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# Bank Runs and Private Remedies

**C**URRENT banking regulation in the United States is based in part on the notion that both the banking system and the economy must be protected from the adverse effects of bank runs. An example often cited as typical is the string of bank runs from 1930 to 1933, which conventional wisdom holds responsible for thousands of bank failures and the Banking Holiday of 1933 when all banks closed. The runs on savings associations in Ohio and Maryland in 1985 are more recent examples.

This conventional view is reflected in a recent comment on the "Panic of 1907" in the *Wall Street Journal* (1989):

Long lines of depositors outside the closed doors of their banks signaled yet another financial crisis, an all-too familiar event around the turn of the century.

Research in the last few years on bank runs indicates that the conventional view is mistaken. Runs on the banking system were not commonplace events, and their impact on depositors and the economy easily can be overstated. Prior to the formation of the Federal Reserve System in 1914, banks responded to runs in ways that

lessened their impact. These private remedies did not solve the problem of runs, but they did mitigate the effects of the runs on the banks and the economy. In this article, we explain the private remedies for runs and provide some evidence on the frequency and severity of runs on the banking system.

## BANK RUNS: THE THEORY

Before examining the history of bank runs, it is useful to consider why banks are vulnerable to runs. This examination establishes a framework for determining the kinds of observations that would be consistent with their occurrence.

### *Runs on Individual Banks*

In a run, depositors attempt to withdraw currency from a bank because they think the bank will not continue to honor its commitment to pay on demand a dollar of currency for a dollar of deposits.<sup>1</sup> One aspect of the contract banks make with their customers is central to understanding why depositors would run on their bank. Banks make contractual promises that they cannot always honor: exchange of gold or

<sup>1</sup>Salant (1983) provides a general analysis of the breakdown of such arrangements as bank redemption of its

liabilities at par. The mapping from speculative attacks into bank runs is discussed by Flood and Garber (1982).

currency at par value for bank liabilities.<sup>2</sup> When banks issued notes as a form of currency, the promise was a contractual agreement to deliver specie (gold or silver) in exchange for the bank's notes at par value. Banks currently promise to deliver U.S. currency to depositors on demand at par value. Because banks hold reserves that are only a fraction of their liabilities payable on demand, they cannot honor this promise if all of their depositors try to convert deposits into currency at the same time.

Fractional-reserve banking by itself is not sufficient to make it impossible for banks to honor their promises to deliver currency in exchange for deposits on demand. Banks always could honor a promise to pay currency at a variable exchange rate of currency for deposits. If all depositors want to exchange their deposits for currency at the same time, banks do not have sufficient currency (or other reserves that can be transformed into currency on a dollar-for-dollar basis instantaneously) to meet that demand for currency at a price of one dollar of currency for one dollar of deposits.<sup>3</sup>

In the normal course of affairs, the inability of all depositors to exchange their deposits for currency is irrelevant. As some depositors withdraw currency from a bank, others deposit it. The low probability of every depositor closing his or her account at the same time is the reason a bank usually can operate with fractional reserves and pay currency on a dollar-for-dollar basis.

A low probability is not the same as a zero probability though. Information or rumors which suggest a capital loss by a bank may induce its depositors to attempt to convert their deposits to currency.<sup>4</sup> The mere expectation that other depositors will attempt the same conversion also can cause a run on a bank. A run on a single bank is unlikely, however, to have substantial effects on the economy. The primary effect of a single bank closing is that the bank winds up its affairs and no longer operates.

The effects of a run by depositors on one bank can be illustrated by an example. Table 1 shows the balance sheet of a hypothetical national bank in New York City in the national banking period (1863 to 1914). Its liabilities include deposits and national bank notes backed by securities deposited with the Treasury. In the event of the bank's failure, the notes were guaranteed by the U.S. Treasury, whether or not the deposited bonds were sufficient backing for the notes. Apparently as a result of this guarantee, runs on banks in the national banking era were runs by depositors, not by note holders.<sup>5</sup>

During this period, national banks in New York City were required to maintain reserves of specie and legal tender equal to 25 percent or more of deposits, with the required ratio of reserves to deposits lower for national banks in other cities. Banks generally held excess reserves as a buffer stock to meet deposit withdrawals, but we use a reserve ratio of 25 percent to keep the numerical example simple. The second part of table 1 shows the initial loss of reserves upon withdrawal of \$2 million of deposits, while the last part indicates the reaction of the bank to the decrease in deposits. An individual bank can replenish its reserves by selling assets; in the example, the bank returns its reserve ratio to 25 percent by selling \$1.5 million in assets. At least part of the reserves are from other banks, thereby transmitting the reserve loss to other banks.

