

# The Lender of Last Resort: Lessons from the Fed's First 100 Years

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We review the responses of the Federal Reserve to financial crises over the past 100 years. The authors of the Federal Reserve Act in 1913 created an institution that they hoped would prevent banking panics from occurring. When this original framework did not prevent the banking panics of the 1930s, Congress amended the Act to give the Federal Reserve considerably greater powers to respond to financial crises. Over the subsequent decades, the Federal Reserve responded more aggressively when it perceived threats to financial stability and ultimately to economic activity. We review some notable episodes and show how they anticipated in several respects the Federal Reserve's responses to the financial crisis of 2007-09. We also discuss some lessons that can be learned from these responses and some of the challenges that face a lender of last resort.

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## **The Lender of Last Resort: Lessons from the Fed's First 100 Years**

“It is the duty of the United States to provide a means by which the periodic panics which shake the American Republic and do it enormous injury shall be stopped.” –Robert L. Owen<sup>1</sup>

The founding of the Federal Reserve System in 1914 established the first official U.S. lender of last resort. Recurrent banking crises in the nineteenth and early twentieth centuries were widely viewed as evidence of defects in the U.S. banking system, including the absence of an official lender of last resort. Panics had been met by ad hoc actions by bankers (from Nicholas Biddle to J.P. Morgan), Secretaries of the Treasury (e.g., Leslie Shaw), and private clearinghouses, but these actions did not obviously reduce the frequency or severity of panics. The Fed's founders sought to prevent panics from arising in the first place as well as provide a mechanism for limiting any crises that did occur.

To achieve this objective, the Fed's founders desired to 1) create an “asset-backed” currency whose supply was tied to the level of commercial activity rather than to the stock of government bonds held by banks; and 2) establish reserve banks to hold the reserves of the banking system and to provide additional currency and reserves as needed by rediscounting commercial paper. The Fed's founders expected that discount window lending would be the principal means by which the Federal Reserve would serve as lender of last resort to the banking system. However, the founders gave the Fed other tools as well, notably the ability to invest in government securities and bankers acceptances, which subsequently were used to take lender of last resort actions as well as to implement monetary policy.

This paper reviews the Fed's near-100 year history as lender of last resort. We do so with two objectives in mind. First, we document changes in the Fed's behavior over time. From the beginning, the Fed acted as lender of last resort in the sense of providing currency and reserves to its member banks by rediscounting commercial paper and purchasing bankers acceptances.<sup>2</sup> In doing so, extensions of Federal Reserve credit apparently eliminated the seasonal stringency in money markets that banking reformers had viewed as an important source of instability (Miron, 1986).<sup>3</sup> However, the Fed appears to have been hesitant or timid in responding to crises, and its response to the banking panics of the Great Depression

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<sup>1</sup> Robert L. Owen was Chairman of the Committee on Banking and Currency, United States Senate, 1913-19 (Owen, 1919).

<sup>2</sup> During World War I, the Fed also supplied a large volume of reserve by lending to banks against their holdings of U.S. Government securities.

<sup>3</sup> Clark (1986) notes that interest rates exhibited notably less seasonal patterns in other countries after 1914, and suggests that the suspension of the gold standard at the start of World War I, rather than the founding of the Fed, explains the disappearance of interest rate seasonality.

does not seem in keeping with the objective of preventing periodic banking panics; we discuss some reasons why this might have been so. In the wake of the banking panics of the early 1930s, the Federal Reserve was given considerably greater power to act as a lender of last resort. Since World War II, the Fed has shown considerably more willingness to respond to threats to financial stability. We examine how and why the Fed's behavior as lender of last resort changed over time, and how well the lender of last resort adapted to underlying changes in the financial system driven by regulation, financial innovation, and the macroeconomic environment. We argue that a number of the actions taken during the financial crisis of 2007-09 were anticipated by actions taken during the prior 40 years.

Our second objective in reviewing the Fed's history as a lender of last resort is to identify lessons from that history, particularly lessons that can be gleaned from actions taken between 1970 and 2010. Some economists argue that a central bank can perform effectively as lender of last resort solely by engaging in open-market operations or otherwise varying the quantity of high-powered money, i.e., through "monetary policy" (e.g., Goodfriend and King, 1998; Schwartz, 1992). Others, such as Goodhart (1999), argue that a lender of last resort may need to engage in targeted responses to prevent financial disturbances from spreading.<sup>4</sup> Arguably, the founder's conception of how the Fed would act as lender of last resort blended aspects of "banking," or credit, policy with aspects of "monetary" policy. Since the Great Depression, however, Fed officials generally have drawn a sharp distinction between lender of last resort actions and monetary policy. This distinction is perhaps best illustrated by the Fed's response to the recent financial crisis, in which, before September 2008, the Fed prevented a large increase in its lending from increasing the total reserves of the banking system. We sidestep broader issues about the history and performance of the Fed in conducting monetary policy, which have been considered in depth by Meltzer (2003; 2009a) and others.

Section II discusses the Fed's performance up to and including the Great Depression and identifies some key reasons for the Fed's failure to act effectively as lender of last resort during the Great Depression. Section III reviews key legislation from the 1930s affecting the Fed as lender of last resort, comprising changes to the Fed's lending authority (generally expanding it), changes to the Fed's structure (concentrating authority), and changes to the financial system. These changes shaped the environment in which the Fed operated after World War II. Section IV discusses the financial environment in the post-war era as initial stability unraveled under the strains of the Great Inflation of the 1970s, financial innovation, and deregulation of the 1980s and 1990s. Section V reviews responses to episodes in which the Fed acted as lender of last resort between 1970 and 2000. Section VI reviews actions taken during the

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<sup>4</sup> Bordo (1990) discusses alternative views about the appropriate role of a lender of last resort and reviews the history of banking panics and their resolution.

crisis of 2007-09. We argue that the Fed's actions in the earlier period anticipate its responses to the more recent episode. All these actions illustrate how the Fed's behavior as lender of last resort had changed since the 1930s. Section VII provides a discussion of observations from these episodes and lessons from the Fed's history for the future. Section VIII briefly concludes.

## **II. The Fed's First Twenty Years**

The Panic of 1907 was a watershed event that led to the establishment of the Federal Reserve System. Banking reform had been debated off and on since the 1870s. However, the Panic of 1907 provided the impetus for Congress to enact the Aldrich-Vreeland Act of 1908 which established the National Monetary Commission, as well as a temporary mechanism for issuing currency during banking crises. The studies of the National Monetary Commission identified defects of the U.S. banking system and drew lessons from the performance of banking systems in other countries. One study in particular argued that the relative stability of European banking systems reflected the presence of central banks operating in deep, liquid money markets (Warburg, 1910). The study's author, Paul Warburg, convinced the chairman of the National Monetary Commission, Senator Nelson Aldrich, of the efficacy of the European model, and Aldrich became an important champion of a central banking system for the United States. Aldrich submitted a bill to Congress in 1912 to establish a central bank with key features of the European systems. Aldrich proposed a National Reserve Association that would oversee a system of local and regional reserve associations and set a discount rate at which the local branches would rediscount notes and bills of exchange for member banks (Wicker, 2005). Congress rejected the Aldrich bill, but the Federal Reserve Act of 1913 resembled the Aldrich plan in key respects, including the establishment of regional reserve banks with authority to rediscount commercial paper and bills of exchange for member commercial banks.

The Federal Reserve Act did not address financial crises explicitly nor prescribe how the Federal Reserve should respond to banking panics. The act's proponents believed that the Fed's presence would prevent panics from occurring in the first place. The authors sought to "furnish an elastic currency" supplied as needed to accommodate seasonal and other fluctuations in currency demand. The authors intended the Fed's discount window to be the principal mechanism by which the System would add to the stocks of currency and bank reserves, and thereby serve as lender of last resort. Federal Reserve member banks could obtain currency (Federal Reserve notes) or reserve deposits by rediscounting commercial paper with reserve banks, which were required to maintain reserves in the form of gold and commercial paper against their note and deposit liabilities.

The Fed's founders also sought to promote a U.S. market for bankers acceptances. Warburg (1910) argued that the relative stability of European banking systems stemmed from the presence of deep markets for bills of exchange (such as bankers acceptances) and central banks that provided liquidity to back-stop those markets and serve as lender of last resort in times of stringency. The Federal Reserve Act authorized the reserve banks to purchase acceptances in the open market, which gave the Fed a second mechanism to add currency and reserves to the banking system, and thereby serve as lender of last resort.<sup>5</sup>

No banking panics occurred during the Fed's first fifteen years, 1914-29, which suggested that the Fed had accomplished the founder's objectives. The establishment of the Fed did, apparently, eliminate seasonal strains in financial markets, which had been widely recognized as a source of instability. Seasonal swings in money market interest rates dropped sharply after the Fed's founding as Federal Reserve discount window loans and purchases of bankers acceptances rose and fell with seasonal fluctuations in the demands for currency and credit (Miron, 1986; Friedman and Schwartz, 1963, pp. 292-93). Seasonal accommodation was largely automatic, as the Fed's founders had intended. At relatively fixed discount rates on loans to member banks and on purchases of acceptances in the open market, the reserve banks made more discount window loans and purchased more bankers acceptances at times of the year when demands for credit and currency were high.<sup>6</sup> Unfortunately, the Great Depression demonstrated that accommodating seasonal variation in money and credit demand was not sufficient to eliminate the problem of banking panics.<sup>7</sup>

#### *Lender of Last Resort during the Great Depression*

The Great Depression witnessed enormous strains in financial markets and stresses on the banking system associated with banking panics and failures. There were efforts within the Federal Reserve System to respond to these pressures. Following the 1929 stock market crash, the New York Fed extended discount window loans liberally to member banks so that they could take on stock exchange

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<sup>5</sup> Broz (1997) argues that the Fed's founders sought the development of a U.S. market for bankers acceptances to promote the use of the dollar in international trade and finance. See Bordo and Wheelock (2013) for additional discussion of the history and intent of the Federal Reserve Act, especially with regard to the Federal Reserve as lender of last resort.

<sup>6</sup> See Miron (1986) and references therein for discussion of the relationship between seasonal money market stringency and banking crises in the nineteenth and early twentieth century. Clark (1986) notes that interest rates exhibited less seasonality after 1914 in many countries, and suggests that the decline in interest rate seasonality was more likely caused by suspension of the international gold standard with the outbreak of World War I than by the founding of the Fed.

<sup>7</sup> Miron (1986) contends that the Fed was less accommodative of seasonal demands during the Depression, which could explain the increased incidence of financial crises. However, Wheelock (1992) finds that any changes in the seasonal patterns of interest rates and Federal Reserve credit after 1929 were not statistically significant.

loans held by brokers. The New York Fed also purchased more than \$100 million of government securities in the open market.

Some reserve banks also maintained easier lending policies to provide extra liquidity to the banking system. According to Richardson and Troost (2009), the Federal Reserve Bank of Atlanta responded to local panics by moving large quantities of cash to affected regions, extending emergency loans to member banks, and helping member banks make loans to nonmember banks. Comparing the performance of the Federal Reserve Banks of Atlanta and St. Louis during a 1930 banking panic that straddled both districts, Richardson and Troost (2009) conclude that the Atlanta Fed's more aggressive response to the panic kept bank failure rates lower, and commercial lending and economic activity higher, in the Atlanta district than in the St. Louis district.

Reserve banks also on at least some occasions shipped large amounts of cash to locations exhibiting signs of stress. The Atlanta Fed shipped large amounts of currency to Florida as part of an aggressive response to banking distress, for example. Carlson, Mitchener and Richardson (2010) conclude that the reserve bank's swift action stopped the panic and held down the number of bank failures. Similar uses of cash reservoirs to respond to distress were made by the Boston Fed in Bangor, Maine in 1933 and New Haven and Hartford, Connecticut in 1932; the Richmond Fed in Charleston, South Carolina in 1932; and San Francisco Fed in Boise and Twin Falls, Idaho in 1932 and Sacramento, California in 1933 (Federal Reserve Board, 1934; 1938).<sup>8</sup> These efforts, termed currency depots, provided instant access to cash from an onsite source maintained by a custodian on behalf of the Federal Reserve, but were not strictly lender of last resort actions. Banks were required to obtain financing from another source, such as a New York correspondent, but once they did so, the presence of a currency depot meant that currency was immediately available to be a source of confidence during a bank run. As in Tampa, currency depots elsewhere appear to have contributed positively to stability:

On January 2 [1932], a situation developed in Hartford, Connecticut, when the City Bank and Trust Company, a large non-member bank, following a run, was forced to close its doors, and its failure forced the East Hartford Trust Company and the Unionville Bank and Trust Company, two small institutions closely allied with it, to close the same day. This disturbance naturally was felt by the banks in that locality. The Federal Reserve Bank of Boston opened on January 2 a temporary currency depot to assist in facilitating the delivery of currency, officials of the bank going to Hartford to supervise the establishment and operations. Through active cooperation of the Hartford Clearing House banks, the National Credit Corporation, and the Federal Reserve Bank of Boston, this

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<sup>8</sup> The first use of currency depots to respond to local banking stress appears to have been by the San Francisco Fed in response to troubles in 1921 in Boise, Idaho (a location without quick access to cash from the branch of a Federal Reserve Bank).

situation was localized, so that within two or three days the banking situation in Hartford was apparently back in normal conditions. (Curtiss, 1933)

The actions by the various reserve banks suggest that the Fed had tools that could be used to respond to banking crises. However, those tools were used idiosyncratically and required leaders who were willing to improvise and, if necessary, test the limits of the Federal Reserve Act. A truly effective response would have required coordination across the System. The Federal Reserve Act did not provide an automatic, fool-proof mechanism for dealing with crises as the founders had hoped. Instead, the Fed responded timidly to the banking panics and failures during 1930-33, as well as to large declines in the price level and output, and clearly failed to serve effectively as lender of last resort.

