Local financial capacity and asset values:

Evidence from bank failures*

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Abstract

Using differences in regulation as a means of identification, we find that a reduction in local financial intermediation capacity reduces the recovery rates on assets of failing banks. It also depresses local land prices and is associated with subsequent distress in nearby banks. Fire sales appear to be one channel through which lower local intermediation capacity reduces the recovery rates on failed banks' assets. The paper provides a rationale for why bank failures are contagious, and why the value of specialized financial assets could depend on the size of the intermediary market that is available to buy it.

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1. Introduction

Does the loss in financial intermediation capacity in an area lead to a fall in the liquidation value of financial assets? Could any of the loss in value be ascribed to fire sales? And if the available local financial intermediation capacity influences liquidation values, could the failure of a bank bring down nearby banks, not because they are subject to the same economic shocks but because one bank's failure reduces local intermediation capacity and hence the value of the other banks' assets? We examine these questions in this paper.

Why might financial asset values fall if local intermediation capacity falls? There are at least four channels through which a fall in intermediation capacity could transmit into asset value declines – local balance sheet linkages, a fall in the cash flows generated by the underlying real asset, a fall in the sale value of the real asset relative to its value in best use (which we term a real fire sale discount), and a fall in the sale value of the financial asset relative to the value in the hands of the seller (which we term a financial fire sale discount). These transmission channels of value decline are not mutually exclusive.

Let us be more specific. First, the balance sheets of intermediaries may be linked, either directly, as one intermediary lends to another, or indirectly as they both lend to a common borrower. The failure of one intermediary will directly reduce the value of the loans another intermediary has made to it. Also, the failure of one intermediary may result from, or cause, the failure of a common borrower, and therefore one would expect the loans the other intermediary has made to the common borrower to also be of lower value.

Second, to the extent that intermediaries have specific organizational capabilities in bringing borrowers and savers together, a fall in available local intermediation capacity will limit borrower access to finance, making some potential borrowers forego new investments or purchases, thus leading to a fall in local activity. This could depress the fundamental value of real assets such as firms and land. We will broadly refer to these two channels of value decline as *fundamental* channels.

To understand the other two channels, we elaborate on the reasons for fire sale discounts. In their seminal paper, Shleifer and Vishny (1992) argue that the sale price of an asset may depart from fundamental value if the best users of the asset are heavily indebted. The departure from fundamental value arises because users may be forced to sell the asset to buyers with money but with less capacity to use the asset well.¹ The real fire sale discount centers on the drop in fundamental value as the first best users of an asset give up ownership. A number of papers since Pulvino (1998) have uncovered a discount on real assets when distressed borrowers sell real assets to second best users.

Forced sales of financial assets can similarly occur when a lender, such as a bank, does not have the ability to roll over loans [see Acharya, Shin, and Yorulmazer (2011) or Allen and Gale (2000)]. One alternative for the bank is to sell its loans to healthier banks. If loans are liquid assets with a large market – if there is no specificity between lender and borrower -- there should be no discount from fundamental value in such sales. Because the real asset stays with the original

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¹ See Benmelech and Bergman (2011), Coval and Stafford (2007), and Shleifer and Vishny (2011) for comprehensive reviews.

borrower, there will be no real or financial fire sale. Discounts from fundamental value on sold loans can, however, be large if special knowledge is required to make a loan or special expertise is required to recover payment (see Diamond and Rajan (2001, 2005)) and there is too little financial intermediation capacity in the market among those with similar knowledge or expertise to take the loans over. Even if the loan sales market is competitive, the limited cash available with knowledgeable banks for loan purchases puts an upper limit on what can be paid for sold loans. A shortage of available, knowledgeable liquidity, sometimes termed *cash in the market* pricing, would mean that even though the value of the loan is high in the hands of the original lender, its realized value in a loan sale is lower and depends on available financial intermediation capacity (see Allen and Gale (1994) for an early exposition and Allen and Gale (2005) or Brunnermeier and Sannikov (2013) for comprehensive reviews). Here, any discount on the sold loan relative to its value in the originator's hands is a pure *financial fire sale discount*, since the real asset stays with the original borrower.

These channels of value loss are not mutually exclusive. For example, when a bank fails, its solvent borrowers could also be called upon to repay their loans, especially if they have borrowed short term. Clearly, those borrowers that have cash or liquid assets will be able to repay the full face value of their borrowing easily. In contrast, the capacity of illiquid borrowers to repay will depend on their ability to secure new financing from elsewhere. Even though a borrower may have the internal equity to continue rolling over loans from the original bank, once that bank is short of financing and has to recall loans, there may be few financiers that can match its lending skills. If so, only a fraction of the original loan may get refinanced – effectively a financial fire sale as the original loan is “sold” for a fraction of its value

(see Diamond and Rajan (2001)). Because the borrower cannot refinance fully, borrower assets may be seized and sold to second-best users at a discount to their value in best use. So in addition to a financial fire sale discount, loan recovery may be subject to a real fire sale discount as the underlying real asset changes hands.

In sum, a loss in local financial intermediation capacity can lead to a loss in the value of financial assets such as loans because of a loss of fundamental value, a financial fire sale discount and any real fire sale discount. The consequent depressed value of financial assets in the local economy can lead to a contagion of bank failures and a widespread slowdown in real activity (see, for example, Allen and Gale (2005), Bernanke (1983), Dell’Arricia, Detriagache, and Rajan (2008), Diamond and Rajan (2005), Klingebiel, Kroszner and Laeven (2007), and Ramcharan, Verani and Vandenheuvél (forthcoming)).

To examine the impact of changes in local financial intermediation capacity on the value of financial assets, we analyze data on failures of nationally chartered banks in the United States in the period leading up to the Great Depression – between 1920 and 1927. Bank failures before the Depression were often driven by a common source of distress, agricultural loans gone sour, allowing us to construct a comprehensive and comparable dataset on failed banks. Bank receivers were enjoined to recover bank assets “as early as practicable” and after obtaining a court order, this disposition of assets occurred through the forced sales of assets into the local area for most of the 1920s (Upham and Lamke (1934, page 24)).²

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² Observers of the time noted that “It is a truism that at a forced sale it is usually impossible to secure more than a fraction of the thing sold, and all receivership sales are more or less of the “forced” variety. In so far as farms and chattels of various sorts must be disposed of

With the onset of the Depression, the number of bank failures mounted significantly within a relatively short period. The sources of economic distress were more varied in the 1930-1934 period, and authorities took actions to prevent fire sales. Nevertheless, the sheer number of failures provides another rich laboratory to study the importance of financial intermediation capacity and to undertake robustness tests of our underlying thesis.

Historical institutional features allow us to overcome many of the traditional hurdles associated with measuring and identifying the impact of changes in financial intermediation capacity. In particular, to measure financial intermediation capacity in the market, we make use of the fact that in the early 20th century, physical distance made credit markets local. During this period, few farmers had cars or phones. So proximity to the lender was essential. Indeed, even in the late 20th century, Petersen and Rajan (2002) find that physical proximity was important in determining credit access for small potential borrowers.³ Operationally then, for a given county, the banks within that county as well as the banks in physically proximate counties constitute the local market willing to finance a failed bank's borrowers.

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during receivership, it may be expected that losses will result" (University of Nebraska, 1931, p. 45).

³ In 1992, the median distance between a household and the bank in which the household maintained a checking account was just 2 miles. The distance between the household and its mortgage credit provider was 9 miles. Only with the significant technological changes over this period did these distances expand: in 2004 the median distance between a household and its mortgage credit supplier widened to 25 miles; the median checking account distance remained constant (Amel, Kennickell, and Moore (2008)).

Using the county as the unit of data, we find that the fraction of a failed bank's assets recovered within three years after failure – the three-year recovery rate—is strongly negatively related to subsequent bank failures in that county. Moreover, the relative size of the failed bank in the county is also related to recovery rates; that is, the higher the relative size of the failed bank, and thus the lower the relative residual financial intermediation capacity in other banks, the lower is the subsequent recovery rate. Of course, recovery rates may have been lower in areas with more subsequent failures only because economic conditions were worse in those areas. It is therefore necessary to disentangle the effects of a loss in financial intermediation capacity from the effects of an independent increase in economic distress on recovery values.

Limitations imposed by bank regulation do, however, offer a way of telling these effects apart. Consider a county surrounded by other counties. Because the local financing market is likely to extend to neighboring counties, the recovery rate on a failed bank's assets is likely to be depressed by the failure of banks in neighboring counties, and hence the loss of local financial intermediation capacity. Of course, because economic conditions are likely to be similar in neighboring counties, bank failures there could be a proxy for economic conditions in the county of interest – thus far we have not solved the basic problem of identification.

However, in the 1920s and 1930s, states strongly discouraged out-of-state banks from operating branches in their territories (see, for example, Kroszner and Strahan (1999)) or lending cross-state-border. So bank failures in neighboring in-state counties proxy both for omitted poor local economic conditions and a loss in local financial intermediation capacity, while bank failures in neighboring out-of-

state counties proxy primarily for omitted poor local economic conditions – since out-of-state banks typically did not lend to borrowers in the county of interest (also see the evidence in Rajan and Ramcharan (2015)). By examining the differential effects of neighboring in-state bank failures and neighboring out-of-state bank failures, we can identify the effect of a loss in local financial intermediation capacity. We find that bank failures in neighboring in-state counties had a significantly more adverse effect on the recovery rate from a failed bank's assets than bank failures in equidistant out-of-state counties. Robustness checks that examine lending across Federal Reserve Bank district borders in addition to state borders provide further suggestive evidence.

We try and distinguish the various channels through which a loss in financial intermediation capacity affects recovery rates. We do find that lower healthy intermediation capacity available to buy the failed bank's assets also impinges on recovery values, which suggests that balance sheet linkages among distressed banks are not the entire explanation for the impact of lower intermediation capacity. We also find evidence consistent with fire sales, over and above any effects of changes in fundamental values. For instance, using differences across states in the rapidity and ease with which bank assets could be liquidated, we find that where legal frictions impede the rapid seizure and selling of loan collateral, any loss in local intermediation capacity has less influence on recovery values (perhaps because the liquidators of the failed bank dump fewer assets quickly on the market). More generally, a reduction in local financial intermediation capacity is associated with lower land prices, especially in states that do not impede collateral sales. Finally, it also does foretell subsequent bank failures, suggesting the financial contagion predicted by the theory.

Others have examined some of the issues analyzed in this paper. Aggregate evidence from the Depression suggests that the loss of financial intermediation capacity might have been economically disruptive. Anari, Kolari, and Mason (2005), for example, investigate the relationship between the liquidation of failed banks and the persistence of the Depression using a VAR model. They find that the stock of deposits of closed banks is as important as the money stock in explaining output changes over forecast horizons from one to three years. Complementing this aggregate evidence, our paper, focusing on the cross-sectional variation at the bank and county level, suggests a microeconomic channel through which real shocks might propagate themselves through time -- the loss in local intermediation capacity and the concomitant decline in financial asset prices, exacerbated by fire sales, cause further bank failures and asset price deflation.

We are not the first to examine the losses associated with bank failures.⁴ While not focused on the effects of local financial intermediation capacity, James (1991) uses the savings and loans crisis to examine how past unrealized losses and asset quality, along with the method of liquidation might affect asset recovery.