In a run on a single bank, the specie and legal tender withdrawn from the bank are likely to be largely deposited in other banks. As a result, a run on a single bank is not likely to drain reserves from the banking system or increase currency held by the public. If the currency withdrawn is deposited in other banks, the net effect on the bank's balance sheet is that shown in table 1, and the deposit and reserve loss at this bank is matched by a similar increase in deposits and reserves at other banks.

<sup>2</sup>Whether this promise is a result of market forces or government regulation is an open question. Davis (1910) summarizes the laws in the United States in the 19th century, and Schweikart (1987) provides the historical development of these laws in the South in the 19th century.

<sup>3</sup>Promises that cannot be kept in all states of the world are hardly unique to banking. For instance, firms often cannot make payments on debt if there is a large decrease in the demand for their products. The common legal word for failure to honor contractual commitments is "default."

While default generally is not the expected outcome of a contract, it does happen.

<sup>4</sup>Among others, Diamond and Dybvig (1983) and Gorton (1985a) present models of runs.

<sup>5</sup>In banking panics prior to the national banking era, customers of banks attempted to redeem their bank notes for specie. For details on the backing for notes in the national banking era, see Friedman and Schwartz (1963), pp. 20-23, 781-82.

Table 1

### Balance Sheet of a National Bank in New York City with a Large Withdrawal of Deposits (millions of dollars)

#### INITIAL BALANCE SHEET

Assets		Liabilities	
Reserves (specie and legal tender)	\$ 2.5	Deposits	\$10.0
Interest-earning assets	11.0	Notes	1.0
Total assets	\$13.5	Net worth	2.5
		Total liabilities	\$13.5

#### IMMEDIATELY AFTER WITHDRAWAL OF \$2 MILLION BY DEPOSITORS

Assets		Liabilities	
Reserves	\$ 0.5	Deposits	\$ 8.0
Interest-earning assets	11.0	Notes	1.0
Total assets	\$11.5	Net worth	2.5
		Total liabilities	\$11.5

#### AFTER RESTORATION OF RESERVE RATIO TO 25 PERCENT

Assets		Liabilities	
Reserves	\$ 2.0	Deposits	\$ 8.0
Interest-earning assets	9.5	Notes	1.0
Total assets	\$11.5	Net worth	2.5
		Total liabilities	\$11.5

### *Runs on the Banking System*

Runs on a single bank can develop into runs on the banking system.<sup>6</sup> An important, if seemingly obvious, aspect of banking is that the likelihood of a bank's default on its deposit agreement is not known with certainty by depositors. Instead, depositors estimate this likelihood as best they can with available information. One type of information that can be useful in estimating the value of a bank's assets is information on the value of assets at other banks. News about the failure of one bank can cause depositors at other banks to raise their estimate of the probability that their bank will default. Contagious bank runs can be defined as runs which spread from one bank or group of banks to other banks.

A term sometimes used for a period of a run on the banking system is a "banking panic," a

term that has a connotation of unreasoning fear or hysteria. Contagious runs, however, can be based on the optimal use of all information by all agents. As a simple example, suppose that two banks are identical in all respects known by depositors, and one of the two fails because of loan losses. Because of the first failure, depositors will increase their estimate of the probability that the second bank will fail. If this estimate increases sufficiently, depositors will run on the second bank, even though no other information has appeared. This use of information is quite consistent with rational behavior. Depositors use the information available, and one part of that information is the condition of other banks.

Simultaneous runs on many banks need not be contagious runs though. For example, an exogenous event can increase simultaneously de-

<sup>6</sup>Gorton (1985a) and Waldo (1985) provide models of aspects of the process which we discuss in this section.