#### *Reasons for a lack of action during the Great Depression*

Bordo and Wheelock (2013) review alternative explanations for the Fed's policy failings during the Great Depression, focusing especially why the discount window and bankers acceptance mechanisms failed to operate as the Fed's founders intended to prevent or alleviate banking panics. Bordo and Wheelock (2013) argue that the Fed was hampered as lender of last resort because the Federal Reserve Act failed to recreate key features of major European banking systems. Those features included deep, liquid money markets, nationwide branch banking, and a central bank that lent anonymously to the market against good collateral.

The Fed's founders sought to promote the development of a large U.S. bankers acceptance market, similar to the bill markets in European financial centers. Accordingly, the Federal Reserve Act permitted national banks to issue bankers acceptances and authorized the reserve banks to purchase acceptances in the open market. However, the market did not grow as envisioned and it declined sharply during the Depression.<sup>9</sup>

The Federal Reserve System helped to integrate and make the U.S. payments system more efficient (Gilbert, 1998), but was silent on branch banking. Dual banking, i.e., the chartering of banks by both the federal government and state governments, was preserved. Federally-chartered, i.e., national, banks were required to join the Federal Reserve System, but membership was made optional for state-chartered banks. With its system of semi-autonomous regional reserve banks, the Federal Reserve System was made to fit the structure of the U.S. banking system rather than to reform it.<sup>10</sup>

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<sup>9</sup> Broz (1997) argues that international objectives were particularly important to the Fed's founders, including the establishment of an active bankers acceptance market to increase the share of world trade financed by U.S. banks.

<sup>10</sup> Grossman (2010) reports and discusses evidence that historically banking crises have been less prevalent in systems with larger banks and nationwide branching. A more detailed comparison of the Canadian banking system

The Federal Reserve Act imposed some fairly strict limitations on the Fed's ability to serve as lender of last resort to the banking system, which became apparent during the Great Depression. The act restricted access to the Fed's discount window to member commercial banks. Nonmember banks, trust companies, savings institutions, and other depository and financial institutions had no direct access to Federal Reserve credit.<sup>11</sup> Few state banks chose Fed membership. By December 1929, fewer than 10 percent of all state-chartered commercial banks were Fed members. Including national banks, only 35 percent of the nation's commercial banks were members, though member banks held nearly 75 percent of total U.S. bank deposits. Still, on the eve of the Great Depression, 65 percent of U.S. commercial banks, holding some 25 percent of total U.S. bank deposits, had no direct access to the lender of last resort. This proved especially problematic during the Great Depression when banking panics and failures occurred predominately among nonmember banks. The annual average suspension rate among nonmembers was 8 percent during 1930-32, double the rate for member banks. Similarly, on average, 5 percent of the total deposits held by nonmember banks, but only 1 percent of those held by member banks, were in banks that suspended operations during the Depression.<sup>12</sup>

In addition to prohibiting reserve banks from lending directly to nonmember banks, the Federal Reserve Act also prohibited member banks from acting as agents for nonmember banks in applying for or receiving Federal Reserve credit except by permission of the Federal Reserve Board. During World War I, the Board authorized the reserve banks to discount for nonmembers, with the endorsement of a member bank, notes secured by U.S. Government securities if the proceeds were to be used for holding government securities (Hackley, 1973, pp. 118-19). Then in 1921, the Board authorized the reserve banks to discount for member banks any eligible paper acquired from nonmember banks, but that authority was rescinded in 1923 (Hackley, 1973, p. 119). Thereafter, Federal Reserve credit was extended to nonmember banks only in exceptional circumstances and with Board approval. However, during the Depression, the Fed rarely authorized loans to member banks as agents for nonmember banks.

The Fed's lending was also constrained by restrictions in the Federal Reserve Act on the types and maturities of loans and securities that banks could rediscount or use as collateral for advances from the discount window. The authors of the act were influenced by the real bills doctrine and believed that

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with the U.S. system by Bordo, Rockhoff and Redish (1994) finds that the Canadian system of large banks with nationwide branches has been more stable, though less efficient, than the U.S. unit banking system.

<sup>11</sup> The act prohibited member banks from acting as agents for nonmember banks in applying for or receiving Federal Reserve credit "except by permission of the Federal Reserve Board." Lending to nonmember banks is discussed in more detail in the next section.

<sup>12</sup> These rates are calculated as the annual average total number of suspensions (deposits in suspended banks) for 1930-32 divided by number of banks (total deposits) on December 1929. Data on number of banks and deposits by class of bank are from Federal Reserve Board (1943, Table 1). Data on suspensions are from Federal Reserve Board (1943, Table 66).

Federal Reserve credit should be extended only by rediscounting of short-term self-liquidating commercial and agricultural loans. The act permitted rediscounting of “notes, drafts, and bills of exchange arising out of actual commercial transactions,” but forbid rediscounting of loans and securities “covering merely investments or issued or drawn for the purpose of carrying or trading in stocks, bonds, or other investment securities, except banks and notes of the Government of the United States.” Further, the act specified that only those loans with a term to maturity of 90 days or less (180 days for agricultural loans) were eligible for rediscounting with reserve banks. During the Depression, many banks apparently were unable to obtain Federal Reserve credit because they lacked sufficient amounts of eligible paper (Chandler, 1971, pp. 227-33).

Although the Federal Reserve Act expressly limited the types and maturities of paper that reserve banks could rediscount for member banks, the act did not specify how reserve banks were to set their discount rates (or acceptance buying rates) or administer their discount windows. However, the Fed’s founders expected that reserve banks would set their discount rates sufficiently high to protect their gold reserves, while adjusting their rates as necessary to respond to and support the unique banking and currency needs of their individual districts.<sup>13</sup> Each reserve bank set its own discount rate, subject to review by the Federal Reserve Board, and administered its discount window. Some reserve banks were more liberal than others in determining and valuing acceptable discount window collateral (Chandler 1971, p. 233), and in responding to local banking disturbances.

Friedman and Schwartz (1963) contend that the Fed suffered from a lack of effective leadership, which enabled parochial interests and petty jealousies to hamstring policy. The individual reserve banks acted competitively, rather than cooperatively, at critical points during the Depression. For example, in March 1933, the Federal Reserve Bank of Chicago refused a request from the New York Fed to exchange gold for U.S. government securities when gold outflows threatened to push the New York Bank’s reserve ratio below its legal minimum (Meltzer, 2003, p. 387). Although the Federal Reserve Board eventually required the Chicago Fed and other reserve banks to lend to New York, the episode illustrates how the System’s structure hampered its response to crises.

There also appears to have been reluctance on the part of some within the Federal Reserve during that period to react to systemic stresses. This is apparent in discussions by the Federal Reserve Board in late February 1933 (two weeks after the state of Michigan had declared a bank holiday and other states had begun to follow suit) where there was a decided aversion to engaging in expansionary open market

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<sup>13</sup> Reserve banks were required to maintain minimum gold reserves equal to 40 percent of their outstanding notes and 35 percent of their deposit liabilities (plus eligible paper equal to 100 percent of their note issues).

operations despite clear signs that the banking system was under stress. In response to a call by Treasury Secretary Ogden Mills for Federal Reserve purchases of government securities to improve public confidence and to ease stresses on the banking system, Federal Reserve Governor Meyer responded as follows:

Governor Meyer stated that he feels that the recent thinness in the market for Government securities is incident to the necessary readjustment in a market which has been too high under the conditions that have prevailed; that in view of the recent increase in money rates abroad, over which control cannot be exercised in this country, and the increase in money rates in the New York market and in the bill rates at the Federal Reserve Bank of New York, continued purchases of Government securities at the present time would be inconsistent from a monetary standpoint; and that the New York market should protect itself against the higher rate abroad by increased rates and not through open market purchases of government by the Federal Reserve Banks...He also expressed the view that any reasonable amount of open market purchases at this time would prove to be ineffective and appear to be a vain attempt to prevent a readjustment of rates which is inevitable [Minutes of the Federal Reserve Board, Feb 27, 1933]<sup>14</sup>

What lessons can be drawn from the Great Depression for the effectiveness of a lender of last resort? The Federal Reserve's shortcomings as a lender of last resort during the Depression stemmed from multiple sources, including the following:

- 1) The narrowness of its mandate—the Fed was authorized to lend only to member banks. However, during the Depression, banking panics and failures were acute among nonmember banks which had no direct access to the Fed's discount window.
- 2) The Federal Reserve Act restricted acceptable collateral for Federal Reserve loans to short-term commercial and agricultural loans and U.S. government securities. During the Depression, many banks lacked collateral for discount window loans. Some reserve banks apparently were also conservative in valuing collateral pledged for loans.
- 3) Some reserve banks focused on local conditions and their own reserve positions with inadequate regard to national conditions, as reflected, for example, in the Chicago Fed's refusal to lend to the New York Fed.
- 4) The geographically-fragmented unit banking system of the United States was particularly vulnerable to shocks.

The Fed's founders limited the System's mandate and imposed strict collateral and reserve requirements on the reserve banks to keep the Fed from being a source of inflation or financial

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<sup>14</sup> The minutes can be found in the records of the Federal Reserve System, Record Group 82, Box 745, index number 2158; National Archives and Records Administration, College Park, MD

speculation. Similarly, the Fed's regional structure was intended to be responsive to conditions throughout the country and not dominated by either New York banks or Washington politics. However, the regional structure hampered coordinated policy action in response to a national crisis. It seems likely that the Fed would have been more aggressive and more effective as lender of last resort if it had greater freedom to lend to nonmember banks and other depository institutions against a wider array of collateral, and if authority had been concentrated in the hands of policymakers with a better understanding of, and interest in, national banking conditions. Conceivably, the restrictions on the Fed's discount window would not have mattered if the Fed had pursued an aggressive monetary policy response to the Great Depression, as argued most strongly by Friedman and Schwartz (1963). Even so, the structure of the U.S. banking system made it more crisis prone, which would have challenged even an optimally-designed lender of last resort. As Warburg (1910) had argued, the stability of a banking system depends on features of the banking system and financial markets as well as the presence of a lender of last resort.

### **III. Creating a New Regime: Depression Era Reforms to the Banking System and Lender of Last Resort**

This section describes reforms put in place during the Depression that broadened the Fed's lending authority and changed the structure of the Federal Reserve System to make it more effective and responsive to crises. Significant reforms were also implemented elsewhere in the financial system to make the banking system less crisis prone, though the federal prohibition on interstate branching remained.

#### *Federal Reserve Credit Programs*

During the Depression, Congress sought to improve the flow of credit to the banking system by easing restrictions on both access to the Fed's discount window and the types of securities that could serve as collateral for discount window loans. For example, the Glass-Steagall Act of February 1932 authorized reserve banks to lend to smaller member banks – those with capital not exceeding \$5 million – against *any* satisfactory asset (not just assets that ordinarily were eligible for rediscounting or for use as collateral for advances) in “exceptional and exigent circumstances.” Loans made under this authority (Section 10(b) of the Federal Reserve Act) required the approval of five or more members of the Federal Reserve Board and bore an interest rate not less than 1 percent above the regular discount rate (Hackley, 1973, pp. 101-02).<sup>15</sup> Section 10(b) was initially set to expire in March 1933, but was subsequently extended by the Emergency Banking Act of March 1933. The act also eliminated the requirement that at

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<sup>15</sup> The Glass-Steagall Act of 1932 also added Section 10(a), which permitted the Reserve Banks to lend to groups of five or more member banks (see Hackley, 1973, pp. 103-05).

least five members of the Federal Reserve Board approve all 10(b) loans (Hackley, 1973, pp. 106-07). Further, the act authorized reserve banks to make loans to nonmember banks in limited circumstances on the same terms as advances to member banks under Section 10(b). This authority expired after one year and was not renewed (Hackley, 1973, pp. 124-25).

Besides giving banks enhanced access to Federal Reserve credit, Congress also sought to improve the flow of credit to bank customers. As the Depression worsened, Congress received complaints that even financially-secure borrowers with good collateral had difficulty obtaining loans from banks. In a letter to Carter Glass, Chairman of the Senate Banking Committee, Federal Reserve Board member Charles Hamlin wrote, "I firmly believe, but cannot prove, that there are many merchants in the United States today who are unable to obtain credit, although they can give satisfactory collateral. I know that there are large areas where there are no banks left."<sup>16</sup> As the banking problems lingered so did concerns about credit availability. In 1934, the Federal Reserve reported the following:

The need for this character of loans [working capital loans] has become increasingly apparent in recent months. Many small industrial establishments have suffered severe capital losses during the depression and are now short of working capital. A survey made by the Federal Reserve Board through the Reserve banks and the chambers of commerce showed that this condition is widespread and is not being met by existing facilities.<sup>17</sup>

Congress responded to such concerns first by adding Section 13(3) to the Federal Reserve Act as a provision of the Emergency Relief and Construction Act of July 1932. Section 13(3) authorized the Federal Reserve, "in unusual and exigent circumstances ... to discount for any individual, partnership, or corporation, notes, drafts, and bills of exchange of the kinds and maturities made eligible for discount for member banks." The provision stipulated that before extending credit, "the Federal Reserve Bank shall obtain evidence that such individual, partnership, or corporation is unable to secure adequate credit accommodations from other banking institutions."<sup>18</sup> A similar provision, Section 13(13), allowed for borrowing against obligations of the U.S. government and its agencies. Later, in 1934, amid the ongoing concerns about lack of overall credit availability, Congress added Section 13(b) to the Federal Reserve Act which allowed working capital advances for up to five years to established industrial and commercial

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<sup>16</sup> Letter from Charles Hamlin to Carter Glass, July 9, 1932 (Box 305, Carter Glass papers, University of Virginia Library).