The rest of the paper proceeds as follows. In section 2, we describe the historical background and, in section 3, the data. In section 4, we present the main results on asset recovery rates. In section 5, we attempt to distinguish between the various channels of decline in recovery values, and in section 6 we discuss other

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⁴ There is a nascent empirical literature in the wake of the recent financial crisis focused on financial intermediation capacity in the market and asset prices. See for example Buraschi, Sener and Meguturk (2012), Garleanu and Pedersen (2011), Mancini-Griffoli and Ranaldo (2011), Mitchell and Pulvino (2011), as well as the discussion in Allen and Carletti (2008).

implications of our hypothesis that local financial capacity matters before concluding.

2. Historical Background

The banking failures of the early 1920s had their origins in the preceding commodity price boom (see Rajan and Ramcharan (2015)). Despite the growing number of failures in that decade, policy interventions to contain financial sector distress in the agricultural areas came only towards the end of the decade. This absence of any systematic policy interventions, along with the fact that we have good proxies for the shock to agricultural fundamentals, help to make the 1920s an almost ideal period to identify the impact of changes in local financial intermediation capacity on asset recovery rates.

In the period leading up to 1920, farm land prices in the United States and the value of farm output boomed. The boom had its roots in strong US growth, but it accelerated as World War I disrupted European agriculture, even while demand in the United States was strong. The Russian Revolution in 1917 further exacerbated the uncertainty about supply and intensified the commodity price boom, especially the price of wheat and other grains. The widespread belief was that “European producers would need a very long time to restore their pre-war agricultural capacity” (Johnson (1973, p178)). The national average of farmland values was 68 % higher in 1920 compared to 1914, and 22 % higher compared to 1919.

However, European agricultural production resumed faster than expected after the war’s sudden end, and in need of hard currency, the new Russian government soon recommenced wheat and other commodity exports. As a result,

agricultural commodity prices plummeted starting in 1920 and declined steadily during the 1920s (Blattman, Hwang, and Williamson, 2007; Yergin, 1992).

During the long boom, credit became widely available, as competition between state and national bank regulators led to the chartering of thousands of new banks. Traditional commercial banks also competed with life insurance companies, joint stock land banks and Federal land banks in some areas to provide credit (Alston, 1983a, b). And the long history of rising land prices gave lenders confidence that they would be able to sell repossessed land easily if the borrower could not pay, so lending standards fell and banks lent and refinanced willingly.⁵

Mortgage debt per acre increased 135% from 1910 to 1920, approximately the same rate of increase as the per acre value of the ten leading crops (Alston, Grove, and Wheelock, 1994) citing Federal Reserve documents). Borrowers often only had to put down 10 % of the amount, obtaining 50 % from a bank, and getting a second or junior mortgage for the remainder (Johnson, 1973)). Loan repayments were typically bullet payments due only at maturity, so borrowers had to make only interest payments until maturity. And as long as refinancing was easy, borrowers did not worry about principal repayment. Debt mounted until the collapse in commodity prices put an end to the credit boom. With borrowers unable to repay, banks started failing.

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⁵ C.D. Brener (p. 38, 1935) observes “When war prosperity came, it was looked upon as a normal acceleration of the universal course of events, and the possibility of a reaction was seldom, if ever, considered...the unlimiting granting of charters to all applicants, resulting in the admission to the banking fraternity of thousands of incompetent individuals and the establishment of a bank in practically every village or hamlet, the enactment of banking statutes of the flimsiest substance, and extreme laxity of supervision—would undoubtedly have resulted in the realization that it would be impossible to escape the consequences of such fair-weather banking.”

In the two decades before the collapse of the boom, banking failures were relatively rare (Fig. 1), but around four thousand state chartered banks and 690 national banks were suspended in the period 1921-1927—a time when industry was largely booming. Suspended state banks were generally smaller than national banks, and suspended deposits during this period totaled \$30 billion, roughly evenly split between state and national banks. Panel A of Fig. 2 shows the geographic range of the Federal Deposit Insurance Corporation (FDIC) bank suspension rate across counties in the period 1921-1927. This agricultural depression before the Great Depression, characterized by a spate of bank suspensions concentrated in agricultural counties, offers a way to test theories of asset liquidity and liquidation values.

[Insert Figs. 1 & 2 about here]

For most of the sample period, it was generally rare for closed banks to be entirely taken over by existing banks. Instead, receivers usually sought to liquidate the assets of failed national banks as quickly possible, selling these assets on the open market in a decentralized manner within the local community (Upham and Lemke, 1934)).⁶ That is, once court approval was obtained, loans were collected upon. If repayment was not forthcoming, the receiver seized collateral such as farms, livestock, bonds, stocks and furniture and attempted to sell it (Popejoy, 1931). Thus, over and above any change in underlying fundamental values, to the extent that borrowers could get refinanced elsewhere or loans could be transferred, the

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⁶ The National Bank Act of 1864 provided for the appointment of receivers by the Office of the Comptroller of Currency (OCC) for failed national banks. State supervisory authorities managed the liquidation of failed state banks. See also the discussion on suspensions and failures in Anari, Kolari, and Mason (2005).

recovery value of the failed bank's assets would reflect financial fire sale discounts. To the extent that they could not, recovery values would reflect the extent of real fire sales. In either case, of course, local financial intermediation capacity would matter.

However, as the number of failures increased, it became increasingly apparent that the dislocations caused by the rapid forced selling of these assets into the community tended to push down local farm land prices, hampered asset recovery and increased the legal and administrative costs of liquidating the bank. Falling land prices often made recovery from the failed bank's debtors more difficult, prompting many receivers to resort to expensive litigation in order to collect from these debtors (University of Nebraska ,1931)).⁷

To help reduce these dislocations, centralized approaches to asset liquidation eventually became more common, and federal intervention deepened dramatically in the 1930s.⁸ In 1931, the federal government encouraged the formation of a private corporation, the National Credit Corporation, which was intended to allow stronger banks to aid weaker banks. In 1932, the federal government created the Reconstruction Finance Corporation (RFC) to help stem the

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⁷ The stock of deposits in failed banks remained fairly constant in the late 1920s (see Figure 1 in Anari, Kolari, and Mason, 2005)), but this does not imply that recoveries were not being undertaken, perhaps only that the flow of new failures matched what was being recovered.

⁸ For example, rather than selling locally, the OCC announced in February 1932 that the sale of bonds formerly held in failed national banks would be concentrated in a board located in New York City. Variations of the "Spokane Plan", which sought to induce healthy banks to take over failed banks without directly selling assets into the local market, and was first used in 1928, also became increasingly common (Upham and Lemke,1934)). Likewise, states, such as Ohio, also adopted similar rules to "operate with centralization of policy without detriment to the individual localities" (Whitsett,1938)).

wave of bank suspensions by lending directly to troubled banks. The RFC also began making loans to closed banks after the 1933 banking holiday in order to prevent receivers from having to dump large blocks of loan securities on an “abnormally low market” (Federal Reserve Board, 1936)). In other words, policy and institutional changes may have reduced the pressure to sell, and thus the frequency and magnitude of real and financial fire sales.

So compared to the 1920s, the sample of failures in 1930-34 may differ both in the causes of failure (not just agriculture) and in the resolution process. But the sheer magnitude of banking sector distress between 1930-1934 (see Panel B of Fig. 2) provides another potentially useful context in which to study the impact of changes in local financial intermediation capacity on recovery rates. We now describe the data.

3. Data

We collect two separate data panels, which we cannot combine because they represent two different environments. The first is from the agricultural depression of the early 1920s. We hand-collected annual data between 1920 and 1927 on insolvent national banks placed in receivership as reported by the Office of the Comptroller of Currency (OCC) in its various Annual Reports. The second panel is from the early years of the Great Depression, where we used the OCC Annual Report in 1936 to collect data on national banks that were suspended between 1930 and 1933. Throughout, we organized the samples based on the date the receiver was appointed, which is not always the same as the date of suspension—there can be lags between the decision to suspend and then liquidate a bank (OCC (1936)). This is why we have a number of banks placed in receivership in 1934, though few banks

were suspended that year. We now describe the data from each period in more detail.

3.2. 1920s data set

The OCC Annual Reports identifies 587 banks placed in receivership between 1920 and 1927. By comparison, data from the FDIC, available in electronic form, cover around 690 suspended national banks during this period (and also less detailed data on suspended state banks). Banks can be suspended and then possibly reopened without necessarily being placed in receivership, and data from the FDIC are based on this more general measure of banking distress. Nevertheless, as Panel A of Table 1 suggests, there appears to be no systematic differences in coverage across regions between the FDIC data on suspensions, and the OCC's coverage of national banks in receivership. In what follows, we will use both sources of data, the more detailed OCC data for asset recoveries from banks placed into receivership, and the broader coverage of the FDIC data for the total number of suspended banks (state and national) in a county.

(Insert Table 1 near here)

For each bank in receivership, the OCC's Annual Report provides information about the bank at the time of failure: capital stock at the time of the bank's organization; the date of organization; the date of failure; deposits at the time of failure; and total assets at the time of failure. Total assets are further decomposed into the value of assets expected to be recovered—"estimated good assets"; those assets of "doubtful value"; and those viewed to be "worthless" by the appointed receivers. In addition, the OCC reports annual information on asset recovery. For each bank, we collected this information on asset recovery over a three year

window, beginning in the year of failure. Once a bank's assets have been collected to the extent possible, the bank is considered resolved. Fig. 3 contains pages from the 1924 OCC Annual report.

(Insert Fig.3 near here)

We know the county in which the failed bank was headquartered. Because banking sector distress was initially driven by falling agricultural prices, we hand-collected data from the 1920 decennial census on the acreage in each county devoted to five principal crops: corn, wheat, tobacco, cotton, and grains. We multiply the share of acres devoted to each crop by the change in the world price of the crop, and then take the sum of these acreage weighted price changes to get a county level measure of the perceived shock to local agricultural fundamentals over the 1920s. Fig.4 depicts this county level variation in the perceived shock to local agricultural fundamentals, averaged over 1921-1927. Counties in the upper Midwest and the South suffered some of the sharpest deterioration in agricultural fundamentals during this period.

(Insert Fig. 4 near here)

We also hand-collected data from the 1920 United States Agricultural Census on the average mortgage debt to farm value ratios at the peak of the credit boom in 1920. In addition, we obtained annual data on land prices per acre, to serve as another measure of asset price declines. These data come from the Department of Agriculture reports on actual market transactions of farm land for an unbalanced panel of counties observed annually from 1907-1936.

From 1920 onward, the FDIC provides data in electronic form on the total number of banks and the quantity of deposits in each county within both the state and national banking systems. The FDIC also provides data on the number of suspended state and national banks, as well as the fraction of deposits in suspended banks, in each county every year. We will use these data as a measure of the loss of local financial intermediation capacity.

In Panel A of Table 2, we present summary data in 1920 for those counties that had national banks present in 1920, but no national bank suspensions throughout the decade. Panel B contains summary data for the subset of counties that experienced at least one national bank suspension in the decade. Across both subsamples, the level of leverage appears similar, as does the local run-up in commodity prices.

(Insert Table 2 near here)

However, consistent with the results in Rajan and Ramcharan (2015), credit availability at the peak of the boom in 1920, as proxied for by either the log number of banks or banks per capita, is significantly greater in those areas that also suffered greater banking sector distress. It would seem then that pre-existing local economic conditions, along with the local structure of banking, could matter both for subsequent banking fragility and the evolution of asset recovery rates within in a county. In what follows, we consider a number of ways to control for these and other potential explanations when assessing the importance of local financial intermediation capacity in shaping asset recovery.