Table 2

**Balance Sheet of the Banking System with a Large Withdrawal of Deposits (millions of dollars)**

<b>Assets</b>		<b>Liabilities</b>	
Reserves	\$ 250	Deposits	\$1,000
Interest-earning assets	1,100	Notes	100
Total assets	\$1,350	Net worth	250
		Total liabilities	\$1,350
After withdrawal of \$200 million by depositors:			
<b>Assets</b>		<b>Liabilities</b>	
Reserves	\$ 50	Deposits	\$ 200
Interest-earning assets	500	Notes	100
Total assets	\$ 550	Net worth	250
		Total liabilities	\$ 550

positors' estimated probability that many banks will fail to redeem at par. Myers (1931) suggests that bank runs in 1914 resulted from the public's expectation that the war would result in a restriction of convertibility of notes and deposits into specie.<sup>7</sup>

Whether a contagious or a simultaneous run, a run on the banking system is associated with a drain of reserves from the banking system. The effect of this withdrawal of reserves is shown in table 2, which illustrates the effect of a \$200 million increase in the demand for currency. For each bank individually, the initial impact is a withdrawal of reserves. Banks no longer have a reserve ratio of 25 percent, and, as a result, they attempt to increase their holdings of reserves by selling assets. The sale of assets by one bank drains reserves from other banks though, and these banks then sell some of their assets to acquire reserves. Unlike the previous example, the \$200 million of reserves is gone from the banking system. As

table 2 shows, the result of this process is a contraction of deposits and assets that is a multiple of the initial decrease in reserves.

If banks sell relatively large amounts of their assets quickly in a run, they can drive down the market value of their assets and drive up market interest rates. Table 2 could be modified to reflect this effect, with an additional decline in the value of bank assets and their net worth. If the declines in net worth are large enough, the response of the banks to the run indicated in table 2 will cause some banks to fail. Thus, an additional effect of a bank run might be a rise in the rate of bank failure.

### *Observations Consistent with the Occurrence of Runs*

The definition of a run is based on depositors' estimated probability of non-par redemption by banks. While it is possible to use an economic model to estimate this probability, we use a less-demanding basis to examine data for evidence

<sup>7</sup>See Myers (1931), p. 421. Empirically distinguishing between contagious runs and simultaneous runs is a tricky issue, which requires distinguishing between bank runs due to information that affects banks' assets and those due to information about *some* banks' assets. One way of

doing this is to define contagious bank runs as those that would not have occurred without runs on earlier banks. There is at least one successful attempt at providing detailed evidence of a contagious run: Wicker's (1980) analysis of the runs in November and December 1930.

of runs: we examine the data for consequences of runs.<sup>8</sup>

A leading example of an event consistent with a run on the banking system is a joint restriction of convertibility by banks. Without an official central bank, banks can limit the effects of a run by jointly agreeing to restrict currency payments to depositors.<sup>9</sup> The effects of such a restriction can be illustrated by referring to table 2. Suppose that, after depositors withdraw \$50 million in currency, the banks agree to stop making currency payments. In this illustration, deposits decline by only \$200 million, to \$800 million. The demand for more currency by depositors will not cause a further decline in deposits because some or all of that demand is refused by the banks.

Hence, one observation that provides clear evidence of a run on a banking system is a restriction of currency payments by banks in the system. An individual bank resorts to a restriction of currency payments if it cannot meet its commitment to pay currency to depositors on demand. Banks will resort to this action jointly if they face a common problem of currency withdrawals.

If the restriction of payments results in significant restrictions on depositors' ability to transform deposits into currency, a market for transforming currency into deposits may develop. If there is such a market, there will be a premium for currency in terms of deposits.<sup>10</sup>

A bank run need not result in restriction though. The following developments also would be consistent with the occurrence of a run on a banking system, although they are not inevitable effects of runs and they can occur in the

absence of a run. Perhaps most importantly for our purposes, these indicators of runs can be lessened by a restriction of payments to depositors. They are:

1. a decline in the ratio of reserves to deposits.
2. a rise in the ratio of currency to deposits.
3. for a given monetary base, a decline in the money supply (because the decline in deposits is a multiple of the decline in bank reserves).