<sup>17</sup> *Federal Reserve Bulletin*, July 1934, p. 429. See Carlson and Rose (2011) for a further discussion of efforts by the Federal Reserve to study credit availability during this period.

<sup>18</sup> See Hackley (1973, pp. 127-30). Subsequently, the Emergency Banking Act of March 1933 added Section 13(13) to the Federal Reserve Act, which authorized Federal Reserve advances to any individual, partnership, or corporation for periods of not more than 90 days on notes secured by direct obligations of the United States or issued or fully guaranteed by U.S. agencies (Hackley, 1973, pp. 122-23). And, Section 13(b), which authorized the Fed to make working capital loans to businesses, was added in June 1934. The latter provision was repealed in 1958 (Hackley, 1973, pp. 133-45).

businesses. The Banking Act of August 1935 made permanent Sections 10(b) and 13(3), and removed the requirement of “exceptional and exigent circumstances” for loans made under 10(b). It also eliminated a provision requiring that loans made under Section 13(3) be secured by both collateral eligible for discount by member banks and the endorsement of the borrower or a third-party surety.

Section 13(3) was not used extensively. In four years the Fed made just 123 loans, totaling \$1.5 million, under its Section 13(3) authority, with the largest loan being for \$300,000 (Fettig, 2002). Similarly, few loans were made under Section 13(13). Between 1933 and 1937, about \$5.5 million in loans were extended under this authority. Section 13(b) was used somewhat more extensively, and the introduction of Section 13(b) was a possible reason why Section 13(3) and Section 13(13) were little used. By the end of 1937, \$151 million in loans had been approved under Section 13(b) authority.<sup>19</sup>

Federal Reserve lending under Sections 13(3) and 13(13) as authorized in the early 1930s ended around 1940. The Fed extended credit under Section 13(3) during the financial crisis of 2007-09. Section 13(b) lending continued through World War II but dissipated shortly thereafter. Section 13(b) was repealed in 1958 by a provision of the Small Business Investment Company Act.

### *The Gold Standard*

The founders of the Federal Reserve System sought to create a mechanism by which the supplies of currency and bank reserves would adjust “elastically” to accommodate fluctuations in demand. The founders intended the discount window to serve primarily as that mechanism. However, the Federal Reserve Act also imposed constraints that prevented the Federal Reserve from supplying unlimited liquidity, which bounded the Fed’s ability to act as lender of last resort. Fundamentally, the Federal Reserve was constrained by the gold standard. The reserve banks were required to maintain minimum gold reserve ratios against their note and deposit liabilities, as well as collateral in the form of eligible commercial paper against their note issues.<sup>20</sup>

Scholars have debated the extent to which the statutory reserve requirements on Federal Reserve note issues and deposits prevented the Fed from responding more aggressively to the Great Depression. In particular, Friedman and Schwartz (1963) contend that, despite the subsequent claims of some Fed officials, a lack of “free gold” could not explain why the Fed failed to offset fully the effects on bank

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<sup>19</sup> For comparison, loans outstanding at all commercial banks in 1934 totaled \$20 billion. In 1939, the first year for which such data are available, commercial and industrial loans at all commercial banks was about \$7 billion.

<sup>20</sup> The Federal Reserve Act imposed gold reserve requirements of 40 percent and 35 percent, respectively, against reserve bank note issues and deposit liabilities. In addition, reserve banks were required to hold collateral in the form of commercial paper equal to 100 percent of their note issues. A 1917 amendment lowered the collateral requirement for note issues to 60 percent, in the form of either commercial paper or gold (Friedman and Schwartz, 1963, p. 194).

reserves of large currency and gold outflows in the fourth quarter of 1931.<sup>21</sup> Regardless whether the Fed's gold reserve requirements ever prevented action, Fed officials desired to preserve the gold standard and took actions that they believed were consistent with that objective.<sup>22</sup>

The Glass-Steagall Act of February 1932 eased the Fed's reserve requirements by permitting reserve banks to use government securities rather than commercial paper as collateral for their note issues. The Emergency Banking Act of March 1933 further eased the constraint temporarily by authorizing the Fed to issue an unlimited amount of currency backed only by U.S. government securities, i.e., with no gold reserve requirement. The Emergency Banking Act also ratified President Roosevelt's declaration of a bank holiday and suspension of the gold standard. Subsequently, the Gold Reserve Act of 1934 fixed the gold value of the dollar at nearly 40 percent below its pre-suspension level, made permanent the prohibition on ownership of monetary gold by the public or banks (including Federal Reserve Banks), and granted the Secretary of the Treasury broad powers to buy and sell gold and foreign exchange at home and abroad through an exchange stabilization fund.

Although the dollar remained linked to gold, the Gold Reserve Act gave the Treasury broad monetary powers. Further, beginning in 1933, gold inflows kept the gold standard from constraining Federal Reserve or Treasury actions, and were the source of a substantial increase in the money stock between 1933 and World War II (Friedman and Schwartz, 1963). Under the post-war Bretton Woods System, gold once again became an influence on monetary policy (Calomiris and Wheelock, 1998; Meltzer, 2009a, pp. 214-24), but not on the Fed's actions as lender of last resort.

#### *Other Significant Legislation*

Several pieces of New Deal legislation modified the structure and authority of the Federal Reserve System, and the environment in which it operated. The Banking Acts of 1933 and 1935 gave the Fed new powers to regulate banks and credit flows, and consolidated many existing System authorities within the Federal Reserve Board. For example, the acts authorized the Federal Reserve Board to adjust member bank reserve requirements, set maximum limits on interest rates paid by member banks on time deposits, and regulate margin requirements for purchases and holding of registered securities. They also gave the Board greater influence over reserve bank discount rates and, through a reconstituted Federal Open Market Committee, the System's open market policy.

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<sup>21</sup> Free gold was the amount of gold held by Reserve Banks in excess of that required as a reserve against their note and deposit liabilities. See Chandler (1971, pp. 182-91) and Meltzer (2003, pp. 355-57) on the extent to which a lack of free gold limited the Fed's response to the Depression.

<sup>22</sup> Eichengreen (1992), Temin (1989) and Wicker (1966) are perhaps the strongest proponents of the view that the Fed's actions during the Depression reflect primarily a desire to preserve the international gold standard. Meltzer (2003, pp. 272-82) reviews alternative explanations for Federal Reserve policy actions during the Depression.

The banking acts and various other legislation enacted during the 1930s also significantly changed the banking and financial regulatory environment. For example, the Banking Act of 1933 introduced federal deposit insurance, which the Banking Act of 1935 expanded and made permanent. Deposit insurance had been given a black eye by the poor performance of state-run deposit insurance schemes in the 1920s. However, federal insurance of bank deposits was viewed as necessary to restore confidence in the banking system and was politically popular. Moreover, the Fed's failure to be an effective lender of last resort suggested that a different approach was needed. Federal deposit insurance seemed to solve the problem of banking panics and thus eliminate the need for a lender of last resort. In the words of Friedman and Schwartz (1963, p. 440), "Adopted as a result of the widespread losses imposed by bank failures in the early 1930s, federal deposit insurance, to 1960 at least, has succeeded in achieving what had been the major objective of banking reform for at least a century, namely, the prevention of banking panics." As subsequent events beginning in the 1970s proved, however, deposit insurance did not eliminate banking or financial instability, or the Fed's willingness to take actions that it viewed as necessary as lender of last resort.

Deposit insurance is a two-edged sword. By reducing, or eliminating, any incentive for depositors to run on banks, deposit insurance can effectively prevent banking panics. However, it also reduces market discipline and encourages banks to take on greater risk than they would in the absence of insurance. The moral hazard created by deposit insurance was well understood in 1933, and Congress initially limited insurance coverage to levels that protected small depositors but did not eliminate market discipline altogether (Flood, 1992). At the same time, other measures were imposed to contain risk taking. For example, the Banking Act of 1933 prohibited the payment of interest on transactions accounts and instructed the Fed to set limits on rates banks could pay on time deposits (Regulation Q). Regulation of deposit interest rates, continued prohibition of interstate branching (and, in many states, even local branching), and a conservative chartering regime in which new bank charters were granted only when a market was shown to be underserved by existing banks, all limited competition, protected bank charter values, and thereby discouraged excessive risk taking.<sup>23</sup> Further, the Glass-Steagall Act of 1933, i.e., that part of the Banking Act of 1933 that separated commercial and investment banking, prohibited the comingling of commercial and investment banking in a single organization. The act's proponents believed that preventing commercial banks from engaging in securities-related activities would make the banking system more stable.

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<sup>23</sup> Keely (1990) shows that the level of risk among U.S. banks increased as increased competition eroded charter values.

#### IV. Financial Instability Returns

For some time after World War II, economic and financial conditions remained quite stable. Stable monetary policy was a characteristic of the environment that contributed to stability of the banking system and helped obviate the need for lender of last resort action. As noted previously, the Glass-Steagall Act of 1932 relaxed the gold standard constraint on the Fed's note issuance. The Emergency Banking Act of 1933 and Gold Reserve Act of 1934 further relaxed the gold standard constraint on monetary policy and gave the Treasury Department authority and resources to intervene in gold and foreign exchange markets. Beginning in 1933, substantial gold inflows increased the U.S. money stock and promoted economic recovery (Friedman and Schwartz, 1963; Romer, 1992). During World War II, the Federal Reserve pegged yields on short-term U.S. government securities and maintained ceiling yields on long-term government bonds. Price and wage controls and rationing were also in place throughout the war.

At the behest of the Treasury Department, the Federal Reserve continued to maintain a ceiling on long-term government bond yields into the 1950s. However, rising inflation led to an accord between the Fed and Treasury in March 1951 that restored the Fed's freedom to carry out independent monetary policy. Inflation remained low and economic fluctuations were relatively modest over the subsequent 15 years.<sup>24</sup> Few banks failed; from 1946 to 1960 there were only 42 bank failures.

Inflation began to rise in the mid-1960s amid greater political pressure on the Fed to keep interest rates low and the rising influence of Keynesian macroeconomics. Stability of the market for government securities remained a Fed objective after its 1951 accord with the Treasury Department, which frequently delayed or limited changes in monetary policy around the times when the Treasury offered securities to the market (Meltzer, 2009a). President Johnson famously browbeat Fed Chairman William McChesney Martin not to raise the Fed's discount rate in 1965, and though he resisted overt pressure, Martin believed that he had a responsibility to maintain good System relations within the government which caused him to sometimes delay moves toward tighter policy (Meltzer, 2009a, pp. 474). The rise of Keynesian macroeconomics, common acceptance of an exploitable, perhaps even favorable, tradeoff between inflation and unemployment, and of nonmonetary explanations for inflation also softened the Fed's willingness to tighten policy to halt rising inflation. Finally, the post-World War II Bretton Woods

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<sup>24</sup> See Friedman and Schwartz (1963), Calomiris and Wheelock (1998), Romer and Romer (2002), and Meltzer (2009a) for discussions of Federal Reserve monetary policy during the 1950s and early 1960s.

System of fixed exchange rates proved less constraining on expansionary monetary policy than the prewar gold standard had been (Bordo, 1993; Calomiris and Wheelock, 1998).<sup>25</sup>

Inflation and the financial regulatory environment proved to be a bad mix, especially for depository institutions and, most notably, savings and loan associations (S&Ls). Rising inflation and the Fed's efforts to resist it led to rising market interest rates and occasional "credit crunches" when depositors moved funds from depository institutions, which were subject to caps on the interest rates they could pay on deposits, to higher-yielding money market instruments. The Eurodollar market, an offshore dollar funding market, expanded rapidly as institutions sought to avoid interest rate ceilings. S&L's, which specialized in housing finance, were especially affected by rising interest rates because their assets consisted primarily of long-term, fixed-rate mortgages while their liabilities were mainly shorter-term deposits.<sup>26</sup> Regulators gradually increased deposit interest rate ceilings, which slowed the outflow of deposits from banks and S&Ls, but higher ceilings increased bank and S&L funding costs and reduced their profits.

Financial innovation introduced products that were close substitutes for the regulated deposit accounts offered by banks and S&Ls. Notably, credit union share draft accounts and money market mutual funds offered alternatives to the noninterest-bearing demand-deposit accounts offered by banks and the regulated savings and time deposits offered to small savers by both banks and S&Ls. In an effort to level the playing field, the Depository Institutions Deregulation and Monetary Control Act of 1980 (DIDMCA) and Garn-St. Germain Depository Institutions Act of 1982 permitted banks and S&Ls to offer limited forms of interest-bearing transactions accounts and automatic transfer services, expanded permissible investment opportunities for savings institutions, and phased out regulated ceilings on time and savings deposit accounts (Spong, 2000, pp. 29-30). The DIDMCA also increased federal deposit insurance coverage limits from \$40,000 to \$100,000 and permitted all depository institutions to access Federal Reserve services and lending facilities, including the discount window.