3.2 1930s data set

The FDIC recorded 1,951 national bank suspensions between 1930 and 1934. Not all suspended banks are liquidated, and we collected detailed data from the 1936 OCC Annual Report for 1,072 national banks in receivership in 1936. Panel B of Table 1 shows the regional variation in the data, again suggesting little difference in coverage across regions between the FDIC data on suspensions, and the OCC's receivership data.

In Table 3, we summarize recovery rates. For those banks placed in receivership in the 1920s, this is measured three years after failure. For those banks placed in receivership between 1930 and 1934, the recovery rate is observed in 1936. The median recovery rate for the 1920s sample is around 52% and is similar to the recovery rate for those banks placed in receivership amid the early panics of 1930 and 1931, although in this latter sample, asset recovery, observed in 1936, would have been ongoing for nearly twice as long as in the 1920s sample. However, for the 1933-1934 subsample, which coincides with the formation of the RFC in 1932 and the sustained efforts to limit fire sales, asset recovery rates are considerably higher than in the earlier periods despite the much shorter recovery period.

(Insert Table 3 near here)

4. Financial intermediation capacity and recovery rates

In this section, we examine the role of local financial intermediation capacity in shaping recovery rates. We first establish the basic correlations between bank suspensions and asset recovery rates for the more homogenous 1920-1927 sample;

we then use differences in regulations across states to help facilitate causal inference; we finally turn to the 1930s sample of failed banks.

4.1. Basic analysis of liquidation values

We start by documenting some basic correlations between bank suspensions and asset recovery rates for the 1920-1927 sample. The dependent variable in the regression in column 1 of Table 4 is the fraction of the book value of assets that are recovered in a failed national bank within three years after the bank is placed in receivership. The numerator in this variable includes collections from all sources (see Fig. 3). The key explanatory variable, which we include along with state indicators, is the sum of deposits in both state and national banks suspended in that county over the same three year window, expressed as a fraction of total deposits within the county in the year of failure.⁹ Note that in what follows, whenever we measure financial intermediation capacity (or the loss of financial intermediation capacity due to suspensions), we include both state and national banks in the computation since aggregate bank financial intermediation capacity in the county is what matters.¹⁰ Also, to ease comparisons of economic magnitudes across specifications, all variables have been standardized to have zero mean and a

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⁹ Both the numerator and denominator of this variable exclude the deposits of the failed national bank placed in receivership. Also, since about 60 % of all national bank receiverships were recorded in the first quarter of the year, matching the OCC and FDIC data by year of failure is unlikely to significantly mismeasure local financial intermediation capacity.

¹⁰ We do not include other sources of finance in part because our thesis is that bank loans are special and have a limited market, which is why banking capacity matters. Comingling with other sources of finance might be inappropriate.

variance one. The coefficients thus measure the number of standard deviations that the dependent variable changes, given a one standard deviation change in the variable of interest.

(Insert Table 4 here)

As predicted, recovery rates are strongly negatively correlated with the share of subsequent failed deposits.¹¹ A one standard deviation increase in the share of failed deposits is associated with a 0.32 standard deviation decline in the three year recovery rate. Alternatively, moving from the 50th to the 75th percentile in the share of failed deposits, about a 16 % point increase, implies a 3.2 percentage point decline in the three year recovery rate. To put these magnitudes in context, the median three year recovery rate in the sample is 51.7 %, suggesting that the economic relationship between local financial intermediation capacity and asset recovery might be large.¹²

In column 2, we add a number of the failed bank's characteristics that could influence recovery rates. These include the log of the bank's assets (as a measure of absolute bank size), the ratio of the failed bank's assets to total county deposits at the time of failure (as a measure of the relative size of assets that need to be

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¹¹ Our results are unchanged if we exclude collections from shareholders, which were affected by the double liability laws of the time, from total collections—the numerator in our dependent variable of interest. For example, when shareholder collections are excluded, the coefficient in column 1 of Table 4 is 0.19.

¹² Alternatively, in an analogous log linear specification that controls for log assets at the time of failure as well as log deposits in the county, moving from the 50th to the 75th %ile in the log value of suspended deposits over the recovery period inside the county is associated with a 5 %age point drop in the value of recovered assets; these results are available upon request.

refinanced and, concomitantly, the relative loss of financial intermediation capacity at the time of failure), the bank's capital at the time of set up relative to total assets in the year of failure, as well as the bank's deposit to asset ratio in the year of failure.

Not all of the aforementioned bank level observables are available for each bank, so the sample size in column 2 is lower by about 12 %. Nevertheless, the recovery rate of failed banks headquartered in that county is negatively and significantly (at the 1% level) associated with suspended deposits in a county over the three year recovery window.

The theory suggests that relatively large bank failures, with failing bank assets measured relative to total deposits in the county, might overwhelm the financial intermediation capacity of a county. Relative size is indeed associated with lower recovery rates. A one standard deviation increase in the ratio of failed bank assets to county deposits is associated with a 0.14 standard deviation decrease in the recovery rate. Once we correct for relative size, the actual size of the failing bank does not seem to be statistically significant.

Also, failed banks that were initially organized with large amounts of capital (relative to the book assets at the time of failure) tend to have lower recovery rates. One explanation is that a bank that failed after burning through larger amounts of capital must have experienced a larger erosion in underlying asset values. Another explanation, consistent with our reading of contemporary documents, is that capital requirements may have affected bank risk taking incentives. The Economic Policy Commission (1935) observed that as the pool of "good business" shrank during the agricultural depression of the 1920s, banks organized with large amounts of capital may have sought lower quality loans in order to generate earnings commensurate

with their capital investment. As an aside, this suggests that higher capital requirements are not a panacea for the problem of bank risk taking; they may exacerbate it unless accompanied by appropriate asset side regulation and supervision.

Thus far, the evidence is consistent with the idea that local financial intermediation capacity might be important in shaping recovery rates. But the correlation between recovery rates and subsequent bank failures might also be driven by deteriorating economic fundamentals in the county, as the latter can both depress bank recovery rates and also engender more local bank failures.

Counties vary considerably in economic conditions and demographic and geographic features. In column 3, we attempt to control for some of these by including a number of controls, including the log of total population, the log urban, and log African-American populations in the county; the log number of people between the age of 5-17 years old; the log number illiterate; the share of manufacturing value added in the county; the log value of crops; the log number of farms; the log of the number of banks in the county; the log area of the county, and the log of the county centroid's distance in miles from key waterways. These variables are observed in 1920 and help measure potentially important pre-existing county characteristics.

We include the commodity index observed both at the time of failure and averaged over the subsequent recovery window, as well as the annual change in imputed state per capita income averaged over the subsequent recovery window. The negative correlation between bank suspensions and asset recovery reported in column 3 remains virtually unchanged in magnitude and statistical significance from

that in column 2. While this evidence suggests that a loss of financial intermediation capacity might lead to depressed recovery rates, it remains possible that subsequent bank failures in the county might themselves proxy for a worsening of economic conditions.

4.2. In-state and out-of-state neighbors

In the 1920s, regulatory prohibitions on inter-state bank branching meant that an in-state bank could not open branches across state lines to originate out-of-state loans. To prevent bankers from simply seeking a bank charter across state lines to gain out-of-state business, some states, such as Florida, also imposed residency requirements on the directorate of banks (The Bankers Encyclopedia, 1920). Concerned about the illiquidity of real estate collateral, states also severely restricted the types of mortgage-related transactions that their banks could engage in across state lines, imposing limits for example on the types of properties that could be used as collateral, aggregate limits on out-of state exposures, as well as more general limits on the size and duration of the mortgage portfolio (Barnett. 1911, Weldon, 1910).

State laws also typically required the recording of both real estate and chattel mortgages in both the county in which the property was located, as well as in the county of loan origination. For any bank seeking to originate credit across state lines, these requirements significantly increased origination costs, as seizing collateral in the case of non-repayment required these often small rural banks to be familiar with judicial practices across state lines, and to retain lawyers able to

practice across state lines (The Bankers Encyclopedia, 1920).¹³ These judicial practices differed dramatically across states, largely for idiosyncratic historical reasons (Ghent, 2013). For instance, narratives around this period observed that the cross-state variation in foreclosure costs significantly limited the flow of mortgage credit across state borders (Bridewell, 1938).

These regulations made cross-state-border lending more difficult, and provide a relatively powerful test to help distinguish the importance of financial intermediation capacity in shaping asset recovery. The test builds on the idea that the large costs of banking at a distance implies the potential lending market is local, and includes in-county banks as well as banks in neighboring counties but not banks in distant counties. Moreover, because of difficulties in cross-state-border lending, banks in in-state neighboring counties should be part of the local lending market but banks in out-of-state neighboring counties should not.

Therefore, given that economic conditions are relatively similar among nearby counties on either side of the state border, if bank suspensions proxy only for omitted aspects of economic conditions, then the bank suspension rate on either side of the state border should be similarly correlated with asset recovery.¹⁴

However, because of the difficulty, if not outright prohibition, on cross-state-border

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¹³ These legal and other impediments to the flow of credit across state lines often had strong political motives. For example, even in the midst of the wave of Depression-era banking reforms, a bill introduced by Carter Glass allowing national banks to branch in all states, and to be able to branch up to 50 miles across the state boundary line was defeated in 1932, led by the populist Huey Long (Westerfield (1939)).

¹⁴ The data suggest that geographical features such as mean rainfall did not vary significantly across state borders among counties located within one hundred miles of a state border. Also, the acreage devoted to typical crops (in 1920) also did not vary significantly across state borders, at least up to 50 miles on either side of the border.

lending, bank suspensions in nearby counties within state also proxy for a loss in local intermediation capacity. Any difference, therefore, in measured coefficients for in-state-neighboring-county suspensions and out-of-state-neighboring-county suspensions should be related to the fact that the former would constitute a loss in local financing capacity while the latter would not. We would expect the difference in estimated coefficients to be negative and significant. Furthermore, even within a specific state, the influence of in-state bank suspensions on financial intermediation capacity should diminish with distance, as informational and other frictions would be expected to hinder the ability of more distant banks to influence financial intermediation capacity in the county of interest.

We implement this test in Table 5, Panel A column 1. We restrict the sample to those counties within 90 miles of a state border. The suspension rate is the total value of suspended deposits (both national and state banks) in neighboring counties within the relevant distance increment over the three years after the failure of a given bank divided by total deposits in the banking system over the same area in the year of the bank's failure. We then include in the baseline regression (Table 4, column 3 which includes year, bank, county, and state controls) the suspension rates for banks in neighboring in-state counties within 30 miles of the county, within 30-60 miles, and within 60-90 miles of the county, as well as suspension rates in neighboring out-of-state counties within 30 miles of the county in which the failed bank is headquartered.

(Insert Table 5 near here)

The evidence suggests that local financial intermediation capacity significantly influences asset recovery. The impact of the suspension rate within the

county remains negative, large, and economically and statistically significant. But the impact of the suspension rate in in-state counties up to 30 miles away is only slightly smaller in magnitude and is significant at the five % level. This coefficient suggests that a one standard deviation increase in the suspension rate in close neighboring in-state counties is associated with a 0.13 standard deviation decrease in the recovery rate. These effects also decay with distance. Neither the coefficients on in-state bank failures in the 30-60 mile or the 60-90 mile increments are statistically significantly different from zero. Their magnitudes indicate significantly less adverse effects on recovery rates.