## RESTRICTION OF CONVERTIBILITY

The view that the banking system is vulnerable to runs may be based primarily on the experience of the early 1930s, but the most relevant period to examine for evidence of runs is before the operation of the Federal Reserve System. Prior to late 1914, the United States had no official central bank.<sup>11</sup> We focus on the banking system beginning with the 1850s. While events in earlier years also are of interest, 1853 marks the beginning of a weekly data set on reserves and deposits in banks in New York City which is very useful. In addition, by the 1850s, New York City was the most important financial center in the United States. Many banks in other parts of the country held correspondent balances in New York City banks, and pressures affecting banks in the rest of the country affected New York City banks through these balances.<sup>12</sup>

### *Restrictions on Payments*

As table 3 indicates, banks in New York City restricted payments on five occasions

<sup>8</sup>Gorton (1988) does estimate a particular model for runs and finds them generally consistent with our analysis. He also defines runs on the banking system, or in his terms "banking panics," as periods when convertibility was restricted in New York City, clearing house loan certificates were authorized by the New York Clearing House or both (1988, pp. 222-23). We prefer not to identify periods with runs based on a single criteria. If we were to pick a single criteria, it would be restriction of payments by banks. With any penalties on nonpar payments, banks will not do this unless they at least believe that they cannot continue payments at par indefinitely. For the use of a multiple set of criteria along our lines, see Bordo (1986).

<sup>9</sup>The names "restriction of cash payments" or "restriction of convertibility of deposits into currency" are suggested by Friedman and Schwartz (1963, p. 110, fn. 32) rather than the traditional name of "suspension of currency payments." Following this suggestion avoids confusion of "suspension of currency payments" with "suspension of operations" and is more consistent with the fact that

banks commonly did not completely stop converting deposits into currency. Currency payments were non-price rationed, not suspended. Evidence for the post-Civil-War period that payments generally were restricted, not suspended, is presented by Sprague (1910), pp. 63-65, 121-24, 171-78, 286-90, and Andrew (1908), pp. 501-02.

A more general and precise, but also quite pedantic, name for restrictions would be "restriction of convertibility at par of bank liabilities with promised par redemption on demand."

<sup>10</sup>As we show below, banks remained open for deposits. Hence, a discount on currency could not persist.

<sup>11</sup>Friedman and Schwartz (1963) and, in more detail, Timberlake (1978) discuss the central banking activities by the Treasury in the national banking period. As argued forcefully by Dewald (1972), the New York Clearing House acted as a central bank at times.

<sup>12</sup>See Myers (1931) and Sprague (1910).



Table 3

### Dates of General Restriction of Payments in New York City, 1857 to 1933

Year	Beginning date	Ending date
1857	October 13	December 11
1861	December 28	April 1862
1873	September 24	October 22
1893	August 3	September 2
1907	October 26	December 28
1933	March 3	March 15

Sources: see data appendix available on request.

between the 1850s and 1914.<sup>13</sup> In the episodes from 1857 to 1907, banks across much of the country restricted currency payments, but the restrictions were not universal.<sup>14</sup> The last such restriction was the banking holiday of March 1933. In the banking holiday of 1933, the federal government closed all banks in the country and gradually reopened those that regulators judged to be in satisfactory financial condition. In the earlier restrictions, in contrast, banks remained open and processed transfers of deposits for their customers.

Other than for the restriction of payments in 1907, it is difficult to obtain precise estimates of how widespread or binding these restrictions were. Shortly after the panic of 1907, A. Piatt Andrew surveyed banks in 147 cities in the United States with populations greater than 25,000. Andrew (1908) found that, of the 145 cities for which he had responses, 53 had no restriction of payments or emergency response. Of the remaining 92, the only restriction of payments in 20 cities was a request by the banks that larger depositors mark their checks as "payable only through the clearing house." In the remaining 72 cities, limits on withdrawals were often discretionary. Even in the 36 cities where there was joint agreement between the banks in the city to limit withdrawals, there was substantial variations across them. For ex-

ample, in Atlanta, depositors could withdraw up to \$50 per day and \$100 per week from their banks. At the same time, depositors in two of these 36 cities, South Bend, Indiana, and Youngstown, Ohio, could withdraw nothing from their checking accounts.

### *The Relative Price of Currency and Deposits*

During the periods of restrictions of currency payments in the national banking era, markets developed in New York City for the exchange of currency for certified checks. Holders of certified checks marked "payable through the clearing house" could obtain currency in this market if they were willing to accept less than the face amount of the certified checks. Figure 1 shows the premiums on currency quoted in these markets in the three periods of restrictions in New York City in the national banking era. These markets operated for about four months in this period. The maximum premiums on currency are about 4 percent to 5 percent, but for most of the days in which these markets operated, the premiums are much smaller. Nonetheless, the important issue is whether the premiums are nonzero, which they are.