Increased competition, deregulation, and expanded deposit insurance coverage contributed to the S&L debacle and sharp increase in the number of commercial bank failures in the 1980s (FDIC, 1997). The FDIC's rescue of Continental Illinois Bank in 1984 brought the semi-official designation of banks deemed "too big to fail." Allegations that Federal Reserve loans to troubled banks had increased the costs of resolving failed banks borne by the FDIC insurance funds led to enactment of the Federal Deposit

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<sup>25</sup> See DeLong (1997), Calomiris and Wheelock (1998), Hafer and Wheelock (2003), and Meltzer (2011, pp. 472-79) for perspectives on the Fed's monetary policies in the 1960s and the origins of the Great Inflation.

<sup>26</sup> The 30-year fixed rate mortgage was another legacy of the Great Depression – specifically of the Federal Government's actions to stabilize the mortgage market (Green and Wachter, 2005).

Insurance Corporation Improvement Act of 1991 (FDICIA), which subjected the Fed to potential penalties if it exceeded specified limits on extensions of Federal Reserve credit to undercapitalized depository institutions (Gilbert et al., 2012).<sup>27</sup>

Other significant legislation in the 1990s affecting the structure and competitiveness of the banking industry included the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 and the Gramm-Leach-Bliley Act of 1999. The Riegle-Neal Act eliminated most federal barriers to interstate banking and branching, whereas the Gramm-Leach-Bliley Act allowed affiliations of banks, securities, firms and insurance companies within financial service holding companies, and thus repealed the Glass-Steagall Act of 1933. Branching deregulation increased competition in many markets, and both acts likely encouraged consolidation in the banking industry and reduced impediments to growth of individual banking organizations.

The preceding discussion summarizes the regulatory and macroeconomic environment in which the U.S. banking system operated from the mid-1930s until the financial crisis of 2008-09. The Fed's failure to act effectively as lender of last resort during the Great Depression prompted legislation that expanded the Federal Reserve's capacity to serve as a lender of last resort with the intention that it respond more to perceived credit troubles (see for instance *Federal Reserve Bulletin*, July 1934, p. 429).<sup>28</sup> The Depression experience also sparked other reforms, such as federal deposit insurance and a new system of banking regulations that reduced the need for a lender of last resort. The financial legislation of the 1930s focused on promoting stability in the banking system, and few bank failures occurred over the ensuing four decades. However, the regulatory system also limited the ability of banks to adapt to rising inflation or to compete with new financial services offered by less regulated financial firms. Deregulation enabled banks to better compete, but did not halt financial innovation or the growth of a large "shadow" banking system. Ultimately, in 2007-09, the financial system again required a strong lender of last resort.

We discuss the financial crisis of 2007-09 and the Fed's response to that crisis in the next section. First, however, we review five episodes beginning in 1970 when the Fed acted in its capacity as lender of last resort to alleviate financial disturbances. We show that these episodes 1) demonstrate a fundamental shift since the Great Depression in the System's view of its lender of last resort responsibilities, and 2) presage the Fed's response to the crisis of 2007-09.

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<sup>27</sup> FDICIA did increase the Fed's ability to respond to crises by removing the restriction that loans extended under Section 13(3) were secured by collateral "of the kinds and maturities made eligible for discount for member banks under other provisions of the Act" and only required that the advances be secured to the satisfaction of the Reserve Bank, the same test that applied to borrowings by depository institutions. See Todd (1993) for further details.

<sup>28</sup> Similar motivations led to an expansion of the mandate of the Reconstruction Finance Corporation.

## V. Response by the Federal Reserve to Financial Crises, 1970-2000

We discuss in chronological order the Fed's response to five episodes that occurred between 1970 and 2000. Our descriptions of the crises and responses are drawn from publicly available sources. For the most part, discussion of Federal Reserve concerns and actions comes from congressional testimony of Federal Reserve officials and the minutes and transcripts of the Federal Open Market Committee. Reports of market developments are generally drawn from newspaper reports, especially the *Wall Street Journal*, the *New York Times*, and the *Washington Post*.

### *Penn Central*

In 1970, the Penn Central Company (Penn Central) was the largest railroad company in the United States and through various subsidiaries owned a variety of high-profile assets (including Madison Square Garden); the firm had generally been considered a dependable blue-chip company. However, during 1969 and the early part of 1970, its income had fallen notably relative to its expenses due in part to increased operating costs and required outlays for equipment.<sup>29</sup> Further, the company had taken on significant debt to purchase and develop real estate and to acquire other corporations. Penn Central's troubles worsened notably with the release on May 9, 1970, of a prospectus for a planned bond offering. The prospectus indicated that Penn Central had a considerable amount of short- and long-term debt coming due soon and that it was having difficulty rolling over its commercial paper (Morris, Sansweet, and Williams, 1970). The extent of the difficulties reportedly surprised even investors familiar with the company.

As Penn Central's financial troubles neared a critical juncture, market participants became worried that other firms would be affected by its collapse. Penn Central was a significant issuer of commercial paper and there was reportedly some speculation that the holders of this debt might experience liquidity problems if the company proved unable to redeem its paper (Janssen and Stabler, 1970). Uncertainty about corporate credit quality and the ability of the market to absorb a large default raised worries about a possible disruption to the functioning of the commercial paper market. Nixon Administration officials and some Wall Street analysts became concerned that a collapse in the commercial paper market could cause liquidity problems for other firms (Janssen, 1970; Janssen and Stabler, 1970). Attempts by the Nixon administration to organize a rescue of Penn Central failed and Penn Central declared bankruptcy on June 21.

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<sup>29</sup> Calomiris (1994) also provides a discussion of events surrounding the collapse of Penn Central. Murray (1971) details the decline in the solvency of Penn Central.

Even prior to the events at Penn Central, Federal Reserve officials were worried about conditions in money markets; at the May 26, 1970, FOMC meeting, members expressed concern about the “crisis atmosphere” prevailing in these markets (FOMC minutes, May 26, 1970, p. 25). The anxiety in financial markets was attributed to problems in the corporate sector and to political events related to the conflict in Southeast Asia. The FOMC noted that the stresses in financial markets might have a detrimental effect on the real economy (FOMC minutes, May 26, 1970, p. 26). When Penn Central declared bankruptcy, Federal Reserve officials were concerned that the commercial paper market might decline rapidly, or possibly collapse, and that firms that depended on the market would be unable to obtain financing elsewhere. Thus, “firms that in other circumstances would be regarded as perfectly sound” would be forced to declare bankruptcy (Burns 1971, p. 402). To prevent the Penn Central collapse from spreading, and to calm financial markets, the Federal Reserve acted to bolster the capacity of alternative sources of funding for firms that might be shut out of the commercial paper market.

As part of its response to the Penn Central bankruptcy, the Board suspended interest rate ceilings (Regulation Q) for certificates of deposit of \$100,000 or more with a maturity of between 30 and 89 days to ensure that commercial banks could raise funds to make loans to firms pushed out of the commercial paper market (Burns 1971, p. 402).<sup>30</sup> This action was taken in consultation with the FDIC and Federal Home Loan Bank Board. The Federal Reserve also made clear to member banks that the discount window could and should be open for them to obtain funds to make loans for firms unable to issue commercial paper (Burns 1971, p. 402). The Fed released no official statement regarding discount window borrowing, but the *Wall Street Journal* stated that a Federal Reserve official had indicated “that the circumstances imply a liberal stance towards any bank finding if necessary to borrow temporarily from a district Reserve Bank (WSJ 1970).”

The Fed’s actions caught most market participants by surprise but were generally hailed as constructive.<sup>31</sup> Banks took immediate advantage of the suspension of Regulation Q; rates reported in the *Wall Street Journal* on 30-59 day CDs issued by New York banks jumped by 1.5 percentage points on the day that the regulation was suspended and remained at the higher level. Commercial paper outstanding declined following Penn Central’s bankruptcy announcement but commercial and industrial (C&I)

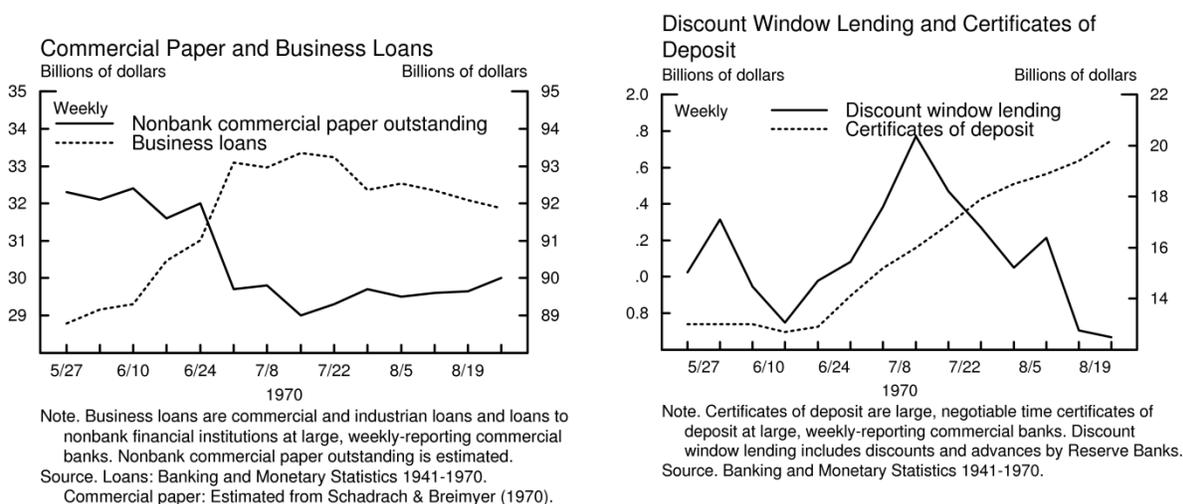
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<sup>30</sup> Fed officials quickly decided that suspending Regulation Q was an appropriate response, but were concerned that the action could be inflationary. The FOMC ultimately decided that the new CDs would likely attract the money that would otherwise have funded commercial paper, and thus would have little effect on the expansion of credit or inflation (FOMC minutes, June 23, 1970, p. 61).

<sup>31</sup> There had been some discussion in the *Wall Street Journal* that the Federal Reserve would act as a lender of last resort (Janssen and Stabler 1970). However, the articles discussing the lender of last resort option focused on the possibility that aid would be focused on rescuing Penn Central rather than on providing liquidity to the market as a whole.

lending rose by about the same amount that commercial paper decreased. Banks were able to fund the increase in C&I loans first by borrowing temporarily at the discount window and subsequently, with the suspension of Regulation Q, by attracting depositors to certificates of deposit (see Figure 1).<sup>32</sup> The spread between the yields on four- to six-month prime commercial paper and six-month Treasury bills widened following the Penn Central bankruptcy, likely due to risk-aversion in the commercial paper market and safe-haven flows to government debt. However, this increase in the spread was soon reversed as markets stabilized.

**Figure 1**



The Fed's response to the Penn Central bankruptcy reflected a notable shift in thinking within the Fed regarding how it should respond to financial instability. By 1970, Fed officials had determined that they should act to prevent financial instability from affecting economic activity even if that instability originated outside the banking system. Federal Reserve chairman Arthur Burns later summarized the Fed's response to the Penn Central bankruptcy as follows:

Last spring, within a few months after I assumed my present duties, financial markets suffered an erosion of confidence severe enough to cause widespread concern that the country might face a liquidity crisis—a situation in which even creditworthy firms might be unable to borrow the funds they needed to carry on their business.

The sharpest contraction of credit came in the commercial paper market, following the insolvency of the Penn Central Transportation Company, a prominent borrower in that market. Since commercial paper is wholly unsecured, investors backed away from issuers about which there was any question. Concern spread throughout the credit markets, fed

<sup>32</sup> Prior to the relaxation of Regulation Q, rates on 30-59 day certificates of deposit reported in the Wall Street Journal for New York banks were notably below those on comparable maturity commercial paper.

by fears that some borrowers might be unable to obtain sufficient credit from alternative sources to refinance maturing commercial paper and thus be forced into bankruptcy. With investors generally becoming more cautious, companies with credit ratings less than Aaa experienced increased difficulty in borrowing through the bond market, as was evidenced by the sharp widening of spreads in the structure of corporate bond yields. In short, there appeared to be a risk of bankruptcies spreading to firms that in other circumstances would be regarded as perfectly sound.

Confronted with an incipient crisis, the Federal Reserve System acted promptly to assure the availability of loanable funds to meet the credit needs of firms that were being squeezed by the contraction of the commercial paper market. First, the System made it clear to member banks that the discount window would be available to assist them in meeting such needs. Second, the Board suspended ceilings on the rates of interest member banks could pay on certificates of deposit of \$100,000 or more. In this way banks were placed in a much better position to attract funds to lend to their hard-pressed customers. These two actions helped to restore confidence, and fear of a liquidity crisis abated. We can all take comfort from the fact that the money and credit markets met the tests of mid-1970 successfully. (Burns, 1971)

### *Franklin National*

Between the 1950s and 1970s, Franklin National Bank expanded from being a modest-sized regional bank focused in Long Island to the nation's 20<sup>th</sup> largest bank. It opened offices internationally in London, England and Nassau, the Bahamas (Brimmer, 1976). Franklin worked to expand market share by making loans to riskier borrowers at below market rates. In the year prior to the crisis, Franklin's assets had surged 29 percent to \$4.9 billion (Spero, 1980).<sup>33</sup> During this period, the bank's capital increased by less than 0.5 percent while its domestic core deposits *decreased* by over 5 percent. The bank funded its expansion through money markets, with about one-sixth of its liabilities consisting of federal funds (Sinkey, 1975). Foreign deposits were also an important funding source. Reportedly, Franklin was willing to pay slightly above market rates to fund its expanding balance sheet.