Perhaps most relevant, the coefficient on the suspension rate in counties up to 30 miles away but across state lines is small, statistically insignificant, and different from the corresponding equidistant in-state coefficient at the 5% level (p -value = 0.02). The small magnitude of the coefficient estimate for out-of-state suspensions suggests that not much additional economic information is conveyed by proximate county suspensions, over and above other included explanatory variables. The difference in coefficient estimates between the in-state suspensions and out-of-state suspensions in neighboring counties suggests the adverse effects of a loss in financial intermediation capacity for the bank in receivership on its recovery rates.

We replicate the analysis using different border intervals. In column 2 of Panel A of Table 5, we include in-state counties within 80 miles of the failed bank's county, broken into 40 mile increments, while in column 3, we include in-state

counties within 100 miles of the border, but in 50 mile increments.¹⁵ Throughout, the point estimate on the bank suspension rate within the reference county remains largest, followed by the point estimate on the suspension rate in the nearest in-state distance increment. The negative association of neighboring county bank suspensions with the recovery rate from the failed bank's assets diminishes with distance, and is never large or statistically significant when the neighboring counties are across state borders.

In what follows, we use counties within 100 miles as our baseline -- regressions for other distances are available from the authors. Also, about two thirds of the counties in the sample are drawn from the Mid-West; so while there are sizeable differences in county sizes across US regions—note that we already control for area in the baseline specification—the relative homogeneity of this sample is likely to limit further the potential for any measurement error based on differences in county sizes.

We have the one year recovery rate on failed bank assets. While one year may be too short a time to capture the full recovery on assets, we can combine the three year and one year recovery rates to create a panel. The panel structure in turn allows us to use fixed effects to control non-parametrically for any time invariant bank level unobserved variables --geography, bank management, branching regulation, and local market structure at the time of failure—that might influence asset recovery, and possibly local financial intermediation capacity. In Panel B of

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¹⁵ Because waterways sometimes coincide with state borders and also might lead to economic differences on either side of the state border, we have run these regressions excluding counties within 100 miles of the Mississippi river. The results are qualitatively similar and available upon request.

Table 5 (column 1), we again see evidence of local financial intermediation capacity in shaping asset recovery; the adverse effects of the increase in neighboring county bank suspensions between 1 to 3 years after a bank's failure on the reduction in asset recovery over that period are seen only for nearby in-state counties.¹⁶

Given that a bank has failed, at least some fraction of its assets might be of little value. And it might be that our results are driven by poor initial asset quality rather than the diminution of local financial intermediation capacity. To gauge the plausibility of this alternative explanation, we have data on the estimates made by bank examiners of "good" assets at the time of the bank's failure. And in Panel B of Table 5 column 2, the dependent variable is the ratio of the value of assets recovered over the three year window relative to the value of assets estimated "good" at the time of failure. We include the standard set of bank, county and state controls.¹⁷ To control for the impact of local banking sector distress on the formation of these asset recovery expectations, we control as well for the suspension rate in the county the year before failure.

From column 2 of Panel B of Table 5, nearby in-state suspensions over the three year recovery window are associated with lower asset recovery volumes relative to the value of assets of believed to be "good" at the time of failure. A one

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¹⁶ The in-county bank suspension rate has a slightly smaller coefficient than the in-state, bank suspension rate, within 50 miles. One would expect the reverse relationship. A possible explanation is that the in-county bank suspension rate is measured more noisily than the nearby in-state bank suspension rate (which benefits from averaging across counties). The estimated coefficient on the former would be more biased towards zero.

¹⁷ The median fraction of all assets categorized as "good" is around 0.3, and the median ratio of recovered to good assets is 1.9. Richardson (2008) discusses further the classification of assets in "good", "bad" and "doubtful".

standard deviation increase in the suspension rate within 50 miles is associated with a 0.17 standard deviation decline in the ratio of recovered assets relative to assets judged "good" at the time of failure; this impact is statistically similar to the in-county suspension rate. By contrast, the coefficient on suspensions in out-of-state counties is about 60 % of its equidistant in-state counterpart and statistically insignificant.

4.3 Recovery values in the 1930s

One virtue of the data from the 1920s is that the causes of failure are fairly similar (agricultural distress). Not only did these causes become more varied during the Depression, but the policy interventions of the 1930s aimed at containing asset fire sales could hamper inference. At the same time, the sheer number of failures during this period (we have over twice the number of failed banks in this sample relative to the 1920s) allows us to conduct important robustness checks for our main results.

Unfortunately, we only have data on recovery outcomes for 1936. Therefore, we will have a different number of years from failure depending on when a bank failed. Indicators for the year of failure should take care of any average differences in recovery between years. Nevertheless, these differences in the available data (as well as the changes induced by the Depression) precludes pooling data from failures after 1930 with data before.

In Panel A of Table 6, we present estimates based upon the sample of national banks that were placed in receivership between 1930 and 1934. The dependent variable is the recovery rate observed in 1936, and we include year

indicators, the standard bank level controls, as well as the available county demographic and economic controls observed in 1930.

(Insert Table 6 near here)

From the basic regression in column 1 of Panel A, a one standard deviation increase in the suspension rate, measured between 1930-1934, in the county is associated with a 1.6% point or 0.11 standard deviation drop in the recovery rate—an impact statistically similar to that observed in the 1920s sample. In column 2, we present estimates similar to those in Panel A of Table 5 column 3 (using the 100 mile window). As before, the evidence suggests that local financial intermediation capacity significantly influences asset recovery. The point estimate on the suspension rate within the county, as well as for suspensions in counties up to 50 miles away, remains negative, large, and statistically significant at the 5% level.¹⁸ For suspensions at distances beyond 50 miles in-state, and also suspensions within 50 miles across state lines, the point estimates are small and not different from zero.¹⁹

4.4. National vs State Banks in the 1930s

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¹⁸ Branching regulation might also affect the ability of banks to project financial intermediation capacity at a distance, and in results available upon request, we make use of the larger number of failures in the 1930s sample to estimate separately the specification in column 2 for banks that failed in a unit banking state, and banks that failed in a branch banking state. The impact of financial intermediation capacity on recovery rates remains significant in the two subsamples. In the case of the unit banking states for example, the coefficient on the “In-state, bank suspension rate, within 50 miles” variable is -0.20 (p-value=0.07), and -0.29 (p-value=0.00) in the branching states.

¹⁹ Also, the suspension rate in counties up to 50 miles away in-state, as well as across state lines is nearly identical. The 50 mile in-state suspension rate has a mean of 0.13 with a standard deviation of 0.10. The 50 mile out-of-state suspension rate has a mean of 0.13 with a standard deviation of 0.15.

Thus far, the key measure of financial intermediation capacity has not distinguished between state and national banks, emphasizing that the aggregate bank financial intermediation capacity in the county of interest is likely to matter most for absorbing the liquidation of national bank assets. However, national banks were generally larger than their state counterparts and served different clienteles, and their precise rights to make real estate loans remained a matter of debate for some time (see Sylla, 1969 and Keehn and Smiley, 1977). The larger sample from the 1930s gives us enough data to determine whether these potential differences in the business models of national and state banks led to differences in the impact of their suspension.

This disaggregation between national and state banks also provides another useful way of testing the financial intermediation capacity hypothesis. Federal Reserve Bank district borders sometimes cut across a state (Fig. 5). The Federal Reserve Act of 1913, while allowing national banks to more freely engage in mortgage lending, also limited the ability of these banks to make real estate loans across district borders. While the McFadden Act of 1927 relaxed this geographic restriction slightly (Preston, 1927), state banks were never subject to these restrictions on cross-district lending. These regulatory differences between state and national bank lending suggest a further test.²⁰

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²⁰ More precisely: "The Federal Reserve Act permitted national banks for the first time to make loans on real estate. This power was restricted to banks not in central reserve cities. Authority was given to make loans on improved farm land situated within the Reserve district, the amount lent not to exceed 50 % of the actual value, and the aggregate of such loans not to exceed 25 % of capital and surplus, or one third of deposits. Loans were not to run longer than five years. In 1916, national banks were given permission to make loans on real estate (non-farm land) situated within 100 miles of the bank's domicile, the maturity of such loans not exceed one year. By the McFadden Act the one year limitation on non farm land was extended to five years, the restriction on location widened to the entire Federal

(Insert Figure 5 near here)

If the negative association between suspensions and recovery rates is driven by the loss of local financial intermediation capacity instead of poor fundamentals, then for two counties in the same state separated by a Federal Reserve district border, the national bank suspension rate across the district border should influence recovery rates on the other side of this border to a lesser extent than national bank suspensions within border. Because the restriction on across-Reserve-Bank-district lending within the same state did not apply to state banks, state banks would be expected to be more natural buyers of these assets, and we would still expect a negative association between the recovery rate and suspensions of state banks in nearby in-state but across-Reserve-Bank-district counties. This test gives us a persuasive way of addressing concerns that our results might primarily be driven by economic differences in proximate counties across state borders.

In Panel B of Table 6, we report the estimates from this test. The direct impact of national and state bank suspensions in the county of interest on recovery rates are nearly identical, supporting our earlier decision to club state and national bank suspensions together. But consistent with the hypothesized financial intermediation capacity channel, suspensions of within-district national banks in counties up to 50 miles away continue to be negatively and significantly correlated with asset recovery, while the coefficient estimate on equidistant in-state national banks located across district lines is small and statistically insignificant. As before, the estimates on out of state national bank suspensions or distant in state national

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Reserve District, and the stipulation regarding the aggregate that could be lent changed to 50 % of savings deposits" (Bremer ,1935), pg. 97).

bank suspensions are not significant. Perhaps most compelling, the point estimate for state banks suspensions within 50 miles is negative, similar in magnitude regardless of the district line, and statistically significant across district lines (it is not statistically significant within district lines because of high standard errors). The difference in coefficient estimates for national and state bank suspensions based on whether they occur in proximate areas where regulations permit the banks to lend (or not) strongly supports the hypothesis that the loss of financial intermediation capacity might matter for asset recovery rates.

5. Alternative Mechanisms

In the introduction, we proposed a variety of channels through which local financing capacity could affect asset recovery values. In this section, we try to shed more light on the channels of transmission that could be at work.

5.1. Available healthy financial intermediation capacity

Perhaps the least surprising channel is balance sheet linkages. Could bank failures in neighboring counties have effects only because of direct or indirect balance sheet linkages to the bank whose assets are being recovered?

One way to see if there are effects beyond balance sheet linkages is to check if “healthy” available intermediation capacity matters. We test the theoretical prediction that recovery rates are likely to be high in those areas where the size of

the bank that fails is relatively small compared with the initial available intermediation capacity in the market. Recovery rates are likely to be lowest when there are no nearby banks able to purchase the assets of the failed bank. And if we measure potential aggregate financing capacity either in 1920, well before any failures were envisaged in 1920s sample, or in 1929, before our Depression-era failures, our results cannot be easily explained by any balance sheet linkages to distressed banks.

In Table 7, column 1, the dependent variable is the three year recovery rate and the data come from the 1930s sample. The explanatory variables (along with those in the baseline regression) are the ratio of the failed bank's assets scaled by deposits of banks in the county (other than the failed bank), as well as assets of the failed bank scaled by deposits in nearby counties, with all deposits and assets measured in 1929. The right hand side variables are thus a measure of the potential available healthy financial intermediation capacity outside the bank in 1929 for the bank's assets. Large banks would have relatively low outside financial intermediation capacity, as would banks in areas that have little banking in neighboring counties.

