acre 1920-25	-0.001	0.021	-0.110*	-0.091
	[0.037]	[0.038]	[0.058]	[0.057]
ΔLand Value 1910-20 * ΔLand Value 1920-25	-0.087**	-0.096**	0.080	0.079
	[0.040]	[0.043]	[0.063]	[0.063]
ΔMortgage Debt 1910-20	-0.006	-0.008	-0.005	0.004
	[0.011]	[0.012]	[0.014]	[0.013]
ΔImproved Acres 1910-20	0.003	-0.002	0.054***	0.048***
	[0.012]	[0.009]	[0.014]	[0.015]
Ln(Mortgage Debt Per Acre)	-0.012	-0.007	0.004	-0.006
	[0.013]	[0.014]	[0.017]	[0.015]
ΔLoans 1914-20		0.018**		0.016
		[0.008]		[0.014]
Ln(Assets)	-0.049***	-0.045***	-0.028***	-0.015
	[0.007]	[0.007]	[0.011]	[0.010]
Loans/Assets	0.120***	0.135***	0.062	-0.012
	[0.041]	[0.046]	[0.061]	[0.056]
(Capital+Surplus)/Assets	-0.082	-0.139*	-0.090	-0.207
	[0.058]	[0.072]	[0.100]	[0.131]
Cash/Assets	-0.291***	-0.350***	-0.190*	-0.255**
	[0.062]	[0.073]	[0.108]	[0.100]
Entered in 1918	-0.034***		-0.023	
	[0.012]		[0.019]	
Entered in 1916	-0.067***		-0.034**	
	[0.011]		[0.015]	
Entered in 1914	-0.051***		-0.025	
	[0.011]		[0.018]	
Entered in 1912	-0.049***	0.012	-0.036***	-0.009
	[0.011]	[0.016]	[0.014]	[0.019]
Entered in 1910	-0.064***	-0.007	-0.044***	-0.019
	[0.010]	[0.014]	[0.013]	[0.017]
Entered in 1908 or Earlier	-0.083***	-0.008	-0.078***	-0.033
	[0.014]	[0.013]	[0.025]	[0.025]
County Controls?	Yes	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes	Yes
Fed District Fixed Effects?	Yes	Yes	Yes	Yes
Observations	10052	7857	2533	2176
R-squared	0.130	0.125	0.145	0.137

Notes: The table presents the marginal effects from a Probit regression. The dependent variable is an indicator variable for whether the bank closed before 1924. Each observation is a bank in 1920. The column headings denote which banks are included in the regressions. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,000 persons, fewer than 250 farms, or fewer than 15,000 improved farm acres. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, the number of state banks in the county, the logarithm of the county's size in square miles, average rainfall in the county, the standard deviation of rainfall in the county, distances to Mississippi River, Atlantic Ocean, Great Lakes, and Pacific Ocean, and a set of Fed district fixed effects. Robust standard errors clustered by county are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table A.10: Determinants of the Agricultural Boom (1910-20)

	Change in Ln(Farmland Value Per Acre)			
	(1)	(2)	(3)	
ΔCrop Price Index 1910-19	0.170**	0.067	0.160**	0.057
	[0.071]	[0.102]	[0.069]	[0.099]
Number of State Banks	0.003	-0.068***	0.004*	-0.066***
in 1910	[0.002]	[0.020]	[0.002]	[0.020]
Number of National Banks	0.010**	0.141***	0.013***	0.139***
in 1910	[0.004]	[0.045]	[0.004]	[0.043]
State Banks in 1910*		0.047***		0.046***
ΔCrop Price Index 1910-19		[0.013]		[0.013]
National Banks in 1910*		-0.084***		-0.081***
ΔCrop Price Index 1910-19		[0.029]		[0.028]
ΔState Bank Loans			0.010**	0.011**
1910-20			[0.005]	[0.005]
ΔNational Bank Loans			0.007***	0.007***
1910-20			[0.002]	[0.002]
County-Level Controls?	Yes	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes	Yes
Fed District Fixed Effects?	Yes	Yes	Yes	Yes
Observations	1199	1199	1199	1199
R-squared	0.487	0.496	0.498	0.506

Notes: The table presents the results of an OLS regression. The dependent variable is the percentage change in farm land value per acre 1910-20. Each observation is a county. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,000, fewer than 250 farms, or fewer than 15,000 improved farming acres. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, the number of state banks in the county, the logarithm of the county's size in square miles, average rainfall in the county, the standard deviation of rainfall in the county, distances to Mississippi River, Atlantic Ocean, Great Lakes, and Pacific Ocean, the percentage of unimproved land in the county, and a set of Fed district fixed effects. Robust standard errors are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.

Table A.11: Determinants of the Agricultural Bust - Using Predicted Closure Probability Cutoffs (1920-25)

	Change in Ln(Farm Land Value Per Acre)		
	(1)	(2)	(3)
ΔCrop Price Index 1919-25	0.287***	0.282***	0.284***
	[0.056]	[0.056]	[0.056]
ΔFarm Land Value 1910-20	-0.303***	-0.292***	-0.298***
	[0.042]	[0.044]	[0.044]
Number of State Banks in 1920	0.002	0.002	0.001
	[0.003]	[0.002]	[0.002]
Number of National Banks in 1920	-0.002	-0.001	-0.001
	[0.004]	[0.003]	[0.003]
Predicted Number of State Bank Closures 1920-25 (With 5% Cutoff)	-0.003		
	[0.002]		
Predicted Number of National Bank Closures 1920-25 (With 5% Cutoff)	0.002		
	[0.004]		
Predicted Number of State Bank Closures 1920-25 (With 10% Cutoff)		-0.004**	
		[0.002]	
Predicted Number of National Bank Closures 1920-25 (With 10% Cutoff)		0.002	
		[0.006]	
Predicted Number of State Bank Closures 1920-25 (With 15% Cutoff)			-0.004*
			[0.002]
Predicted Number of National Bank Closures 1920-25 (With 15% Cutoff)			0.005
			[0.007]
County Controls?	Yes	Yes	Yes
State Fixed Effects?	Yes	Yes	Yes
Fed District Fixed Effects?	Yes	Yes	Yes
Observations	1247	1247	1247
R-squared	0.626	0.627	0.626

Notes: The table presents the results of an OLS regression. The dependent variable is the percentage change in farmland value per acre 1920-25. Each observation is a county. Only counties located in the Midwest, Great Plains, or South with consistent bank-level data published are included. The sample also excludes locations with a city over 25,000, fewer than 250 farms, or fewer than 15,000 improved farming acres. The "Predicted Number" of closures is obtained by estimating each bank's probability of closure from columns (2) and (6) of Table 7 and counting the number of banks with a probability of closure higher than the specified cutoff value. County-level controls include the logarithms of county population and manufacturing output per person, the fraction of county population living in a city or town of 2,500 or more persons, the fractions of county population that are non-white, illiterate, or 15 years of age or younger, the number of national banks in the county, the number of state banks in the county, the logarithm of the county's size in square miles, average rainfall in the county, the standard deviation of rainfall in the county, distances to Mississippi River, Atlantic Ocean, Great Lakes, and Pacific Ocean, the percentage of unimproved land in the county, and a set of Fed district fixed effects. Robust standard errors are presented in parentheses below the coefficients. * denotes significance at 10%; ** at 5% level and *** at 1% levels.