### *Clearinghouses and Restriction*

During these restrictions of payments, banks remained open for much of their regular business and processed checks for their customers as they usually did. In some parts of the country, banks in a local area processed checks bilaterally, but in other areas, banks used clearinghouses to process checks. From 1857 to 1914, these clearinghouses developed an emergency currency used during restrictions for clearing checks.

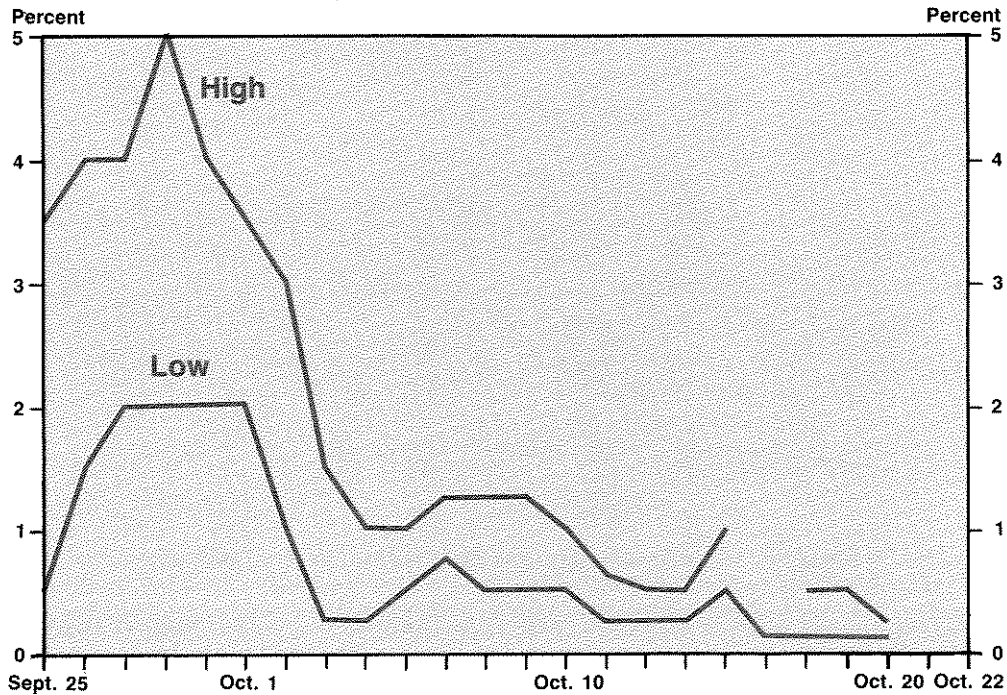
**Clearinghouses for banks** — In the second half of the nineteenth century, banks in many cities established clearinghouses to decrease the resources used in clearing checks and exchanging gold and currency with other banks.<sup>15</sup> Rather than sending checks received to the offices of each bank for collection, members of a clearinghouse sent checks drawn on other member banks to the clearinghouse. Those with net

<sup>13</sup>A data appendix, available on request from the authors, gives the sources of these dates and the other data in this paper.

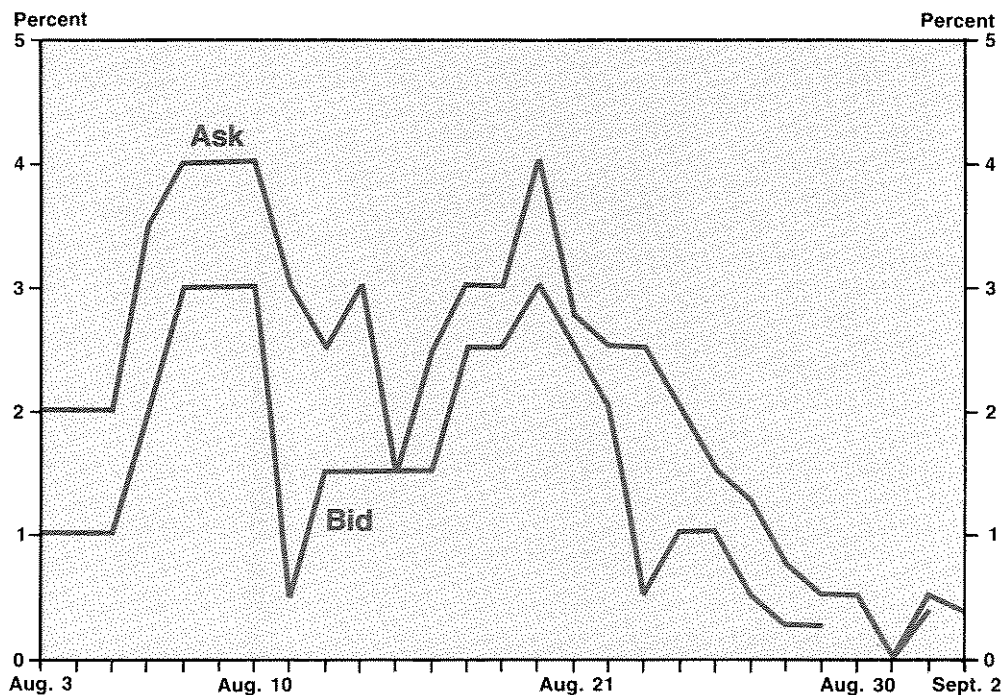
<sup>14</sup>For a discussion of 1873 and 1893, see Sprague (1910), pp. 63-74, 168-69. Andrew (1908) presents the results of a survey for 1907.