(Insert Table 7 near here)

The estimates in Table 7 column 1 suggest that asset recovery rates were higher for those failed banks that were small relative to available healthy financing capacity in 1929 in the local area. Consistent with the idea that these results stem from the relative size of local intermediation capacity, these effects are large for banking capacity in neighboring (within 50 miles) counties, and decay with distance and state borders. In column 2, we use the smaller sample from the 1920s, with the

ratio of failed bank assets scaled by deposits, all computed based on data in 1920. The evidence continues to suggest that the available banking capacity to buy failed bank assets—nearby in-state banks—does seem to matter more for eventual recovery rates.²¹

5.2 Fundamentals vs fire sales

Next, let us examine the evidence for financial and real fire sale channels. More specific financial assets, like loans, often require detailed local knowledge to value, making their pricing more sensitive to the available capacity of local financial intermediaries such as nearby in-state banks. Generic assets like government bonds, however, which can be easily valued by outsiders, are less prone to financial fire sales, as these assets can be more easily sold to any arm's length investor. Therefore, asset recovery is likely to be lower and more sensitive to changes in local financial intermediation capacity when failed banks have a higher share of loans on their balance sheet.

To test this, we collect balance sheet data in 1929 from The Banker's Encyclopedia for all the failed national banks in our 1930s sample, and compute the loan to asset ratio for these banks — unfortunately, we do not have these information at the exact time of their failure. Nevertheless, from column 1 of Table 8, which adds the failed bank's loan-to-asset ratio to the basic specification from column 1 of Table 6, Panel A—this includes the largest sample of failed banks—those banks that had a greater share of loans on their balance sheet in 1929 also had

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²¹ Of course, one could still argue that the number of banks is a proxy for anticipated strong economic activity, though Rajan and Ramcharan (2015) show that areas with more banks in 1920 suffered a worse fall in land prices and greater bank distress in the subsequent years.

significantly lower recovery rates, observed in 1936. A one standard deviation increase in the loans to asset share is associated with a 0.25 standard deviation drop in the recovery rate.²²

(Insert Table 8 near here)

We next investigate whether loan-heavy banks could have even lower recovery when local financial intermediation capacity declines. To this end, we create an indicator variable that equals one if the failed bank's loan-to-asset ratio is above the median, and 0 for those banks with a ratio that is less than the median. In column 2, we interact the county suspension variable with this indicator variable. We include the indicator variable linearly along with the loan to asset ratio as well. Consistent with the fire sales channel, the interaction term is negative, large in magnitude, and statistically significant. It suggests that the loss of aggregate financial intermediation capacity is associated with an especially large negative effect on asset recovery when loans account for a large share of the failed bank's assets to be liquidated.

While these results suggest available liquidity could be important, they do not allow us to fully distinguish between the "fire sale" and "fundamentals" explanations. Because loans have a limited market outside other banks, it may be hard to recover value from a bank whose assets consist largely of loans – this is the fire sales explanation. But the ability to recover money from a distressed borrower may depend on his sales, which may decline if other local banks fail and cannot lend

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²² The results are similar if we restrict the sample to those banks no more than 100 miles from a state border, and also include the suspension rates in nearby in-state and out-of-state county.

to his customers – this is one version of the fundamentals explanation. Balance sheet linkages are another.

One difference between the financial fire sale explanation and the fundamentals explanation is that the former relies on the availability of nearby short term liquid absorptive financial capacity, while the latter relies more on the availability of financial capacity per se. A combination of our first test on ex ante healthy available capacity and our second test on the effects of a more liquid balance sheet for financial buyers may, therefore, indicate whether there is any evidence consistent with the financial fire sales hypothesis. If nearby solvent banks hold a large share of liquid assets rather than illiquid loans, they may be better able to sell these assets in order to buy the assets of failed banks, increasing recovery rates. By contrast, without appealing to liquidity effects (and hence financial fire sales), it would be harder to explain why the composition of balance sheets of nearby banks should matter for a failed bank's recovery rate.

To implement this test, for each of the 985 national banks that failed in our 1930s sample, we identify the town in which the bank is headquartered. We then collect balance sheet information in 1929 from The Banker's Encyclopedia for all the other banks headquartered in the same town as the failed bank. Among these towns with at least one failed national bank, there are a total of 3,835 state and national banks headquartered in the same town in 1929. For each town in our sample, we then aggregate the balance sheet information from these 3,835 banks up to the town level, computing the loan-to-asset ratio. Using the town, as opposed to the county as the unit of aggregation potentially understates the full importance of nearby absorptive financial intermediation capacity in reducing fire sale pricing. However,

banks headquartered in the same town would be expected to be the most natural buyers of the assets of their failed neighbors.

The evidence in column 3 suggests that the liquidity of local healthy absorptive capacity had a significant impact on the recovery rates of failed banks. A one standard deviation increase in the average loan to asset ratio of in-town banks is associated with a 0.08 standard deviation drop in asset recovery, suggesting that when nearby healthy banks hold relatively illiquid assets, they may be less able to absorb the asset sales of these failed banks, leading to bigger discounts.

Let us now turn to evidence for fire sales of real assets. In the real fire sales explanation, faster liquidation of real assets should reduce recovery. In the “fundamentals” explanation, the pace at which the assets collateralizing the failed bank’s loans are sold should not affect recovery, and lower transactions costs of selling these assets may even enhance effective recovery.

Around our sample period, there was enormous variation across states in the extent to which lenders could seize real property. Eighteen states allowed creditors to foreclose on property using some form of a power of sale clause in the mortgage contract. A power of sale clause allowed a creditor, such as the receiver in charge of the failed bank, subject to varying redemption and public notification requirements, to foreclose on a property without resorting to the courts. In states that did not permit power of sale clauses in mortgage contracts, foreclosure usually required the action of the courts, and was a lengthy and expensive proposition for the creditor.

The data presented in Table 9 from Bridewell (1938) indicates that in power of sale states, the average foreclosure cost --the sum of a number of legal and other costs associated with liquidations -- was about \$74, a little less than half of the

average cost in states requiring judicial intervention. The typical loan during this period was less than \$4,000, and these differences in foreclosure costs across states were sizeable. From our perspective, these costs reflect both the incentive of the failed bank's liquidators to collect on loans by selling the underlying real assets quickly (as opposed to holding on and allowing repayment to take its course) as well as the extent to which sales would have been delayed by lengthy court procedures.

(Insert Table 9 near here)

If real fire sales are an important channel of transmission from declines in local financial intermediation capacity to asset recovery values, we should expect: an increase in the cost of (and delay in) foreclosure in the state should reduce the quantum of real fire sales in a failed bank, so a reduction in local intermediation capacity should matter less for asset recovery values. To test this, in column 4 of Table 8, in addition to the explanatory variables in our baseline regression (Table 6, Panel A, column 1), we include the interaction between the suspension rate in neighboring counties and the state-level average cost of foreclosure.

We expect that the estimated coefficient should be positive and significant for the interaction of neighboring in-state county suspensions with foreclosure costs, and insignificant for the interaction of neighboring out-of-state county suspensions with foreclosure costs for the following reasons: For the "in-state" interaction, high foreclosure costs mitigate the impact of the fall in local lending capacity on recovery rates, hence the expected positive significant coefficient. For the "out-of-state" interaction, out of state suspensions do not imply a fall in local lending capacity, so they should have no effect on recovery rates regardless of the state's foreclosure costs, hence the expected insignificant coefficient. The coefficient estimates in Table

8 Column 4 are consistent with these predictions. Real fire sales do seem to be a channel of transmission.

While the tests we have described do suggest that fire sales might have happened, and that proxies for financial costs (the liquidity of available intermediation capacity) and real costs (foreclosure costs for collateral) do seem to matter, we should add an important caveat: As we argued in the introduction, financial fire sales can exacerbate real fire sales, so the two are intertwined. It is unlikely that the available data will allow us to estimate the relative magnitude of each cleanly. What we can say is that the channels through which the reduction in financial intermediation capacity affects recovery values include both real and financial fire sales, over and above more traditional fundamental channels.

6. Consequences: asset prices, contagion, and conclusion

Let us turn finally to other implications of our analysis. If a fall in intermediation capacity affects the liquidation values of assets of failed banks, it should affect asset values more generally. Another implication is that we should see one bank failure make another bank failure more likely.

VA. Land Prices and Transactions

A fall in financial intermediation capacity should lead to lower asset prices more generally. To test this potential connection between bank suspensions and asset prices, we collected annual data from 1920-1933 on the average price of land for a panel of about 350 counties. To reduce the impact of noise in the estimation, we collapse the annual data into a panel of four non overlapping periods: 1920-1923,

1924-1926, 1927-1929, and 1930-1933, averaging the price level in each county in each period.

In Table 10 column 1, we report the results from estimating the impact of the ratio of suspended deposits to total deposits on the log of the average price of land in each county, where we report the somewhat more conservative standard errors that cluster by both state and time period (Cameron, Gelbach, and Miller, 2011). We continue to include bank suspensions both in the reference county as well as in nearby in-state and out-of-state counties, computed over various distance increments. We also control for state and time fixed effects, along with the log price of land in the previous period.

(Insert Table 10 near here)

There is a large significant negative estimated association between bank suspensions within the county of interest and the log price of land (Table 10). A one standard deviation increase in the within-county suspension rate is associated with a 0.02 standard deviation decline in the log price of land. A similar increase in the suspension rate computed over in-state counties up to 50 miles away is associated with a 0.03 standard deviation decline in the log price of land. The coefficient on neighboring out-of-state suspensions is small and statistically insignificant.

Of course, there could be a number of reasons why the fall in land prices and neighboring county in-state bank suspensions are correlated, including the possibility of the fall in land prices causing neighboring county in-state suspensions because these banks have lent cross-county against land collateral. The data on foreclosure costs allow us to throw more light on the direction of causality. If an exogenous fall in land values caused neighboring in-state county banks to fail, this

should be true of both “power of sale” states (where the costs of foreclosure are low) and states where court action is needed (where costs of foreclosure are high). However, if land values are low because of a loss in local intermediation capacity, neighboring county suspensions should be more strongly negatively correlated with land prices in “power of sale” states than in “court action” states.

In column 2, we estimate the regression model in column 1 only for counties in “power of sale” states, and in column 3, we estimate it for counties in “court action” states. As predicted, suspensions in neighboring in-state counties are statistically significantly negatively correlated with land prices only in “power of sale” states. The corresponding coefficient estimate in “court action” states is less than 40 % of its size and not statistically significant. This lends support to our hypothesis that the fall in local intermediation capacity has a causal effect of land prices.²³

We also collected data on the number of land transactions in each of those counties. Available upon request are results that measure the impact of financial intermediation capacity on the transaction volumes in the land market, measured in both the number of properties transacted as well as the acreage. A decline in nearby in-state financial intermediation capacity is associated with a drop in land transactions for the 350 counties for which we have these data, a prediction suggested by theories such as Diamond and Rajan (2011).

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²³ We follow a somewhat different estimation strategy here than in Table 9 column 4, where we estimate one regression instead of two. The reason we do not follow the same strategy in Table 9 is because the number of observations we have there for power of sale states is significantly less than for court action states (144 vs 409), making it difficult to estimate coefficients precisely. Nevertheless, a similar result emerges and is available upon request.

6.2. Contagion

Depressed recovery rates suggest a channel of contagion. If depositors believe that recovery rates will fall because of a loss of financial intermediation capacity, when a bank fails they will impute a higher loss given default for remaining solvent banks, perhaps precipitating runs on some of them. This argument would then suggest a positive association between past banking sector distress in a location and subsequent distress within the same location. Moreover, if indeed this positive association reflects a loss of financial intermediation capacity and contagion rather than omitted adverse economic shocks, then any positive association between past and current banking sector distress should be considerably smaller across state lines.