Even before the crisis, both market participants and regulators had grown increasingly concerned about Franklin (Spero, 1980). The OCC, Franklin's primary regulator, urged the bank to undertake a sizable retrenchment program. Federal Reserve officials were concerned about weak management, chronic capital deficiencies, excessive reliance on short-term borrowings, and escalating loan losses (Brimmer, 1976).

On Tuesday, May 7, Franklin told regulators that "unauthorized" trading had caused the bank to incur severe losses in its foreign exchange department. During this week, the bank started borrowing from the Federal Reserve (Brimmer, 1976). On Friday, May 10, the bank announced that it was omitting its

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<sup>33</sup> Adjusted for inflation, the bank would have roughly \$20 billion in assets today.

second quarter dividend because of poor earnings prospects. Reportedly, this was the first dividend omission by a major bank since the 1930s, which further contributed to investor concerns about the health of the bank.<sup>34</sup>

Over the weekend, the Federal Reserve, Treasury Department, and the FDIC agreed that the Federal Reserve should use the discount window to meet any expected funding difficulties necessary to keep Franklin afloat (Brimmer 1976, pp. 127-28). This decision was made in part out of concern that a failure of Franklin would destabilize money markets and possibly cause the failure of other banks (Burns, 1974a). Following its meeting with the Treasury Department and FDIC, the Federal Reserve issued a statement indicating that it was familiar with the troubles at the bank, that it was monitoring the situation, that Franklin had a large amount of acceptable collateral, and that—as with all member banks—the Federal Reserve stood ready to advance funds should the bank experience liquidity problems.

Efforts to support Franklin were also motivated by the bank's foreign exchange positions (Burns 1974b). In June 1974, German authorities closed the Herstatt Bank. The closure rattled foreign exchange markets because at the time of its closure Herstatt had received funds through foreign exchange transactions but had not yet delivered on its legs of the transactions. Franklin was more active in these markets than Herstatt and had large open foreign exchange forward contracts. U.S. regulators were concerned that a failure by Franklin to meet its obligations would substantially disrupt market functioning. Newspaper reports indicated that bid-ask spreads in foreign exchange markets had widened considerably amid the troubles at Herstatt and Franklin.<sup>35</sup> Further, the Federal Reserve noted that the value of the German mark had fallen following the Herstatt failure and feared a similar decline in the dollar if the Franklin contracts were dishonored (Spero, 1980).

As anticipated, Franklin lost access to private sources of funding—its domestic deposits, federal funds purchased, money market CDs, and foreign deposits all declined. Franklin offset most of these outflows by borrowing heavily at the Fed's discount window (Brimmer, 1976).

Even before Franklin's foreign exchange losses and unauthorized trades became public knowledge in May, many banks in foreign exchange markets reportedly had limited, or stopped altogether, their transactions with Franklin. Franklin started to wind down its foreign exchange operations following the public disclosure of its earnings problems. Still, in September, Franklin had over 300

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<sup>34</sup> The bank subsequently reported a substantial foreign exchange loss, large operating losses, increasing amounts of classified assets, and depreciation in the value of its bond portfolio. Trading in the firm's stock was suspended on May 13.

<sup>35</sup> "Bank Foreign Exchange Departments Reducing Their Speculative Positions," *Journal of Commerce*, June 5, 1974.

forward contracts yet to be fulfilled across a range of currencies (Burns, 1974b). To prevent Franklin from failing to honor its commitments, the Federal Reserve Bank of New York assumed Franklin's foreign exchange positions after consultations between the Federal Reserve Board, the Treasury, and others. The New York Fed purchased Franklin's foreign exchange balances, amounting to the equivalent of \$31.7 million, and acquired Franklin's forward foreign exchange contracts totaling approximately \$725 million. These forward positions were gradually wound down. Franklin paid \$16 million to the New York Fed to cover the estimated book loss of its positions and potential counterparty risks involved with the foreign exchange book. Franklin's agreement with the New York Fed stated that Franklin would indemnify the New York Fed for any losses in excess of the original estimate, and that any residual balances would be returned to Franklin if realized losses proved less than estimated.<sup>36</sup>

Resolving Franklin's problems posed numerous difficulties. As early as May, efforts were made to find a merger partner for Franklin, but the potential losses from Franklin's loan portfolio and foreign exchange exposures dissuaded potential buyers. It took several months for the FDIC to put together a package that would attract bidders for Franklin. The Comptroller officially closed the bank on October 8, 1974. The FDIC, as receiver, auctioned the bank for sale that day and entered into a purchase-and-assumption agreement with the winner, the European-American Bank. Franklin had an outstanding discount window loan of about \$1.7 billion when it closed (Sinkey, 1975). The FDIC assumed the loan—the first time such an action was taken (Spero, 1980).

#### *Continental Illinois National Bank*

In 1984, Continental Illinois National Bank (Continental) was the eighth-largest bank in the United States overall and the largest commercial and industrial (C&I) lender.<sup>37</sup> Over the preceding decade, Continental had aggressively expanded its C&I loan portfolio, especially to energy firms. During this period, the bank's business practices were hailed as exemplary with the manager of bank research at Salomon Brothers reporting that "[i]t's one of the finest managed money-centre banks going" (*Euromoney* 1981, p. 134). Moody's Investor Service rated the long-term debt of Continental's holding company Aaa in 1981 (Moody's 1981). Later assessments, however, suggested that the bank's lending standards were lax. Its loans to energy firms proved risky and the bank incurred heavy losses on them.

Continental did not have a large retail banking business; as of December 1983, core deposits comprised less than 20 percent of the bank's liabilities. Continental relied heavily on institutional

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<sup>36</sup> Part of the payment was to compensate the New York Fed for the risk that some counterparties would not accept the New York Fed's assumption of the contracts. Once the New York Fed was able to confirm with various counterparties that it had assumed the contracts, it returned this portion of the payment to Franklin.

<sup>37</sup> See also FDIC (1997, 1998) for a detailed history of the events surrounding the troubles at Continental.

depositors to meet its funding needs. Over time, domestic institutions became somewhat more hesitant to lend to Continental, and the bank became more dependent on foreign deposits (Moody's, 1983). By the end of 1983, over 40 percent of the bank's liabilities consisted of foreign deposits. This reliance on managed liabilities made the firm particularly exposed to deterioration in market sentiment (FDIC, 1997).

In early May 1984, concerns about Continental's financial health in the wake of its loan losses resulted in increasing funding difficulties as investors either refused to roll over their Eurodollar deposits or demanded significantly higher rates for renewing them. The *Wall Street Journal* reported that Continental also had difficulty placing large CDs and that investors had tried to dump their Continental CDs in the secondary market (Bailey and Zaslav, 1984). Rumors about the bank's funding problems appear to have been partly self-fulfilling in that reports about Continental's funding difficulties led investors to refuse to roll over the bank's other debts as they came due. On May 9, Continental turned to the discount window (Kilborn, 1984; Rowe, 1984). By Friday May 11, its borrowing from the Fed had reached about \$3.5 billion (FDIC, 1997).

The banking industry rallied to support Continental, and on Monday, May 14, Continental announced that sixteen of the nation's largest commercial banks had agreed to provide it with \$4.5 billion in short-term credit (Bailey, Carrington, and Hertzberg, 1984). This action reportedly calmed market participants temporarily, but the run on Continental continued as the bank's CDs were not renewed and its Eurodollar funding continued to be withdrawn (FDIC, 1997; Sprague 1986, p.154).

On May 17, the FDIC, Federal Reserve, and OCC announced a temporary assistance plan for Continental in cooperation with a group of commercial banks. The FDIC guaranteed all of the bank's deposits and general creditors. Absent the expanded guarantee, most of Continental's depositors and creditors would not have been insured; the FDIC (1998) reported that at this point Continental had about \$3 billion of insured liabilities and \$30 billion of uninsured liabilities. The FDIC also injected \$1.5 billion into the bank in the form of subordinated notes with commercial banks adding another \$0.5 billion. The Federal Reserve indicated that it would meet any extraordinary liquidity needs of Continental.<sup>38</sup> The short-term credit facility from commercial banks initiated on May 14 was replaced by a \$5.3 billion line of credit to Continental from a group of twenty banks.

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<sup>38</sup> There is some possibility that the liquidity support provided by the Federal Reserve was interpreted more expansively than was intended. The press release issued by the regulatory agencies indicated that "in accordance with customary arrangements, the Federal Reserve is prepared to meet any extraordinary liquidity requirements of the Continental Illinois bank." Thus, the press release affirmed the ability of Continental to borrow from the discount window, provided that it had sufficient collateral. The *New York Times* article describing the assistance package reported that "The Federal Reserve had promised Continental an unrestricted lifeline of loans at the Federal Reserve's otherwise tightly controlled discount window (Kilborn 1984)," which might have been interpreted as suggesting that Continental had special access to the window.

The initial rescue plan was successful in slowing the run on Continental, and the bank's borrowing at the discount window eased. Newspaper articles reported that the FDIC's guarantee of all deposits was the primary reason that depositors were willing to keep their resources with the bank (WSJ 1984).

Regulators claimed that their extraordinary response to Continental's financial problems was motivated importantly by their concern that the bank's failure would result in a systemic financial crisis that might call into question the condition and liquidity of other large banks.<sup>39</sup> FDIC Director Sprague, for example, reported that a collapse of Continental would cause funding difficulties at other large banks and likely bring down two large (unnamed) institutions (Sprague 1986, p. 155).<sup>40</sup> The funding difficulties at Continental did lead to widening risk spreads at other large banks; the *Wall Street Journal* reported:

At the Chicago Mercantile Exchange's International Money Market, the normally tight price spread between Treasury bill futures contracts and those on bank CDs and Eurodollars has been widening all week on rumors that Continental's problems had worsened.

The widening of the spread came even though Continental's CDs aren't among those issued by major banks and traded interchangeably; Continental removed itself from this trading a few years earlier (Bailey and Zaslow 1984).

Continental also had numerous correspondent banks and the FDIC maintained that some of these banks might fail if their deposits with Continental were not guaranteed.

In July 1984, a permanent assistance plan for Continental was announced (FDIC 1998). Under the plan, the FDIC received loans held by Continental worth \$3.5 billion in exchange for assuming an outstanding \$3.5 billion discount window loan that Continental had from the Federal Reserve. The FDIC also acquired \$1 billion in preferred stock in Continental's holding company (an 80 percent stake), which was down-streamed to the bank in the form of equity. Further, the FDIC received the option to buy stock of the holding company at a rate that depended on the recovery rate on the loans bought by the FDIC. The FDIC also arranged to have the management of the bank and its holding company replaced.

The Federal Reserve agreed to continue to provide liquidity assistance to Continental (and the commercial banks continued to extend a line of credit), and reached a memorandum of understanding

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<sup>39</sup> See for example the testimony by Comptroller of the Currency Conover and FDIC Chairman Isaac before the House Subcommittee on Financial Institutions Supervision, Regulation, and Insurance on September 19 and October 4, 1984 as well as comments by Federal Reserve Chairman Volcker before the Senate on Banking, Housing and Urban Affairs on July 25, 1984.

<sup>40</sup> Wall and Peterson (1990) look at abnormal stock returns on the stocks of other large banks and argue that they find little evidence to support the idea that markets were concerned about runs at other banks. They do, however, find negative returns at some banks prior to the guarantee of deposits by the FDIC which suggests that there may have been some concern about the condition of other banks.

with the holding company requiring it to develop a plan to reduce its consolidated assets and preserve the firm's capital (Federal Reserve Board, 1984).

### *The 1987 Stock Market Crash*

Stock markets had already experienced a notable decline in the days leading up to the crash. Stocks declined broadly on October 14, the Wednesday preceding the crash, reportedly because of the introduction of legislation in the U.S. House of Representatives to eliminate tax benefits associated with financing mergers and the announcement of an increase in the U.S. trade deficit, which many expected would lead to a decline in the dollar and a tightening of monetary policy by the Federal Reserve (Securities and Exchange Commission (SEC) Report 1988, p. 3-10, WSJ 1987a). Equity markets continued to decline on Thursday and Friday. The S&P 500 declined over nine percent for the week—one of the largest one-week declines in two decades—and helped set the stage for the turmoil the following week (WSJ 1987b). Investors using a trading strategy referred to as “portfolio insurance” were left with an overhang as their models suggested that they should sell more stocks or futures contracts (SEC Report 1988, p. 2-10).<sup>41</sup> Mutual funds experienced redemptions and needed to sell shares (Brady Report—The Presidential Task Force on Market Mechanisms—1988, p. 29). Further, some aggressive institutions anticipated the portfolio insurance sales and mutual fund redemptions and wanted to preempt the sales by selling first (Brady Report 1988, p. 29; SEC Report 1988, p. 3-12).

### Monday, October 19, 1987

Substantial selling pressure on the New York Stock Exchange (NYSE) resumed at the open on Monday with a large imbalance in the number of sell orders relative to buy orders (SEC Report 1988, p. 2-13). Many specialists did not open for trading during the first hour. The SEC noted that “by 10:00, 95 S&P stocks, representing 30% of the index value, were still not open (1988, p. 2-13).” As stocks opened notably lower, portfolio insurers' models prompted them to resume sales. These institutions sold in both the cash and futures markets rather than just in the futures market as was typically the practice (SEC Report 1988, pp. 2-15). The Dow Jones Industrial Average, S&P 500, and Wilshire 5000 declined between 18 and 23 percent on the day amid deteriorating trading conditions (Brady Report 1988, Study III, p. 21). The record trading volume on Oct. 19 overwhelmed many systems. On the NYSE, for

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<sup>41</sup> The “portfolio insurance” trading strategy was supposed to limit the losses investors might face from a declining market. Computer models were used to compute optimal stock-to-cash ratios at various market prices. Broadly, the models would suggest that the investor decrease the weight on stocks during falling markets, thereby reducing exposure to the falling market, while during rising markets the models would suggest an increased weight on stocks. Buying portfolio insurance was similar to buying a put option in that it allowed investors to preserve upside gains but limit downside risk. In practice, many portfolio insurers conducted their operations in the futures market rather than in the cash market as it was less costly (Brady Report 1988, p. 7).

example, trade executions were reported more than an hour late, which reportedly caused confusion among traders. Investors did not know whether limit orders had been executed or whether new limits needed to be set (Brady Report 1988, Study III, p. 21).