<sup>15</sup>Descriptions of clearinghouses are provided by Cannon (1910), Myers (1931), pp. 94-97, and Redlich (1968), ch. XVII.

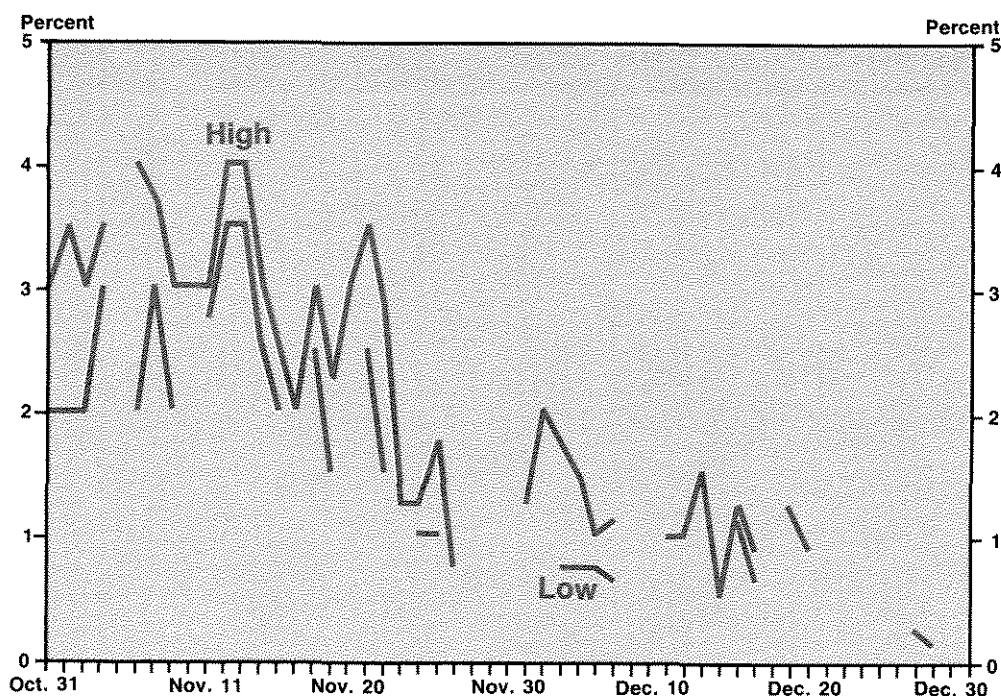
**Figure 1**  
**Currency Premiums during Restrictions of**  
**Currency Payments**  
**September and October 1873**



**September and October 1893**



## November and December 1907



outflows of deposits at the clearinghouse paid those with net inflows in gold and currency or, more conveniently, with clearinghouse certificates. These certificates were receipts for banks' deposits of gold and legal tender at the clearinghouse.