In Table 11, the dependent variable is the bank suspension rate computed from the FDIC data observed annually between 1920 and 1933. We include the suspension rate within the county in the previous period, as well as the suspension rate computed in nearby in-state and out-of-state counties. A one standard deviation increase in the suspension rate within the county of interest is associated with a 0.06 standard deviation increase in the suspension rate the next year. A one standard deviation increase in the bank suspension rate in the previous year among in-state counties located within 50 miles of the county of interest is associated with a 0.03 standard deviation increase in the suspension rate in the reference county in the current year. The point estimate on suspensions among out-of-state counties is not statistically significant, and is much smaller than its in-state counterparts. The loss in financial intermediation capacity seems to matter for future failures.

(Insert Table 11 near here)

6.3 Conclusion

Can the loss of financial intermediation capacity reduce recovery rates on assets? Can it cause assets to turn more illiquid and to sell at a discount relative to fundamental value? And can lower financial intermediation capacity lead to a contagion of bank failures, propagating shocks through time. This paper has used a new dataset drawn from the epidemic of national bank failures just both before the Great Depression, as well from 1930-1934, in order to shed light on these questions. For most of the sample period, banking regulators liquidated the assets of failed banks as quickly as possible. At the same time, state regulations, which limited bank branching across state lines, combined with the transactions costs imposed by distance, helped to segment local banking markets. We then have an almost ideal laboratory to study these questions.

Not only does our work verify that assets trade at a discount relative to fundamental value when they are sold by distressed owners, as suggested by Shleifer and Vishny (1992) (see also Campbell, Giglio and Pathak, 2011, Benmelech ,2009, Benmelech and Bergman, 2008, Benmelech, Garmaise, and Moskowitz, 2005, and Pulvino, 1998, it also shows that this phenomenon extends to financial assets such as bank loans. More importantly, it supports the Shleifer and Vishny view that the capacity of industry insiders (neighboring banks and the composition of their balance sheets in our work) to buy the assets matters. Finally, bank failures could be contagious, as suggested by a growing literature in banking.

We are, of course, not the first to suggest that financial liquidity matters. However, by tying the decline in recovery rates and asset prices to a loss in local financial intermediation capacity, this paper may provide tentative evidence in favor

of theories that emphasize aggregate available liquidity, or equivalently, “cash in the market” pricing, as an important source of financial distress and crises (see Allen and Gale, 2000), for example). As banks fail, aggregate liquidity to fund asset purchases dries up, even while the assets sold by failing banks absorb residual liquidity (see Diamond and Rajan, 2005), precipitating further bank failures.

Another implication of these findings is that there may be multiple equilibria in lending to a particular locality or sector. If few lenders venture in, local intermediation capacity may be low, so loss given default is high and loans are illiquid. Lending is potentially unprofitable at feasible interest rates. By contrast, if many lenders venture in, local intermediation capacity may be high, so loss given default is low, loans are more liquid, and lending profitable at feasible interest rates. This would suggest that programs to incentivize collective lending to an excluded area or sector may be helpful. The scope for further work is clear.

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Fig. 1: the number of suspended banks per one hundred active banks in the United States, 1900-1935. Source: Federal Reserve Board, 1936.

Panel A: 1920-1927

Fig. 2. Bank suspension rate by county, 1920-1927, 1930-1934.

Panel B shows the bank suspension rate for US counties, 1920-1927. The bank suspension rate is the total number of banks suspended from 1921 to 1927 divided by the total number of banks in 1920, and it is plotted for US counties.

Panel B: 1930-1934.

Panel B shows the bank suspension rate for US counties, 1930-1934. The bank suspension rate is the total number of banks suspended from 1930 to 1934 divided by the total number of banks in 1929 and is plotted for US counties. All data are from the Federal Deposit Insurance Corporation dataset.

Table 1. Office of the Comptroller of the Currency (OCC), and Federal Deposit Insurance Corporation Suspensions (FDIC), by Census Regions, 1920-1927.

Panel A lists the number of national banks in receivership by the OCC; the number of national banks suspended, FDIC; and the number of active national banks in 1920, sorted by US Bureau of the Census geographic regions.

Region	OCC failed banks 1920-1927	FDIC suspended national banks 1920-1927	Number of national banks in 1920
New England	3	3	410
Mid Atlantic	12	18	1593
East North Central	39	41	1386
West North Central	259	286	1598
South	102	114	1306
Border	49	71	805
Mountain	99	122	480
Pacific	24	29	442

Panel B. OCC Failures and FDIC Suspensions, by Census Regions, 1930-1934.

Panel B reports the number of OCC recorded failed banks, FDIC suspended banks, and the number of national banks in 1929, sorted by Census Bureau geographic regions.

Region	OCC failed national banks 1930-1934	FDIC suspended banks 1930-1934	Number of National Banks in 1929
New England	26	125	379
Mid Atlantic	209	775	1726
East North Central	295	2438	1308
West North Central	199	2377	1272
South	173	1097	1264
Border	86	578	724
Mountain	31	269	300
Pacific	53	277	376

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TABLE No. 43.—*National banks in charge of receivers, dates of organization, amounts collected from all sources, loans paid and other disbursements, losses on assets returned to stockholders to year ended October 31, 1924*

	Title and location of bank	Date of organization	Capital stock	Receiver appointed
400	Pyncheon National Bank, Springfield, Mass.	Apr. 7, 1865	\$200,000	June 24, 1901
469	Farmers and Drovers National Bank, Waynesburg, Pa.	Feb. 25, 1865	200,000	Dec. 12, 1906
513	First National Bank, Billings, Mont.	Dec. 27, 1883	150,000	July 2, 1910
515	Mount Vernon National Bank, Mount Vernon, N. Y.	Dec. 11, 1906	200,000	Apr. 19, 1911
523	Second National Bank, Clarion, Pa.	Sept. 12, 1883	50,000	June 21, 1912
531	Traders National Bank, Lowell, Mass.	June 10, 1892	200,000	Oct. 20, 1913
533	Mesa County National Bank, Grand Junction, Colo.	May 31, 1905	100,000	Nov. 29, 1913
542	First National Bank, Pensacola, Fla.	Aug. 10, 1880	500,000	Jan. 22, 1914
549	First National Bank, Sutton, W. Va.	Aug. 17, 1902	50,000	Aug. 29, 1914
554	First National Bank, Uniontown, Pa.	Feb. 20, 1864	100,000	Jan. 19, 1915
582	First National Bank, Bowling Green, Ohio.	May 23, 1889	50,000	Jan. 5, 1917
587	First National Bank, St. Cloud, Fla.	Mar. 24, 1912	50,000	Jan. 2, 1918
590	First National Bank, Bluffton, Ohio.	Nov. 19, 1900	50,000	Nov. 17, 1919
591	First National Bank, Newman, Calif.	May 29, 1910	50,000	Jan. 31, 1920
593	First National Bank, Enreka, S. Dak.	Nov. 28, 1919	50,000	Aug. 20, 1920

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appointment of receiver, and closing, with amounts of nominal and additional assets, assets, expenses of receiverships, claims proved, dividends paid, and remaining

Nominal assets at date of suspension			Additional assets received since date of suspension	Total assets	Offsets allowed and settled	Loss on assets compounded or sold under order of court	
Estimated good	Estimated doubtful	Estimated worthless					
\$755,664	\$942,113	\$8,482	\$124,059	\$1,830,318	\$39,884	\$280,140	400
814,783	2,013,406	130,499	2,060,394	5,019,082	546,299	1,422,242	469
1,087,304	505,016	532,201	629,583	2,774,104	218,280	131,667	513
158,243	413,533	199,574	225,397	996,747	39,047	594,714	515
126,110	294,805	19,304	52,807	493,026	49,067	83,630	523
1,610,081	1,603,429	30,913	130,168	3,374,591	148,383	379,443	531
200,412	248,785	165,264	52,069	606,530	32,124	209,679	533
1,488,390	507,052	401,444	1,072,359	3,469,245	647,368	690,698	542
310,050	80,899	27,210	35,199	453,358	12,883	16,668	549
1,080,755	2,388,710	47,909	970,193	4,487,687	330,370	193,610	554
580,259	283,028	46,827	179,140	1,089,254	202,146	289,986	582
98,696	138,332	210,960	35,281	483,269	46,715	27,629	587
453,226	121,751	6,352	93,369	674,608	117,300	18,441	590
260,893	454,549	510,587	195,190	1,421,219	195,097	579,534	591
750,777	192,169	32,304	122,116	1,097,366	92,811	23,499	593
279,978	78,894	125,972	62,271	547,115	164,770	90,151	594

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TABLE NO. 43.—National banks in charge of receivers, dates of organization, amounts collected from all sources, loans paid and other disbursements, losses on assets returned to stockholders to year ended October 31, 1924.—Continued								
	Nominal value of remaining assets	Collected from assets	Collected from assessment upon shareholders	Total collections from all sources	Loans paid and other disbursements	Dividends paid	Legal expenses	Receivers' salary and other expenses
400	-----	\$1,510,204	\$44,483	\$1,554,777	\$353,507	\$1,130,337	\$22,377	\$39,298
469	\$1,456,909	1,593,632	149,271	1,742,903	283,472	1,286,325	51,749	66,135
513	560,204	1,863,953	7,500	1,871,453	299,448	1,387,675	25,975	137,632
515	1	362,985	81,730	444,715	102,544	272,397	39,765	26,916
522	63,764	296,565	28,736	325,301	8,107	269,707	9,226	22,323
531	158,531	2,688,234	91,071	2,779,305	31,588	2,659,658	15,851	66,302
533	105,652	319,075	35,135	354,210	28,192	239,033	5,789	29,183
542	318,593	1,812,586	73,748	1,886,334	293,584	1,472,354	32,934	67,863
549	29,255	391,552	25,180	419,732	24,132	315,272	39,166	25,716
554	612,850	3,350,857	-----	3,350,857	1,033,139	1,665,079	55,986	129,234
582	-----	597,122	41,695	638,817	15,183	562,519	29,339	39,877
587	253,556	155,369	45,161	200,530	25,315	139,774	4,288	21,367
590	68,539	475,418	47,900	523,318	34,039	422,775	7,913	39,577
591	-----	646,588	44,772	691,360	224,189	415,562	10,395	35,063
602	276,769	710,264	28,764	739,028	306,360	245,068	33,605	48,657

Figure 3 excerpts from the Annual Report of the Office of the Comptroller of the Currency, 1924. The figure shows samples of the raw data.

Figure 4 shows the county level variation in the commodity price index. The commodity index is computed as the average annual % change in world commodity prices between 1920 and 1927, weighted by the % acreage of agricultural land devoted to that commodity in the county in 1920.

Table 2. Selected Summary Statistics

This table contains selected summary statistics for a sample of counties with national banks in 1920, but no national bank failures in the period 1920-1927 (panel A), and for a sample of counties with at least one national bank failure in the period 1920-1927 (Panel B). Bank suspension rate includes the suspension of state banks. * denotes that the means across the two subsamples are statistically different at the 10% level or lower.