#### Tuesday, October 20, 1987

Before the opening of financial markets on Tuesday, the Federal Reserve issued a short statement that said: “The Federal Reserve, consistent with its responsibilities as the Nation’s central bank, affirmed today its readiness to serve as a source of liquidity to support the economic and financial system.” This statement reportedly contributed significantly toward improving market sentiment (Murray, 1987), and despite precipitous declines in foreign stock markets overnight, the NYSE rebounded at the open (Brady Report 1988, p. 36-40). Still, trading remained significantly impaired. Over the course of the day, about seven percent of stocks, including some of the most active, were closed for trading by the specialists as order imbalances made maintaining orderly markets difficult (Brady Report 1988, p. 45).

Before it opens, the Chicago Mercantile Exchange (CME) clearinghouse collects margin payments from members to cover losses that occurred during the previous day on their open positions. Margin payments are then made to members for open positions in which the value improved the previous day. Typically these payments are completed by noon. On October 20, two CME clearinghouse members had not received margin payments due to them by noon, which precipitated rumors about the solvency of the CME and its ability to make these payments. The rumors proved unfounded but nevertheless reportedly deterred some investors from trading on the CME (Brady Report 1988, p. 40). Bid-ask spreads widened, and trading was characterized as disorderly (Brady Report, Study VI, pp. 64-65).

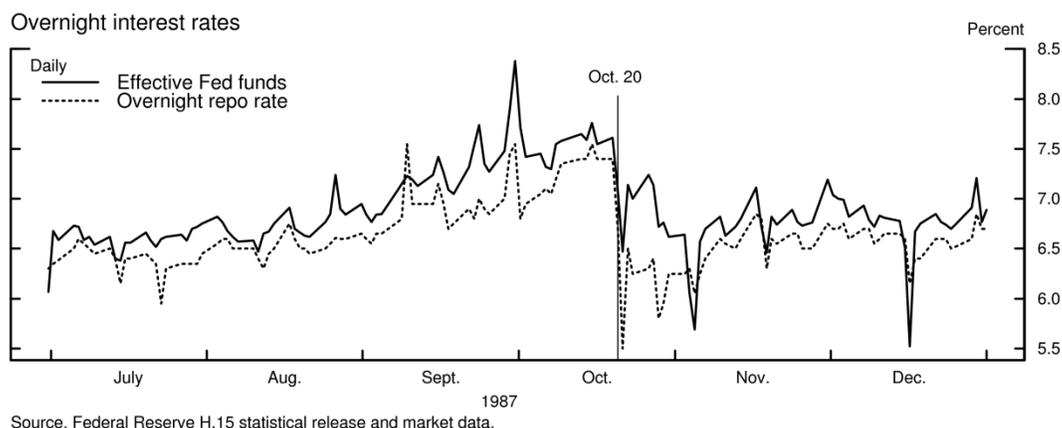
With the number of trading halts for individual stocks on the NYSE and the possibility that the exchange might close, trading of many stock-index derivative products was suspended on the Chicago Board Options Exchange at 11:45 am and on the CME at 12:15 pm (SEC Report 1988, p. 2-20). These exchanges reopened around 1:00 pm. Later in the afternoon, there was a sustained rise in equity prices as corporations announced stock buyback programs to support demand for their stocks (Brady Report 1988, p. 41). Corporations had started announcing these programs Monday afternoon but it was apparently not until partway through Tuesday that a critical mass had formed.

#### Federal Reserve Response

In an effort to restrain the declines in financial markets and to prevent any spillovers to the real economy, the Federal Reserve acted to provide liquidity to the financial system and did so in a high profile manner that was intended to boost confidence. One of the Fed’s most prominent actions was the

issuance of the previously noted statement on Tuesday morning. This statement was referred to by one market participant as “the most calming thing that was said [Tuesday]” (Murray 1987). The Federal Reserve followed-up the statement by carrying out open market operations that pushed the federal funds rate down to near 7 percent on Tuesday from over 7.5 percent on Monday (see Figure 2).

**Figure 2**



The action was taken to “provide significant liquidity to relieve the turbulence and tension in the wake of the financial market upheaval” (FOMC transcripts, meeting of Nov. 3, 1987, comments by Peter Sternlight, p. 2). Other short-term interest rates followed the federal funds rate lower, thereby reducing costs for borrowers. The Federal Reserve continued to inject reserves over the next several weeks to buoy liquidity in financial markets. Moreover, open market operations were conducted in a high profile manner, frequently conducted an hour or more before the normally scheduled market intervention period, in order to underscore to market participants that the Federal Reserve was providing liquidity support (FOMC transcripts, meeting of Nov. 3, 1987, comments by Peter Sternlight, p. 3; Winkler, 1987).

The Federal Reserve also worked with banks and securities firms to ensure that credit was extended to support the liquidity and funding needs of brokers and dealers. The sharp price movements on October 19 on futures contracts resulted in record margin calls for members of the CME clearinghouse. The end-of-day margin calls for October 19 needed to be met before the start of business on the morning of October 20. To meet these calls, clearinghouse member firms drew on their credit lines with the four banks that provided settlement services for the CME. These banks were reportedly concerned as the margin calls exceeded lending limits and increased their exposure to the securities industry at a point

when financial markets were tumbling. To help make the extensions of credit and transfers of funds proceed smoothly, the Federal Reserve Banks of Chicago and New York reportedly let commercial banks in both districts know that the Federal Reserve would help provide liquidity for the loans and intraday credit to brokers. Due in part to these efforts, the settlement banks extended the necessary credit and the accounts for CME clearinghouse members were fully funded by market opening. In testimony given in 1994 to the Senate Banking Committee, Chairman Greenspan indicated that “[t]elephone calls placed by officials of the Federal Reserve Bank of New York to senior management of the major New York City banks helped to assure a continuing supply of credit to the clearinghouse members, which enabled those members to make the necessary margin payments” (Greenspan 1994, p. 137).

Government, and in particular U.S. Treasury, securities are often used as collateral in repurchase agreements and other financial contracts (and can also be pledged to satisfy margin calls). Trading and lending these securities is an important source of market liquidity. After the stock market crash, holders of government securities were somewhat reluctant to lend them as freely as normal, possibly owing to concerns about counterparty risk, which led to scarcity of some securities and a rise in fails to deliver (Greenspan 1988, p. 92). To enhance liquidity in the government securities market, the Federal Reserve temporarily liberalized the rules governing lending of securities from its portfolio by suspending the per issue and per dealer limits on the amount of loans (FOMC transcripts, meeting of Nov. 3, 1987, presentation by Peter Sternlight, p. 7).

The Federal Reserve and other agencies also took a variety of supervisory actions to ensure the soundness of the financial system. The Fed placed examiners in major banking institutions and monitored developments, in part to identify potential runs as well as to assess the banking industry’s credit exposure to securities firms (Greenspan 1988, pp. 90-92). The Fed’s monitoring efforts went beyond the banking industry and included stepped up daily monitoring of the government securities markets and of the health of primary dealer and inter-dealer brokers.

### *Long Term Capital Management*

Long Term Capital Management (LTCM) was a hedge fund founded in 1994 by John Meriwether, a former executive at Salomon Brothers. A number of traders from Salomon Brothers’ Arbitrage Desk joined LTCM as did Robert Merton and Myron Scholes, two important figures in finance who won the Nobel Prize in Economics in 1997. Over its first three years, the hedge fund consistently had high profits, with a return on equity of over 40 percent in 1995 and 1996 and a solid, though lower, 17 percent in 1997 (Siconolfi, Raghavan, and Pacelle, 1998). The fund’s usual, though not exclusive, investment strategy was to use models to identify deviations from historical relationships in the prices of

financial contracts and then enter positions that would pay out as the anomalies disappeared (Edwards, 1999). A frequent bet was that the yields on different interest rate contracts would converge. Typically the price discrepancies exploited by LTCM were small and the firm used substantial leverage to profit from these opportunities. With the pedigree of its staff and its high returns, other financial institutions reportedly were convinced that interacting with LTCM involved minimal risk (Lowenstein 2000, pp. 44-48). Institutions also competed to do business with LTCM, partly because they hoped to learn about the highly-profitable firm's positions. Thus, the firm was able to get exceptionally low cost financing and operate with high leverage.

LTCM began to incur losses during the Asian crisis in 1997, which worsened considerably with the Russian default in 1998. Following the Asian crisis and into 1998, risk spreads widened and implied volatility in asset markets increased. LTCM viewed the level of spreads and volatility as out of line with historical experience and took positions that would profit if spreads narrowed and implied volatilities declined (Lowenstein 2000, pp. 124-146, 187-188). Instead, risk spreads widened and implied volatilities surged following the Russian default as investors rushed to Treasury securities, the preferred safe-haven security. Although LTCM reportedly had tested its positions for possible loss, its models were based on historical patterns in the data and did not anticipate the size of the movements in asset prices that followed the Russian default (Dunbar 2000, pp.202-207). Given the fund's high leverage, these losses quickly eroded its capital (Edwards 1999). As LTCM's losses mounted, its counterparties began to tighten margin and collateral requirements so that the firm's liquidity started to dry up (Lipin, Murray, and Schlesinger, 1998).

Meriweather attempted to raise additional capital in an effort to shore up LTCM's capital position. In mid-September, LTCM officials informed the Federal Reserve Bank of New York that its efforts to raise capital had stalled and that the fund's position was continuing to deteriorate. New York Fed President William McDonough testified to the House Committee on Banking and Financial Services that market participants had informed New York Fed staff that the deterioration of LTCM was negatively affecting financial markets (McDonough 1998, p. 18).

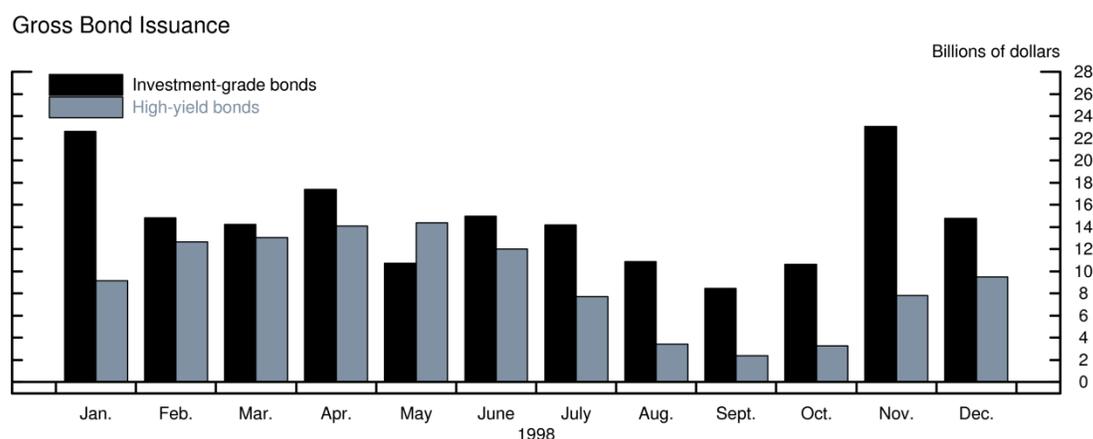
Fed officials determined that, given the stress already apparent in financial markets, the failure of LTCM could pose a significant systemic shock and that the Federal Reserve should help facilitate a resolution of the hedge fund's problems. As noted by Chairman Greenspan in testimony before the House Committee on Banking and Financial Services, "[w]ith credit spreads already elevated and the market prices of risky assets under considerable downward pressure, Federal Reserve officials moved more quickly to provide their good offices to help resolve the affairs of LTCM than would have been the case

in more normal times” (Greenspan 1998, p.23). As noted above, following the Russian default, many markets were already exhibiting high levels of stress. With the already somewhat fragile state of financial markets, officials were concerned about spillover to other financial markets and institutions—both direct counterparties of LTCM and others that may have had similar market positions. Chairman Greenspan noted in his testimony that:

The act of unwinding LTCM’s portfolio in a forced liquidation would not only have a significant distorting impact on market prices but also in the process could produce large losses, or worse, for a number of creditors and counterparties, and for other market participants who were not directly involved with LTCM. (Greenspan 1998, p. 24)

A further concern was that the distress in financial markets could have broader negative impact on the U.S. economy. With the elevated risk premiums in bond markets pushing up yields on corporate bonds, especially junk bonds, issuance declined (see Figure 3); similarly, the *Wall Street Journal* noted, “[n]ew issuance of junk bonds has almost ground to a halt after a nervous tone gripped the market last week...Volatility and sharp plunges in the stock market last week cast such a negative tone that many issuers preferred to postpone their deals rather than pay higher interest rates” (Zuckerman, 1998). Federal Reserve officials were concerned that liquidating LTCM might further disrupt the ability of firms to raise money in financial markets; “This [liquidation of LTCM] would have caused a vicious cycle: a loss of investor confidence, leading to a rush out of private credits, leading to a further widening of credit spreads, leading to further liquidations of positions, and so on. Most importantly, this would have led to further increases in the cost of capital to American businesses” (McDonough 1998, p. 19).