**Clearinghouse loan certificates** — In some periods, clearinghouses issued additional certificates called "clearinghouse loan certificates" that could be used to clear checks. These certificates were a commonly used expedient in runs from 1860 until the creation of the Federal Reserve.<sup>16</sup>

The precursor of these loan certificates was an extraordinary issue of clearinghouse certificates in the run on banks in 1857. Fears about the solvency of banks resulted in a drain of specie and ultimately a run on the banks in New York City in 1857.<sup>17</sup> At this time, banks issued notes that were used as currency, and the banks redeemed them in gold or silver on demand. If a bank failed though, holders of the

notes could wind up with less than the promised amount of specie. In 1857, holders of banknotes were concerned about the likelihood that banks in various parts of the country would be able to continue converting their notes into specie at par. As a result of the continuing redemption of their notes, these banks converted their correspondent balances in New York City banks into specie for redeeming their own notes. Thus, specie balances in New York City banks dwindled and this drain of reserves culminated in a run on banks in New York City. On October 13, banks in New York City restricted specie payments, with restriction in many other parts of the United States following.

In part, the effect of this specie drain on banks in New York City was alleviated by a joint agreement of the banks in the New York Clearing House on November 7. New York state banks that were not redeeming their notes agreed to pay 6 percent interest on them, and the clearinghouse agreed that the notes of the

<sup>16</sup>This section owes much to the analyses in Timberlake (1984) and Gorton (1985b).

<sup>17</sup>This account is based on Gibbons (1859), ch. XIX; Myers

(1931), pp. 97-99, 141-44; Calomiris and Schweikart (1988), pp. 31-56.



banks could be used as backing for clearinghouse certificates. Until they were gradually retired, these certificates were used for clearing checks just as if they were clearinghouse certificates backed by deposits of specie.

Clearinghouse loan certificates were first issued in 1860. In anticipation of war, Southerners converted their deposit balances in Northern banks into specie and, just as in 1857, banks in New York City were confronted with a drain of their specie reserves.<sup>18</sup> After the election of Abraham Lincoln in November, the banks in the New York Clearing House responded to the drain by jointly agreeing to allow bonds issued by the federal government and the state of New York to be used as backing for certificates, called "clearinghouse loan certificates," which could be used for clearing checks.

The procedure adopted in 1860 was basically the same as in every later instance when such certificates were issued. A loan committee was established which examined collateral and issued certificates based on the collateral. Upon using a loan certificate, a bank was required to pay interest, at a rate fixed by the clearinghouse, to any bank that held its loan certificates.<sup>19</sup> The members of the clearinghouse, however, were jointly liable for any loss attendant on holding a loan certificate. In addition, the clearinghouse agreements specified a date at which loan certificates would no longer be acceptable for settling balances at the clearinghouse.

Several features of the practices of clearinghouses indicate that, in issuing loan certificates, members of a clearinghouse were pooling their resources to deal with a common problem of withdrawals. Clearinghouse members pledged to absorb any losses on loan certificates as a group, with losses allocated according to each bank's capital. Losses were not likely, however, because the borrowing banks pledged assets with the clearinghouse, receiving loan certificates for a fraction of the value of the assets. In some panics, clearinghouse members stopped the weekly publication of their individ-

ual balance sheets and published combined balance sheets of their members, thus withholding information on the relative weakness of individual members.<sup>20</sup>

Clearinghouse loan certificates were created several times in the 55 years from 1860 to 1914. Table 4 shows the dates when these certificates were issued by the New York Clearing House.<sup>21</sup> As a quick comparison of tables 3 and 4 shows, clearinghouse loan certificates were issued whenever convertibility of deposits into currency was restricted. This is no coincidence, because clearinghouse loan certificates were an important part of banks' strategy for staying open after a run on the banking system.

Although first issued in 1860 in New York City only, the use of clearinghouse loan certificates became widespread over time (Stevens 1894; Andrew 1908; Cannon 1910). In 1873, the clearinghouses in New York City, Boston, Cincinnati, New Orleans, Philadelphia and St. Louis issued them. In 1884, New York City again was the only clearinghouse to issue loan certificates, but in 1890 it was joined by Boston and Philadelphia. In 1893, clearinghouses in at least 12 cities issued loan certificates, and in 1907, banks in 42 of 145 cities in the United States with more than 25,000 people used such certificates.

**Loan certificates and restrictions** — Even with access to clearinghouse loan certificates, banks could provide currency in a run only until they exhausted their inventories of specie and legal tender.<sup>22</sup> During restrictions, banks rationed currency, meeting the requests by some customers for their customary withdrawals of currency and denying requests by others. Banks that were members of the clearinghouse continued to accept checks drawn on other clearinghouse members when deposited by their customers. As a result, depositors could make payments by writing checks drawn on their accounts or with certified checks issued by their banks. The major limitation was that the checks generally could not be exchanged for specie or currency by the recipient of the check.

