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Interbank Connections, Contagion, and Bank Distress in the Great Depression

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The financial crisis of 2008–2009 heightened interest in how relationships within the financial system can amplify exogenous shocks. Amplification can occur through multiple channels. Distress in one firm can signal potential problems in other firms with correlated positions and trigger withdrawals of short-term debt whether or not the firms are contractually connected. For example, during the 2008–2009 financial crisis, the Reserve Primary Fund, a money market mutual fund with a large exposure to Lehman Brothers, was unable to maintain a constant \$1 per share price. This triggered runs on other mutual funds, including many that had little or no counterparty exposure to Lehman or direct connections to the Reserve Primary Fund.

Counterparty contagion can also occur through direct contractual relationships between firms. A default by one firm can impose distress on other firms that hold significant liabilities of the defaulting firm. For example, some observers believe that because of its exposure to AIG, Goldman Sachs might have failed if AIG had been permitted to fail in 2008. As the interbank-lending market collapsed in September 2008, banks scrambled to hoard reserves as a means of self-insurance against prospective liquidity needs, which

aggravated declines in risky asset prices and bank lending.

We investigate the role of contagion on bank distress during the Great Depression. Specifically, we examine the effects of both direct contractual obligations between banks and geographic proximity to distressed banks on increasing the closure probability of individual banks. Despite a large amount of research on the causes and consequences of bank distress during the Depression, previous studies have not examined comprehensively whether or how bilateral bank-network connections contributed to bank-failure risk during the Depression. We do so by mapping the interbank network in detail and examining how network connections affected the risk of bank failure and other closure events.

Using interbank network and balance sheet data for the decades prior to the Depression, we also investigate how the founding of the Federal Reserve System (Fed) affected network risk. Existing literature criticizes the Fed for failing to offset major liquidity shocks during the Depression. We consider a new channel: Did the establishment of the Fed lead banks to become complacent about liquidity risk and therefore more vulnerable to liquidity shocks?

In the early 20th century, contractual exposures between banks occurred mainly through correspondent relationships,

which from a research perspective have the advantage of being both readily observable and without the complexity of many types of modern contractual exposures. Furthermore, because banks and their correspondents were typically located in different cities for regulatory reasons, we can isolate the effects of the contractual relationship from local shocks hitting the markets of the bank and its correspondents. For these reasons, it can be easier to identify the role of contractual exposures on interbank liquidity risk in the historical banking system than it is in the modern system.

Most banks maintained deposits with other banks (i.e., their correspondents) for payments and other services, as well as to invest surplus funds or obtain credit. Correspondent relationships were both a source of liquidity risk and a means of mitigating liquidity risk.

Ordinarily, funds deposited in correspondent banks were a liquid asset that banks could tap as needed. Banks with established connections could also borrow in the interbank market when their own depositors withdrew funds. For example, when faced with deposit withdrawals from 1931 to 1932, Chicago banks borrowed from other banks to replace lost deposits, thus mitigating the need to liquidate assets. Banks that were better known and had a larger network profile were better able to borrow funds when needed.

However, the interbank market was also a source of liquidity risk, especially for banks that relied heavily on interbank deposits as a funding source. Funds that a bank deposited in a correspondent were an asset of the depositing bank but a liability of the correspondent. Those deposits could be withdrawn suddenly and were often withdrawn during panics, putting the correspondent bank in an illiquid position. The interbank system had a core-periphery structure, with large banks in New York City, Chicago, and other major cities at the core of a system composed of local, regional, and national nodes connecting banks across the country. Most banks had at least one correspondent in New York or Chicago, and often one or more correspondents in other cities.

The interbank network dissipated seasonal needs and minor liquidity disturbances across the system, but large shocks that overwhelmed the ability of correspondent banks to provide liquidity resulted in nationwide banking panics. Several major panics occurred in the 19th and early 20th centuries, and the liquidity risk associated with interbank deposit withdrawals was an important magnifier of distress during those panics. Congress sought to eliminate panics by establishing the Federal Reserve System in 1913. The Fed's founders expected that it would greatly reduce the size and importance of the interbank network, which

they saw as a conduit for instability. However, interbank deposit exposures remained large in the aggregate, making up almost \$4 billion, or 6.5 percent of total banking-system assets in 1929, and thus were potentially a major source of risk to the banking system.

Our analysis relies on newly digitized data on the entire U.S. interbank network from key dates before the establishment of the Fed (1910), soon after the Fed was founded (1919), and on the eve of the Great Depression (1929). Most banks had multiple correspondents located in major cities outside their local market. (Very few banks had any correspondents in their local market.) Using information about the identities and performance of each bank's correspondents as well as the bank's own balance sheet and local market, we study the impact of interbank contagion on bank-closure risk and the effect of the founding of the Fed on bank management of network liquidity risks.

Controlling for various balance sheet characteristics that are commonly associated with the probability of failure, we find that a bank's probability of closing during the Depression was higher when a higher percentage of its correspondents closed. A bank would lose access, at least temporarily, to funds it had on deposit in correspondents that closed, and the outright failure of a correspondent could permanently impair a bank's assets, leading to the bank's own downfall. We also find that having a large number of respondent banks increased a correspondent bank's closure risk. Although having multiple respondents probably mitigated liquidity risk in normal times, it likely had the opposite effect when a major banking panic or other adverse shock caused all of a correspondent bank's depositors to withdraw their funds simultaneously. Our results indicate, therefore, that contagion through network ties was a significant source of banking instability during the Great Depression. Finally, we also find important location-specific closure risks in that banks were more likely to fail when other banks in their local market closed, which could be indicative of either location-specific loan risk or local contagion.

To examine how the founding of the Fed affected banks' management of network liquidity risks, we identify two separable aspects of network relationships that affected liquidity risk in the pre-Fed era, consistent with the fact that network relationships could be either a source of liquidity risk or a means of mitigating liquidity risk. One aspect (the amount of deposits due to respondents) created liquidity risk, and the other (the total number of network relationships, which we interpret as a measure of the bank's reputation and credit worthiness within the network, and thus its ability to access

resources) mitigated liquidity risk. After controlling for the amount of deposits due to respondents (which tend to increase risk), the size of a bank's respondent network should ordinarily mitigate liquidity risk. We find that before the Fed was established, both aspects affected how correspondent banks managed their portfolio risk and leverage. Greater exposure to interbank deposits encouraged banks to increase their capital ratios, while more network relationships (holding constant the amount of interbank deposits) led them to hold lower cash and capital ratios.

In contrast, after the Fed was established, correspondent banks appear to have been less sensitive to network liquidity risk. We find that both aspects of network connections had much less impact on banks' risk-management decisions in the years after the Fed's founding, suggesting that expected access to liquidity from the Fed reduced cross-sectional differences in perceived liquidity risk for correspondent banks, which likely heightened contagion risk through the interbank network. In essence, the founding of the Fed provided a perception of

liquidity risk insurance against the sorts of shocks associated with banking panics in the National Banking Era, and in so doing weakened the incentives for correspondent banks to guard against interbank liquidity risks by holding more capital or liquid assets. Ultimately, the Fed failed to provide sufficient liquidity to prevent contagion during the Great Depression, and thus did not fulfill the promise of its founders or the expectations of banks that it would insure them against liquidity risk shocks. Our findings thus contribute new information about how the interbank network contributed to banking system instability during the Great Depression.

NOTE:

This research brief is based on Charles W. Calomiris, Matthew S. Jaremski, and David C. Wheelock, "Interbank Connections, Contagion, and Bank Distress in the Great Depression," NBER Working Paper no. 25897, May 2019, <http://www.nber.org/papers/w25897>.