Panel A: National banks present in county, no national bank suspensions in county, 1920-1927				
	Mean	Median	Standard deviation	Number
Debt per acre, 1920	30.15	21.54	39.29	1689
Log banks	2.27*	2.30	0.64	1775
Banks per area	8.21	6.48	7.18	1759
Banks per capita	0.47*	0.38	0.33	1761
Commodity Shock, 1917-1920	4.14	3.76	3.03	1735
Commodity Shock, 1921-1929	-2.01	-1.89	1.42	1777
Bank suspension rate	1.41*	0.26	2.13	1772
Deposit suspension rate	0.90*	0.00	1.69	1772
Panel B: At least one national bank suspension in county, 1920-1927				
	Mean	Median	Standard deviation	Number
Debt per acre, 1920	30.83	23.21	28.01	473
Log banks	2.53*	2.56	0.60	506
Banks per area	8.13	6.96	6.33	497
Banks per capita	0.74*	0.63	0.44	497
Commodity Shock, 1917-1920	4.38	4.22	3.20	559
Commodity Shock, 1921-1929	-2.10	-2.06	1.47	642
Bank suspension rate	5.43*	4.63	3.78	498
Deposit suspension rate	4.98*	4.07	3.92	498

Table 3. Recovery Rates for Failed National Banks, Summary Statistics

Summary statistics for the recovery rates of national banks in receivership. The first row (1920-1927) summarizes the recovery rate three years after a bank was first placed in receivership. The first row only includes those banks first placed in receivership in the period 1920-1927. The remaining rows summarize recovery rates for banks first placed in receivership in the years 1930 through 1934. Recovered assets are observed in 1936 for the 1930-1934 subsample. In all cases, the recovery rate is defined as the ratio of recovered assets to the book value of assets at the time of failure. The date the receiver was first appointed does not always coincide with the date of suspension.

Recovery Rates of Banks in Receivership in Years:	Observations	Mean	Median	Standard Deviation
1920-1927	433	0.52	0.52	0.13
1930	81	0.55	0.55	0.13
1931	249	0.55	0.56	0.13
1932	218	0.56	0.58	0.15
1933	246	0.63	0.65	0.14
1934	205	0.63	0.66	0.17

Table 4. Basic Analysis of Asset Recovery.

The dependent variable is defined as the ratio of recovered assets three years after the bank was placed in receivership to the book value of assets observed at the time the bank was placed in receivership. All regressions include state fixed effects and year dummies based on year of failure. Column 3 also includes the county's log area, the log distance of the county centroid from the Mississippi River, Atlantic Ocean, Pacific Ocean and Great Lakes. Other controls include the log African-American population, log of the urban population, log of the illiterate population, log of the 5-17 year old population, the log of the total population; the county's share of manufacturing value added, log of the value of crops, log of the number of banks, log of the number of farms, all observed in 1920, as well as the commodity index value at time of failure, and the change in the index over the recovery period. All variables have been standardized to have mean zero and a variance of one. Standard errors are clustered at state level (in parentheses): *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	No controls	Bank controls	Bank and county controls
Bank (deposits) suspension rate over failure horizon	-0.317*** (0.0557)	-0.279*** (0.0563)	-0.292*** (0.0595)
Capital asset ratio		-0.123** (0.0604)	-0.144** (0.0638)
Deposit asset ratio		0.0658 (0.0574)	0.0686 (0.0549)
Assets to county deposits		-0.143*** (0.0272)	-0.0889* (0.0459)
Log of bank assets		0.103 (0.0704)	0.0934 (0.0817)
Observations	433	378	363
R-squared	0.376	0.435	0.488

Table 5, 1920-1929.

In Panel A, the dependent variable is defined as the ratio of recovered assets three years after the bank was placed in receivership to the book value of assets observed at the time the bank was placed in receivership, 1920-1929. All columns include the bank and county level controls from Table 4, column 3. Columns 1-3 restrict the sample to banks in counties up to 90, 80 and 100 miles from a state border respectively. In column 1, the p-value from the test of equality between “In-state, bank suspension rate, within 30 miles” and “Out-of-state, bank suspension rate, within 30 miles” is 0.02. In column 2, the p-value from the test of equality between “In-state, bank suspension rate, within 40 miles” and “Out-of-state, bank suspension rate, within 40 miles” is 0.07. In column 3, the p-value from the test of equality between “In-state, bank suspension rate, within 50 miles” and “Out-of-state, bank suspension rate, within 50 miles” is 0.02. All variables have been standardized to have mean zero and a variance of one. Standard errors clustered at state level (in parentheses): *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	30 miles	40 miles	50 miles
Bank (deposits) suspension rate over failure horizon	-0.187*** (0.0518)	-0.295*** (0.0519)	-0.232*** (0.0642)
In-State, bank suspension rate, within 30 miles	-0.133** (0.0636)		
In-State, bank suspension rate, 30-60 miles	-0.0630 (0.0436)		
In-State, bank suspension rate, 60-90 miles	0.128 (0.104)		
Out-of-State, bank suspension rate, within 30 miles	0.0384 (0.0509)		
In-State, bank suspension rate, within 40 miles		-0.118** (0.0564)	
In-State, bank suspension rate, 40-80 miles		0.132 (0.110)	
Out-of-State, bank suspension rate, within 40 miles		0.0133 (0.0498)	
In-state, bank suspension rate, within 50 miles			-0.135** (0.0577)
In-state, bank suspension rate, 50-100 miles			0.105 (0.0654)
Out-of-state, bank suspension rate, within 50 miles			0.0203 (0.0366)
Observations	252	226	259
R-squared	0.603	0.670	0.625

Table 5 cont'd

In Panel B, the dependent variable in column 1 is the ratio of recovered assets three years after the bank was placed in receivership to the book value of assets observed at the time the bank was placed in receivership, 1920-1929. The panel consists of data both one year after failure as well as three years after failure. The panel includes bank fixed effects, and allows for state by year fixed effects. In column 2, the dependent variable is the ratio of the value of assets recovered over the three year window relative to the value of assets estimated “good” at the time of failure. Column 2 includes the bank and county level controls from Table 4, column 3, as well as the suspension rate in the county before the year of failure. All variables have been standardized to have mean zero and a variance of one. Standard errors clustered at state level (in parentheses): *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	Panel	Expected Recovery Rate
In county bank suspension rate	-0.129*** (0.0458)	-0.0959* (0.0547)
In-state, bank suspension rate, within 50 miles	-0.177* (0.101)	-0.174* (0.0906)
In-state, bank suspension rate, 50-100 miles	0.0260 (0.0722)	0.0331 (0.0605)
Out-of-state, bank suspension rate, within 50 miles	0.102 (0.0971)	-0.0703 (0.0545)
Observations	251	264
R-squared	0.47	0.599

TABLE 6. RECOVERY RATES AND BANK SUSPENSIONS ACROSS BORDERS AND AT A DISTANCE: 1930-34

In Panel A, the dependent variable is the ratio of recovered assets (observed in 1936) to the book value of assets observed at the time of failure. Except for the commodity index, all columns include the bank and county level controls from Table 4, column 3, along with dummy variables for the year in which the receiver was first appointed. Column 2 restricts the sample to banks in counties no more than 100 miles from a state border. Suspension rates are calculated as the sum of deposits in the relevant type of suspended banks over the geographic area of interest from 1930-1934 and are divided by the relevant bank deposits within the area of interest in 1929. All variables have been standardized to have mean zero and a variance of one. Standard errors clustered at state level (in parentheses): *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	Bank and county controls	Distance and state borders
In-county bank suspension rate	-0.106*** (0.0367)	-0.155*** (0.0493)
In-state, bank suspension rate, within 50 miles		-0.143*** (0.0506)
Out-of-state, bank suspension rate, within 50 miles		-0.0286 (0.0302)
In-state, bank suspension rate, 50-100 miles		-0.0217 (0.0500)
Observations	1,072	560
R-squared	0.201	0.303

Figure 5 shows the borders of Federal Reserve Districts

Panel B

The dependent variable is the ratio of recovered assets (observed in 1936) to the book value of assets observed at the time of failure. All columns include the bank and county level controls from Panel A, column 2. All variables have been standardized to have mean zero and a variance of one.

Standard errors clustered at state level (in parentheses): *** p<0.01, ** p<0.05, * p<0.1.

<u>National bank suspension rate:</u>	
In-county	-0.115* (0.0662)
Within 50 miles, in-state, in district	-0.0872* (0.0442)
Within 50 miles, in-state, out district	-0.00806 (0.0152)
50-100 miles, in-state, in district	0.0408 (0.0611)
50-100 miles, in-state, out district	0.102 (0.0640)
Out-of-state, within 50 miles	-0.00442 (0.0446)
<u>State bank suspension rate:</u>	
In-county	-0.0930** (0.0453)
50 miles, in-state, in district	-0.0521 (0.0659)
50 miles, in-state, out district	-0.0682*** (0.0237)
50-100 miles, in-state, in district	0.0408 (0.0611)
50-100 miles, in-state, out district	0.102 (0.0640)
Out-of-state, 0-50 miles	0.0141 (0.0497)
Observations	540
R-squared	0.302

Table 7. Recovery Rates and Relative Outside Financial Intermediation Capacity

The dependent variable in column 1 is the ratio of recovered assets (observed in 1936) to the book value of assets observed at the time of failure. In column 2, the dependent variable is defined as the ratio of recovered assets three years after the bank was placed in receivership to the book value of assets observed at the time the bank was placed in receivership. Controls include the bank and county level variables from Table 4, column 3, as well as state fixed effects. In column 1, assets scaled by deposits are all observed in 1929 at the relevant geographic unit. In column 2, these variables are observed in 1920. All variables have been standardized to have mean zero and a variance of one. Standard errors are clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	1930-1934	1920-1927
Bank (deposits) suspension rate over failure horizon	-0.161***	-1.327***
	(0.0520)	(0.301)
Assets scaled by deposits in county net of own deposits, log	-0.0208	-0.181*
	(0.0527)	(0.0983)
Assets scaled by deposits in in-state counties up to 50 miles, log	-0.193**	-0.237***
	(0.0914)	(0.0604)
Assets scaled by deposits in in-state counties 50-100 miles, log	0.0758	-0.116
	(0.110)	(0.0918)
Assets scaled by deposits in out-of-state counties up to 50 miles, log	0.0264	-0.121**
	(0.0637)	(0.0550)
Observations	546	238
R-squared	0.347	0.542

Table 8. Fire sales and Fundamentals

The dependent variable is the ratio of recovered assets (observed in 1936) to the book value of assets observed at the time of failure. Controls include the bank and county level variables from Panel A of Table 6, column 1, as well as state fixed effects. Column 1 includes the loans to asset ratio of the failed bank, as observed in 1929. Column 2 creates an indicator variable that equals 1 if the loan to asset ratio is above the median, and zero otherwise. This variable is interacted with the suspension rate, and enters linearly into the specification. Column 3 adds the loans to asset ratio (1929) for the other banks located in the same town as the failed bank. The variable is aggregated up to the town level based on the balance sheet data of these other banks. Column 4 interacts nearby measures of changes in financing capacity with the cost of foreclosure in the state—the latter obtained from Bridewell (1938)—see Table 9. The sample is restricted in column 4 to banks located in counties within 100 miles of state border. Standard errors are clustered at the state level.