**Figure 3**



On September 23, sixteen large financial institutions met at the Federal Reserve Bank of New York where they reviewed the position of LTCM, the possible effects on markets if it were liquidated, and options for resolving the situation (Lowenstein 2000, pp. 201-208). Some banks reportedly expressed surprise when they learned the extent of LTCM's positions (Corrigan and Lewis, 1998; Mufson and Dugan, 1998). After some discussion, the banks decided to establish a consortium that would recapitalize LTCM and agreed in principle to inject \$3.5 billion into the hedge fund (Raghavan and Pacelle, 1998). Fourteen banks, all but two of the banks that attended the meeting, agreed to participate in the consortium (Dunbar 2000, pp. 222-223). The largest banks nominated a committee to oversee LTCM and the unwinding of its positions (Morgenson, 1998). LTCM was considered too complex for outsiders to step into managing the positions. Thus, to give management an incentive to stay and liquidate the fund, existing investors, many of whom were LTCM managers, maintained one-tenth of the equity of the fund (Morgenson, 1998; Lowenstein, 2000, pp. 205-206).

## **VI. Response to the Financial Crisis of 2007-2009**

The recent financial crisis was more severe than any episode since at least the 1930s. The Fed's response to the crisis dwarfed any of its actions in previous crises, but many were anticipated by prior actions. Here we briefly review the Fed's response to the recent crisis and then discuss the parallels with other episodes.

### *Brief Review of Actions Taken During the Recent Crisis*

At the onset of the crisis, the Federal Reserve responded to the rising strains in interbank funding markets with only minor modifications of its traditional tools for providing liquidity to financial markets. Monetary policy was eased swiftly, beginning in September 2007 with a reduction in the target federal funds rate of 50 basis points from 5.25 percent to 4.75 percent.<sup>42</sup> The terms on the main discount window related program, the primary credit facility, were also progressively eased as the crisis deepened. The penalty on discount window loans, normally 100 basis points over the federal funds target rate, was cut to 25 basis points. Further, the maximum maturity of discount window loans was extended from overnight to 90 days and loans could be renewed at the discretion of the borrower.

As the crisis deepened and the condition of interbank markets deteriorated further, the Federal Reserve established other programs to facilitate access by banks to central bank credit.<sup>43</sup> The Term

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<sup>42</sup> In October 2008, as the crisis became most intense, the policy rate was reduced to 1 percent. In December 2008, the target rate was reduced further, to a range of 0 to 25 basis points.

<sup>43</sup> Summaries of the credit and liquidity programs introduced by the Federal Reserve during the crisis are available from the Board of Governors of the Federal Reserve System ([www.federalreserve.gov/monetarypolicy/bst.htm](http://www.federalreserve.gov/monetarypolicy/bst.htm)).

Auction Facility (or TAF) was the first such program. Under TAF, the Fed auctioned credit to depository institutions for terms of up to three months. The rate banks paid to borrow was determined by the auction process, subject to a floor. The Fed established the TAF in part because the volume of discount window borrowing had remained low despite persistent stress in interbank funding markets, apparently because of a perceived stigma associated with borrowing at the discount window. Possibly because of the auction format and the time between the auction date and the settlement date, the TAF offered a source of term funds without associated stigma. Later in the crisis, the FDIC supported efforts by depository institutions to maintain their liquidity by insuring all transaction deposits, raising the insurance limit for other types of deposits, and, for a fee, providing insurance for bonds issued by depository institutions (the latter being part of the Temporary Liquidity Guarantee Program).

As part of its typical operating framework, the Federal Reserve lends securities to primary dealers from the system open market portfolio; this lending program typically supports market functioning in secured money markets by expanding access to individual securities for which there is exceptional demand. During the crisis, The Fed eased terms on this regular securities lending program by reducing the rate charged for borrowing securities. Additionally, the Federal Reserve established an auction facility to lend Treasury securities to dealers for periods of a month against other Treasury securities, agency securities, agency mortgage-backed securities, as well as against highly-rated private securities. (The latter part of this program was done under Section 13(3) of the Federal Reserve Act through a program referred to as the Term Secured Lending Facility, or TSLF.) The Fed provided additional support to the primary dealers via direct loans through the Primary Dealer Credit Facility, or PDCF (another program established under Section 13(3) of the Federal Reserve Act).

Given the global nature of interbank markets, and the importance of the dollar in these markets, the Federal Reserve entered into bilateral currency swap agreements with foreign central banks. The number and size of these swap agreements increased as the crisis worsened. These facilities enabled the foreign central banks to acquire dollars from the Federal Reserve which they could then lend to banks in their jurisdictions. These swap agreements helped to ease conditions in dollar funding markets globally.

Commercial paper markets are critical sources of short-term funding for many financial and non-financial institutions. These markets came under severe pressure during the financial crisis, especially after a money market mutual fund (Reserve Primary Fund) that had been an important supplier of funds in the markets “broke the buck” following the collapse of Lehman Brothers. The Federal Reserve established a variety of programs to address strains in commercial paper markets and the liquidity pressures faced by money market mutual funds that faced heavy investor withdrawals. For example, the

Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, or AMLF, assisted money funds by providing loans to depository institutions and bank holding companies to fund purchases of high-quality asset-backed commercial paper from money market mutual funds. Another program, the Commercial Paper Funding Facility, or CPFF, provided a more direct liquidity backstop to the commercial paper market by providing funding to a specially created limited liability company that could purchase three-month unsecured and asset-backed commercial paper directly from eligible issuers. Support to the money market mutual fund industry also came from the Treasury Department which guaranteed investments in money funds.

The Term Asset-Backed Securities Loan Facility (or TALF) was yet another program designed to address strains in key financial markets and in particular the market for asset-backed securities. The TALF issued loans to finance purchases of eligible asset-backed securities (ABS) for terms up to five years. ABS had been an important source of funding for the makers of automobile loans and credit card loans that largely collapsed during the crisis. The TALF was intended to assist the financial markets in accommodating the credit needs of consumers and businesses of all sizes by facilitating the issuance of ABS collateralized by a variety of consumer and business loans.

The Federal Reserve also provided support directly to specific non-depository financial institutions. The Fed facilitated the acquisition of Bear Stearns by JP Morgan Chase & Co. by extending a loan to a limited liability company established to acquire certain assets of Bear Stearns. The Fed also extended a loan to American International Group, Inc. (AIG) after the officials determined that, given the circumstances in financial markets at the time, “a disorderly failure of AIG could add to the already significant levels of financial market fragility and lead to substantially higher borrowing costs, reduced household wealth, and materially weaker economic performance” (Federal Reserve Board, 2008).

The extraordinary liquidity provision by the Federal Reserve helped reduce systemic risk by assuring market participants that, should short-term investors begin to lose confidence, financial institutions would be able to meet demands for cash without resorting to potentially destabilizing fire sales of assets. As the functioning in financial markets normalized and the liquidity troubles of financial institutions waned, these extraordinary facilities were gradually wound down and terms on standing facilities normalized.

Given the topic of this paper, in this section we have focused just on programs that are tied to lender of last resort actions, especially those conducted by the Federal Reserve. There were a number of other programs that were introduced by different government agencies during the financial crisis. For instance, the Treasury Department injected equity capital directly into financial institutions through the

purchase of preferred stock and the FDIC provided a number of temporary expansions to its usual deposit insurance program.

*Relation to Federal Reserve responses to preceding crises*

Since the Great Depression, the Federal Reserve has shown increased willingness to respond to disruptions in financial market functioning outside the banking sector, and the Fed's responses to episodes from 1970 to 2000 in many ways anticipate some of its responses to the recent crisis. For instance, the Fed's response to the problems in the commercial paper market during 2007-09 built on the actions taken during 1970. In the earlier episode, the Fed lifted deposit interest rate ceilings to provide a means by which banks could fill a funding gap caused by collapse of the commercial paper market. In the recent crisis, the Fed again sought to enable banks to backstop the money market mutual fund industry and thus indirectly the commercial paper market (which was under pressure due to the run on the money market mutual fund industry) through the AMLF. However, given the pressures that banks already faced, the Fed also opted to provide direct support to the commercial paper market through the CPFF. This type of assistance to non-financial institutions did not have precedence in the response to financial crises since 1970, but does resemble the lending conducted in the 1930s through the Section 13(3), Section 13(13) and Section 13(b) programs arranged at that time.

During previous episodes of market stress, such as following the 1987 stock market crash, the Federal Reserve had eased terms related to lending securities from the system open market portfolio. These prior experiences provided the foundation for easing terms of lending during the most recent crisis and for programs such as the TSLF.

The Fed's willingness to provide extraordinary support to individual financial institutions when it was thought that their failures could destabilize financial markets or spill over to other financial institutions is evidenced by the responses to Franklin National and Continental Illinois. These two troubled firms were both depository institutions and Federal Reserve System members, which made assistance more straightforward. The Federal Reserve response to Long Term Capital Management demonstrates a concern about threats posed by large non-bank financial institutions. In that case, private actors had the capacity to conduct the rescue. With AIG, however, the Fed determined that private institutions lacked the capacity to respond. Rescues of individual institutions, such as AIG, are well understood to be problematic. Fed officials acknowledged the problems of too-big-to-fail and moral hazard, but contended that without another means of resolving the failures of firms that pose systemic risk, they had little choice but to protect creditors from taking losses in order to avoid catastrophic consequences for the financial system and economy (e.g., Bernanke, 2009a). The Dodd-Frank Act

responded to these concerns by authorizing the FDIC to resolve systemically important institutions. The Dodd-Frank Act also prohibits the Fed from lending to individual non-depository institution under Section 13(3) except as part of a program to provide liquidity to a class of institutions or markets.

## **VII. Observations and Lessons from the Historical Episodes**

Since 1970, the Fed has demonstrated a willingness to respond to financial disturbances that officials believe ultimately threaten to disrupt economic activity. In the cases of Penn Central and LTCM, Fed officials believed that nonfinancial firms might lose access to funding. In the Franklin National episode, the Fed was concerned about potentially detrimental impacts on the economy resulting from potential exchange rate volatility. The wide-ranging disruptions to financial intermediation in the recent financial crisis and concerns about the impact on the economy were clearly important in motivating Fed actions in 2007-09.

The Fed has employed a range of tools in responding to financial disturbances. The discount window has been a part of the response in most, but not all episodes. The discount window has also been used in different forms: the window was used to provide broad liquidity support to the banking sector via the TAF auctions during the recent episode and to the banking sector as it stepped in to replace commercial paper in the Penn Central episode. The window was also used to provide support to specific institutions such as Continental Illinois and AIG.<sup>44</sup> Open market operations were used to provide additional liquidity to the financial system in response to the stock market crash and market disruptions in 2007-09. (Monetary policy was also used to respond to concerns about the economy amid the financial crises.) Public announcements have also figured prominently in the Fed's responses as policymakers sought to reassure markets. Finally, in several cases, part of the Fed's response involved working with market participants to solve coordination problems, as in the wake of the 1987 stock market crash.

### *How Should a Central Bank Provide Liquidity?*

A longstanding debate in academic and policy forums concerns how a lender of last resort should provide liquidity, and in particular whether the lender of last resort should ever lend directly to individual financial institutions. Bordo (1990) nicely describes several approaches that have been advocated. He notes that the classical position (as articulated by Thornton and Bagehot) is to lend freely at a high interest rate. As a variation on the classical view, Friedman and Schwartz (1963) advocate the use of a penalty rate during normal times but a non-penalty rate during a crisis in order to maintain the money stock (see

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<sup>44</sup> Loans to AIG were soon restructured to as credits to newly formed limited liability companies, Maiden Lane II LLC and Maiden Lane III LLC. Further details are included in the Appendix on Federal Reserve Initiatives to Address Financial Strains Federal Reserve's Monetary Policy Report for February 2009.

Nelson, 2011 for further discussion). A second approach, advocated by Kaufman (1991), Goodfriend and King (1988), and Schwartz (1992) among others, is that the lender of last resort should provide liquidity support using open market operations to keep the stock of high-powered money from falling, but generally avoid lending directly to individual institutions. They argue that using the discount window to provide direct support to individual financial institutions, or to address crises originating in the financial sector, can increase moral hazard and cause distortions by removing decisions about credit risk from private markets. Moreover, in an effort to guard against a crisis, policymakers may be inclined to lend freely at any sign of trouble, which could exacerbate moral hazard and thereby increase financial instability.<sup>45</sup>

An alternative view holds that targeted lending to individual financial institutions may be the appropriate response to financial instability. Goodhart (1999) argues that targeted lending to affected financial firms may be necessary to keep financial instability from spreading because it is often impossible to determine reliably the relative importance of illiquidity and insolvency during a crisis. Once the situation has stabilized, insolvency concerns can be dealt with more readily. Rochet and Vives (2004) argue that there are situations in which failures in market coordination can result in liquidity shocks that are best dealt with through discount window lending.<sup>46</sup>

Stern and Feldman (2004) suggest an approach that retains the possibility of supporting individual institutions while addressing concerns about moral hazard and institutions that are too-big-to-fail. Stern and Feldman (2004) argue that in a crisis, policymakers should allow the first large financial institution to fail, i.e., not protect the firm's creditors from loss, but then take extraordinary measures to support remaining firms—even potentially insolvent ones—to prevent contagion. By explicitly allowing the failure of at least one large firm, the lender of last resort policy suggested by Stern and Feldman (2004) would limit moral hazard while protecting the banking system from contagion.