*** p<0.01, ** p<0.05, * p<0.1.

Variables	Loans to assets of failed bank	Loans to assets ratio of failed bank and loss in intermediation capacity	Loans to assets ratio of failed bank and Loans to Assets ratio of other banks in town	Foreclosure Laws
Bank (deposits) suspension rate over failure horizon	-0.0823**	-0.0233	-0.0734**	-0.136**
	(0.0365)	(0.0326)	(0.0357)	(0.0508)
Loans-asset ratio of failed bank in 1929	-0.246***	-0.141**	-0.188***	
	(0.0364)	(0.0698)	(0.0399)	
Loans-asset ratio of other banks in town in 1929			-0.0812**	
			(0.0376)	
Bank (deposits) suspension rate over failure horizon*loans-asset ratio of failed bank above median		-0.119*		
		(0.0643)		
Loans-asset ratio of failed bank above median (indicator variable)		-0.0459		
		(0.0737)		
In-state, bank suspension rate, within 50 miles				-0.244***
				(0.0721)
Out-of-state, bank suspension rate, within 50 miles				0.0752
				(0.0767)
In-state, bank suspension rate, 50-100 miles				-0.0135
				(0.0492)
In-state, bank suspension rate, within 50 miles*cost of foreclosure in state				0.250**
				(0.122)

Out-of-state, bank suspension rate, within 50 miles*cost of foreclosure in state				-0.117
				(0.0746)
Observations	959	959	931	502
R-squared	0.240	0.249	0.252	0.349

Table 9. Cost of Foreclosure, by State, 1937.

This table shows the cost of foreclosure, by state circa 1937. “P” denotes a power of sale; “C” court action and “S” strict foreclosure. Source: Bridewell (1938).

State	Type of action	Principal items as a %age of Total Costs										Average cost of foreclosure
		Attorney's Fees	Advertising cost	Commissioner's, trustee's, and/or sheriff's fees	Court costs	Title search	Auctioneer's fees	Recording Fees	Revenue stamps	Master in chancery's fees	Other	
Alabama	P	69.9	2.5	0	0	0	0	2.7	2.4	0	0	47.95
Arizona	C	58.6	0	18.1	13.4	5.3	0	1.5	2.3	0	0.8	202.38
Arkansas	C	40.6	0.8	0	3.7	18.6	0	1.1	1.9	0	0	123.18
California	C	49.9	0	26.1	8.5	9.4	0	1.7	0.3	0	1.4	161.34
Colorado	P	50.2	9.4	0.5	0	3.1	0	1.5	2.9	0	0	102.65
Connecticut	C	63.6	0	0	36.4	0	0	0	0	0	0	111.00
Delaware	C	0	52.3	0	39.6	0	0	2.5	0.1	0	4.6	120.93
District of Columbia	P	0	64.7	0	0	0	2.2	3.1	9.1	0	1.1	68.75
Florida	C	60.8	7.9	3.6	6.8	9.8	0	1.1	0.5	9.5	0	158.16
Georgia	P	52.5	42.5	0	0	0	0	2.7	2.3	0	0	56.70
Idaho	C	50.1	0	29.7	13.1	3.8	0	0.9	2.1	0	0.3	17098
Illinois	C	34.7	4.8	0	7.9	13.5	0	0.3	1.8	34.8	2.2	35.43
Indiana	C	48.1	0	0	31.1	5.8	0	0.7	2.7	0	11.6	185.61
Iowa	C	59.7	0.5	0	3	5.5	0	0.1	0.3	0	0.3	129.35
Kansas	C	55.1	0	0	34.8	5.4	0	3.3	1.4	0	0	90.88
Kentucky	C	50.3	0	36.4	1	0	0	1.1	1.9	0	0.3	149.23
Louisiana	C	0	31.1	2.8	18.8	0	0	11.8	0.9	0	9.4	125.23
Maine	S	46.9	47.8	0	0	0	0	4.9	0	0	0.4	21.32
Maryland	P	31.7	21.9	6.3	2.2	0	0	2.5	2.2	5.9	7.5	157.56
Massachusetts	P	0	56.9	0	0	0	27.8	15.3	0	0	0	29.08
Michigan	P	50.3	34.6	3.3	0.1	0	0	4.6	6.5	0	0.6	90.52
Minnesota	P	61.2	21.4	16.6	0	0	0	0.7	0	0	0.1	96.11
Mississippi	P	59.5	33.4	0	0	0	0	2.8	4.3	0	0	58.81
Missouri	P	0	78.5	0	0	0	0	11.3	10.2	0	0	48.40
Montana	C	75.6	0	7.6	8.9	4.6	0	0.9	2.3	0	0.1	161.74
Nebraska	C	4.5	0	0	47.1	7.1	0	0.2	0	0	0.6	112.19
Nevada	C	59.8	0	18.3	13.2	4.4	0	1.3	2.8	0	0.2	223.01

New Hampshire	P	60.6	25.2	0	0	0	7.8	5.8	4.6	0	0	70.82
New Jersey	C	3.8	0	0	6.2	0	0	0	0	0	0	22.22
New Mexico	C	5.4	11.4	0	6.8	12.1	0	0.9	1.5	7.8	5.5	175.38
New York	C	4	17.5	0	2.3	5.4	0.2	0.7	1.3	29.1	1.7	312.54
North Carolina	P	55.5	22.5	2.4	12.8	0	0	0	6.8	0	0	64.07
North Dakota	C	51.8	13.5	13.3	5.7	5.5	0	4.2	0.3	0	0.3	114.94
Ohio	C	39.5	0	0.2	49.6	3.6	0	1.1	3.1	0	0.2	125.46
Oklahoma	C	30.7	12.9	10.7	11.3	2.6	0	1.5	2.1	0	4.8	130.97
Oregon	C	56.5	0	9.7	16.2	1.2	0	1.5	2.6	0	1.5	130.37
Pennsylvania	C	31.8	41.5	4.2	21.7	0	0	0.4	0.4	0	0	158.27
Rhode Island	P	0	56.4	0	0	0	2.3	10.7	9.9	0	0	44.72
South Carolina	C	5	1.4	23.5	1	0	1.2	1.1	0	0	0.2	123.25
South Dakota	P	45.5	0	43.4	0	0.7	0	10.4	0	0	0	70.84
Tennessee	P	64.5	28.4	0	0	0	0	3.3	3.6	0	0.2	77.51
Texas	P	0	0	0	0	0	0	65.2	34.8	0	0	51.80
Utah	C	66.2	0	12.8	12.7	3.9	0	1.4	2.6	0	0.4	158.33
Vermont	C	64.4	0	0	35.6	0	0	0	0	0	0	97.14
Virginia	P	42.3	3.3	14.1	0.1	0	0	5.4	4.8	0	0.2	94.80
Washington	C	55.1	0	17.1	16.9	7.1	0	1.1	2.4	0	0.3	134.40
West Virginia	P	0	39.8	46.7	2.6	0	0	4.8	6.1	0	0	56.93
Wisconsin	C	52.7	0	0	33.3	10.2	0	0	0.2	0	0.9	169.94
Wyoming	C	61.7	0	23.9	3.1	7.9	0	1.2	1.8	0	0.4	174.11

Table 10. Land Prices and Bank Failures

The dependent variable is the log market price of land available for an annual panel of counties. The estimation is undertaken after collapsing this panel into four non overlapping periods: 1920-1923, 1924-1926 and 1927-1929, 1930-1933, averaging the price level in each county in each period. Over each period, we also compute the sum of deposits in suspended bank, and divide this sum by the average value of deposits over the period (to account for the formation of new banks). The price level the previous period, along with time and state fixed effects are included, and standard errors are clustered across both state and time—significance levels remain unchanged if errors are clustered only at the state level. All variables have been standardized to have mean zero and a variance of one. Column 1 includes the full sample of counties. Column 2 restricts the sample to counties located in states that allow foreclosure through a “power of sale” while column 3 includes only counties in states that require “court action” for foreclosure. See Bridewell (1938) and Table 9. Standard errors (in parentheses): *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	Full sample	Power of sale states	Court action states
Ratio of suspended deposits in county to total deposits in county	-0.0173* (0.00914)	-0.0219 (0.0159)	-0.0103 (0.0130)
In-state, within 50 miles, ratio of suspended deposits in counties to total deposits in counties	-0.0308** (0.0145)	-0.0553** (0.0221)	-0.0197 (0.0150)
In-state, 50-100 miles, ratio of suspended deposits in counties to total deposits	0.0131 (0.0129)	0.0180 (0.0148)	0.0109 (0.0168)
Out-of-state, within 50 miles, ratio of suspended deposits in counties to total deposits	0.00950 (0.00747)	0.00716 (0.0125)	0.0115 (0.0127)
Observations	587	252	335
R-squared	0.954	0.951	0.951

TABLE 11. BANK FAILURES AND CONTAGION

The dependent variable is the ratio of suspended deposits in a county, defined as the total value of suspended deposits in a county divided by total deposits the previous year. The data are observed annually from 1920-1934 for an unbalanced panel of 2600 counties located within 100 miles of a state border. State and year fixed effects are included. All variables have been standardized to have mean zero and a variance of one. Standard errors (in parentheses):*** p<0.01, ** p<0.05, * p<0.1.

Variables	Bank suspensions
Ratio of suspended deposits in county to total deposits in county, previous year	0.0632***
	(0.0176)
In-state, within 50 miles, ratio of suspended deposits in counties to total deposits in counties, previous year	0.0262**
	(0.0129)
In-state, 50-100 miles, ratio of suspended deposits in counties to total deposits in counties, previous year	0.0575***
	(0.0143)
Out-of-state, within 50 miles, ratio of suspended deposits in counties to total deposits in counties, previous year	-0.00304
	(0.0124)
Observations	14,406
R-squared	0.091

Appendix: Variables' Definitions and Sources

The number of State and National Banks Active in each county; the value of deposits in active banks; and the value of deposits in suspended banks (State and National) are all obtained from the Federal Deposit Insurance Corporation Data on Banks in the United States, 1920-1936 (Inter-University Consortium in Political and Social Research (ICPSR 07). For a bank in receivership, the county suspension rate is the sum of deposits in both state and national banks suspended in that county over the same three year window as asset recovery for the bank in receivership, expressed as a fraction of total deposits within the county in the year of failure. In the 1930s sample, the suspension rate is the sum of deposits in both state and national banks suspended in that county between 1930-1934, and divided by deposits in active banks in the county in 1929.

The Recovery Rate is obtained from Office of Comptroller of Currency (OCC) Annual Reports, 1920-1930, and 1936 (<http://fraser.stlouisfed.org>), and is defined as the ratio of total recovered assets to the book value of assets at the time of failure. In the 1920-1927 sample, recovery is observed 3 years after failure. In the 1930s sample, recovery is observed in 1936. All demographic data, such as Urban Population; Fraction of Black Population; Fraction of Population Between 7 and 20 years; County Area; County Population; Value of Crops/ Farm Land Divided by Farm Population are obtained from the United States Bureau of Census stored at the Inter-University Consortium for Political and Social Research (ICPSR) NOs: 0003, 0007,0008,0009,0014,0017.

All distances are computed using ArcView from each county's centroid. Annual Mean Rainfall is obtained from Weather Source 10 Woodsom Drive Amesbury MA, 01913. These data come from the COOP Network consists of more than 20,000 sites across the U.S., and has monthly precipitation observations for the past 100 years. However, for a station's data to be included in the county level data, the station needs to have a minimum of 10 years history and a minimum data density of 90 %: ratio of number of actual observations to potential observations. If one or more candidate stations meet the above criteria the stations' data are averaged to produce the county level observations. If no candidate station exists within the county, the nearest candidate up to 40 miles away in the next county is substituted. The arithmetic mean and standard deviation level of rainfall are computed from the monthly data for all years with available data.