Corrigan (1990) suggests another strategy for limiting moral hazard, known as “constructive ambiguity.” Corrigan argues that lending to individual firms may be necessary to stem a crisis, but ambiguity about when and which firms would receive bailouts would limit moral hazard. Although constructive ambiguity has appeal *ex ante*, some have suggested that this policy is not effective *ex post*.

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<sup>45</sup> Goodfriend (2012) argues that wide operational and financial independence gives the Federal Reserve an incentive to lend expansively in an effort to avoid financial crises, but that doing so has the capacity to create ever-greater boom and bust cycles. By contrast, he argues that as a private, profit-maximizing institution, the 19<sup>th</sup> century Bank of England had an incentive to lend during a crisis on only high quality collateral at a level that maintained the stock of high-powered money, which limited distorting credit allocation.

<sup>46</sup> Bordo (1990) also notes that some have argued against any lender of last resort but instead advocate allowing free currency issue by commercial banks.

For instance, Meltzer (2009b) argues that the recent financial crisis was worsened by the apparent inconsistent treatment of the creditors of Bear Stearns and Lehman Brothers. In this instance, however, ambiguity may have arisen because of legal constraints on the Fed's ability to lend since, unlike Bear Stearns or AIG, Lehman lacked sufficient collateral to post for a loan from the Fed (Bernanke, 2008).

The historical experiences described here illustrate some challenges in using open market operations alone to respond to financial crises. Financial crises are associated with heightened uncertainty about counterparty risks, collateral values, and the capacity of certain borrowers to repay their obligations, all of which increase demand for liquidity and risk-free assets.<sup>47</sup> Open-market operations, which are conducted with a relatively small set of institutions, are unlikely to alleviate a crisis unless interbank markets are functioning reasonably smoothly, which has not been the case in many crises. For example, following the 1987 stock market crash, the willingness of financial intermediaries to provide credit to each other was impaired, and encouraging them to extend credit was a key part of the Federal Reserve response. Similarly, the Fed introduced the TAF in December 2007 after determining that open-market operations and the Fed's more conventional discount window programs were failing to alleviate strains in interbank funding markets (Bernanke, 2009b).

In several of the crises reviewed here, the Fed sought to ensure that financial institutions had ample liquidity to support markets under strain: commercial paper following Penn Central, bank funding market investors after Continental Illinois, and securities dealers during the 1987 stock market crash. Importantly, in these cases, the Fed believed that liquidity problems had the potential to contribute to deterioration in solvency of various institutions, including those removed from the immediate crisis.<sup>48</sup> Thus, these episodes suggest that provision of liquidity to institutions affected by the crisis either directly or indirectly may be quite important in limiting the spread of crises, preventing asset fire sales, and for allowing a more timely resolution of solvency concerns. On the other hand, it is impossible to know how these crises would have played out if the Fed had not intervened, or simply committed to maintaining the stock of high-powered money or an inflation target.

Our review of the Fed's history as lender of last resort illustrates how the regulatory environment and the scale of the shadow banking system also affect how the lender of last resort responds to crises. Following the bankruptcy of Penn Central in 1970, the banking system, with support from the Federal

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<sup>47</sup> Indeed, one reason for the TSLF was to allow institutions to substitute less liquid and slightly riskier collateral for higher quality and more liquid collateral (for a small fee and with a haircut).

<sup>48</sup> Calomiris (1994) argues that providing backup protection for financial markets is perhaps the main justification for discount window lending. He also argues that the Fed's response to the failure of Penn Central of taking a more open stance toward use of the discount window was, in fact, consistent with a classical approach of providing liquidity support to the market while leaving credit decisions in the hands of the private market.

Reserve, was able to provide credit to institutions shut out of the commercial paper market in part because that market was not large. By 2007, however, the nonfinancial commercial paper market and asset-backed commercial paper market had become quite large. The Federal Reserve established facilities such as the AMLF to channel liquidity through banks to support money market mutual funds and the commercial paper market in a manner broadly similar to what had occurred in the earlier episode. Without such support, banks likely would have been unable to provide loans to replace the substantial drop in commercial paper (or bring the asset-backed commercial paper programs onto their own balance sheets) without becoming highly leveraged or significantly altering the composition of their assets.

The commercial paper market is only a small part of the shadow banking system that was experiencing liquidity difficulties during the crisis. The growth in the size of the shadow banking system has made it more difficult to provide liquidity support to the financial sector through the banking system. This was apparent during the recent crisis when the Fed determined that it was necessary to establish a number of facilities such as the PDCF and TSLF to support non-bank financial intermediaries that in turn supported many parts of the shadow banking system (Madigan, 2009). The fact that the shadow banking system provides many services that were traditionally done within the banking sector—such as maturity transformation and payment services—adds a further complication to the discussion of what types of institutions ought to have access to the lender of last resort.<sup>49</sup> Moreover, as noted by Bernanke (2009b), the nonbank financial sector outside the shadow banking system, such as the corporate bond and syndicated loan markets, is also quite important in the United States, adding further to the challenges faced by the lender of last resort in responding to threats outside the commercial banking system.

Another characteristic we observe in the crisis episodes described here is the concern about spillovers. Franklin National was rescued because of concerns that its failure would roil foreign exchange markets (and thus threaten other financial institutions and the economy). Continental Illinois was rescued partly because of the potential impact its failure could have on wholesale funding markets on which other banks depended. AIG was rescued largely out of concern about the potential impact its failure would have had on commercial paper, other public debt markets, and insurance products to millions of customers (with associated impacts on other financial institutions and on the economy) (Bernanke, 2009a). In each case, these institutions were provided extraordinary financing when they lost access to private funding.

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<sup>49</sup> Still further, Madigan (2009) argues that troubles at shadow banks can affect funding markets which in turn can impact traditional banks. For example, he notes that money market mutual funds are important purchasers of commercial paper, which in turn is an important source of funding for some banks. Troubles at money market funds and a reduction in their ability to buy commercial paper could thus increase bank funding costs. Madigan argues that these connections ought also to be considered by the Lender of Last Resort.

Institution specific rescues, such as these, increase moral hazard.<sup>50</sup> The enhanced resolution strategy contemplated under the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 is intended to provide an alternative that will reduce the need for such rescues going forward. Only time will tell whether these measures will prove effective.

### **VIII. Conclusion**

The authors of the Federal Reserve Act intended the Federal Reserve to serve as lender of last resort to the banking system, and in so doing end banking panics in the United States. However, the banking panics and near collapse of the banking system during the Great Depression demonstrated that the Fed as originally established did not guarantee an effective lender of last resort. The Federal Reserve Act failed to recreate the financial environment that enabled the Bank of England and other European central banks to perform effectively as lenders of last resort. In its early years, the Fed was also hamstrung by leadership failures, poor understanding of the appropriate role of a lender of last resort, and statutory limitations on its ability to support the banking system through its discount window.

As a result of the Great Depression, the Federal Reserve System was reorganized and its emergency lending powers were greatly enhanced. Subsequent to the Great Depression, the Federal Reserve demonstrated a much greater willingness to intervene to stem what it perceived were threats to financial stability (which in turn were viewed as threats to economic stability). As these threats to financial stability materialized within an evolving financial system, the Federal Reserve responded with a range of initiatives and actions. The scale of the Fed's response to the financial crisis of 2007-09 was unmatched in the Federal Reserve's history, but many of the types of programs introduced then had parallels with methods the Fed used to address earlier crises. The legislative response to the financial crisis of 2007-09, the Dodd-Frank Act, in some ways enhanced the Fed's authority still further, for example, by indicating that the Federal Reserve, at the direction of the Financial Stability Oversight Council, should assume an oversight position of institutions considered to pose a systemic threat. The Dodd-Frank Act also changed the Fed's authority for lending under unusual and exigent circumstances such that the Fed can no longer extend credit to individual firms other than through a program with broad based eligibility; this change was intended to ensure that such emergency lending programs are geared

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<sup>50</sup> (See, for example, Reinhart (2008) for more detailed list of concerns related to the moral hazard issue, particularly where it concerns providing support to nonbank financial firms.)

toward providing liquidity to the financial system as a whole, but in limiting the Fed's ability to support individual firms the change may reduce the Fed's flexibility in responding to an unfolding crisis.<sup>51</sup>

More broadly, the history of the Fed's responses to crises illustrates the importance of government policy toward the banking and broader financial systems. The overall regulatory environment affects the likelihood that a central bank will be needed as a lender of last resort and whether the central bank is likely to be effective in that role. For example, strict limits on branch banking probably made the U.S. banking system more crisis prone in the nineteenth century and for most of the twentieth century, which increased the likelihood that lender of last actions would be required. The size and nature of the shadow banking sector and its relation to the traditional banking sector and importance to the overall economy have clearly shaped the Fed's response to crises. The size and importance of the largest financial intermediaries, and the ability of the regulators or courts to unwind them, also has an effect on lender of last resort policy.

The Fed's history as lender of last resort does not fully answer some important questions. For example, it remains an open question whether a central bank can serve effectively as lender of last resort solely by using open market operations to maintain the level (or growth) of high-powered money, as argued by Goodfriend and King (1988), Schwartz (1992) and others. In the Great Depression, the Fed neither maintained adequate growth of high-powered money nor responded to banking panics with a liberal lending policy. Since then, the Fed has used a variety of methods to respond to financial disturbances, including currency depots, liberal discount window lending, and special lending facilities to provide liquidity to non-bank firms and markets, but never relied solely on open-market operations. The Fed has always viewed its lender of last resort mission as distinct from its monetary policy mission. Policymakers have usually determined that other tools are more effective than open market operations for dealing with a financial disturbance. However, they may have also seen a conflict between aggressively countering a crisis with the tools of monetary policy and maintaining control of inflation or achieving other monetary policy objectives. Using only open market operations to respond to the financial crisis of 2007-09 would likely have been exceptionally challenging given the breakdown of interbank funding markets, a substantial disruption in what had become a very large shadow banking system, and severe troubles in other key segments of the financial system. The determination by the Fed that it could not resolve the crisis by supplying liquidity solely through open-market operations, or even through its traditional discount window facility, resulted in the establishment of various facilities to channel funds to specific markets and types of firms. Moreover, until it could no longer do so, the Fed reduced its holdings

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<sup>51</sup> However, it should be noted that the Dodd-Frank Act did expand access to the discount window for designated financial market utilities in order to support the functioning of market payments and settlement systems.

of Treasury securities to prevent its lending from increasing the size of its balance sheet. Given the disruptions in interbank funding markets and the heightened demand for Treasury securities during the crisis of 2007-09, it seems unlikely that the Fed could have fully resolved the crisis by competing with private firms in the open market for Treasury securities. Further, the essence of Bagehot's Rule requires the conversion of *illiquid* assets into liquid assets, not one form of liquid assets (Treasury securities) into another (Fed liabilities).<sup>52</sup> The rapid winding down of the Term Auction Facility and other liquidity programs established by the Fed during the crisis of 2007-09 suggests that they served their intended purpose of providing liquidity during the crisis without becoming a source of cheap financing for the long term.

The Fed's history also does not fully answer questions about which firms should have access to the lender of last resort. The Federal Reserve Act originally limited access to the Fed's discount window to member banks, which was problematic during the Great Depression when banking panics and failures were more prevalent among nonmember banks. The Monetary Control Act of 1980 opened the Fed's discount window to all depository institutions. However, the financial crisis of 2007-09 originated in the "shadow banking" system comprised of investment banks and other financial firms outside the traditional banking sector. These firms created liquidity by issuing short-term, seemingly high-quality claims against holdings of long-term assets, which made them vulnerable to run-like phenomena. In assisting in the acquisition of Bear Stearns and in providing loans to AIG, the Fed determined that the disorderly failures of these institutions threatened the broader financial system and economy. Bernanke (2008), in particular, argued that AIG was simply too large and complex to allow to fail in a disorderly manner during an ongoing crisis and noted several concerns about potential impact on the economy from such a bankruptcy. Although the Fed had not previously provided financial assistance to prevent the failure of a nonbank financial firm, it has a long history of responding to disruptions outside the banking system, beginning with the New York Fed's response to the 1929 stock market crash, and including the Fed's responses to the Penn Central crisis, 1987 stock market crash, and the near failure of LTCM. Further, the Fed's actions were not unlike those of J.P. Morgan in 1907, when he helped facilitate loans to prevent the failures of several trust companies that stood outside the regulated banking system but were active in the same markets as banks. However, extending lender of last resort protection beyond the traditional, regulated banking system would foster moral hazard and encourage the growth of a shadow banking system. It is important, therefore, for policymakers to determine in advance how far lender of last resort protection

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<sup>52</sup> Indeed, this conversion was the purpose of the TSLF, which allowed institutions to borrow Treasury securities in exchange for posting less liquid collateral (for a small fee). Thus the facility increased the liquidity of financial institutions without affecting the size of the Federal Reserve's balance sheet.

should extend beyond the traditional banking system, and to impose regulations or other measures to limit moral hazard by all firms that enjoy lender of last resort protection.

Since its creation in 1913, the Fed's crisis response has evolved as it has rethought its role as a lender of last resort, as that role has been altered by Congress, and as financial industry itself has evolved. Many of the important debates about the proper role of a lender of last resort remain to be solved and are likely to become only more complicated as the financial industry becomes more complex. Nevertheless, the lessons illustrated by the past 100 years of crisis responses do provide useful insights that help inform those debates.

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