<sup>18</sup>Swanson (1908) provides a detailed account of this episode.

<sup>19</sup>The annual rates were 7 percent in 1860 and 1873 and 6 percent in every other instance when they were issued. Comptroller of the Currency (1915, vol. 1), p. 103.

<sup>20</sup>Members of the New York City Clearing House agreed to pool reserves in the panic of 1873 but not in the following

panics. Sprague (1910), pp. 46, 120; Myers (1931), pp. 408-20.

<sup>21</sup>The New York Clearing House authorized but did not issue loan certificates in December 1895 and August 1896. Gorton (1985b), p. 280, fn. 11.

<sup>22</sup>This section draws heavily on Sprague (1910).

Table 4

**Clearinghouse Loan Certificates Issued by the New York City Clearing House: Dates, Duration and Magnitudes (dollar amounts in millions)**

Year	Date first issued	Months until all redeemed	Maximum amount created	Deposits
1860	November 23	3 1/2	\$ 6.9	\$ 99.6
1861	September 19	7 1/4	22.0	99.3
1863	November 6	2 3/4	9.6	159.5
1864	March 7	3 1/4	16.4	168.0
1873	September 22	3 3/4	22.4	174.8
1884	May 15	4 1/4	21.9	317.2
1890	November 12	2 3/4	15.2	386.5
1893	June 21	4 2/3	38.3	398.0
1907	October 26	5	88.4	1023.7
1914	August 3	4	109.2	

Sources: see data appendix available on request.

If a check was not deposited at the issuing bank but at another bank in the local clearinghouse, the issuing bank could obtain more loan certificates to settle with the bank that accepted the check. If the check was deposited at a bank in another area, the receiving bank could deposit the certified check with a correspondent in the clearinghouse of the issuing bank.

Initially, these certificates were used only as a means of payment by other members of the clearinghouse, but in later years, they also were used as currency.<sup>23</sup> In 1893, clearinghouse loan certificates were issued in small denominations by some clearinghouses as a substitute for currency. In addition, banks in several cities with no clearinghouse issued notes that were jointly guaranteed by the banks in the cities. In 1907, banks in many parts of the country created loan certificates which temporarily were used as currency. In 53 of the 71 larger cities in which banks jointly created loan certificates, banks issued the certificates to the public as currency. These issues of currency, which were extra-legal, were given legal status by the Aldrich-Vreeland Act, which permitted associations of

national banks to issue temporary currency. National banks used that privilege in 1914.

## RESERVES, CURRENCY AND MONEY

### *Ratio of Reserves to Deposits*

Clearinghouse loan certificates were at least a partial remedy for runs on the banking system because, with access to them, banks could operate with relatively low reserve ratios.<sup>24</sup> Figure 2 shows the reserve ratios for banks in New York City weekly from 1853 through 1909. The vertical lines in the figure indicate the first week when the extraordinary certificates of 1857 or clearinghouse loan certificates were issued. As one can see, the reserve ratios generally drop around the dates when the New York clearinghouse issued loan certificates, reflecting the effects of bank runs. During several periods when they used loan certificates to cover adverse clearings among themselves, the reserves of banks in New York City fell below required levels (25 percent of deposits after 1874) for at least a short period.

<sup>23</sup>Andrew (1908) and Cannon (1910), pp. 107-112, ch. XI, discuss this aspect of clearinghouse loan certificates. Stevens (1894), pp. 145-48, provides some information for 1893 based on contemporary correspondence. Timberlake (1981) discusses the significance of private money in non-panic periods.

<sup>24</sup>It also was possible for the banks to create sufficient loan certificates that interest-earning assets as well as deposits expanded. According to some authors [Cannon (1910), pp. 75-136; Sprague (1910), pp. 45-46, 171], one of the objectives of clearinghouses in authorizing loan certificates was to expand loans by clearinghouse members.

In 1873, 1893 and 1907, the banks in the New York City clearinghouse restricted convertibility shortly after they had begun borrowing clearinghouse loan certificates. The reserve ratio rose sharply after the banks restricted payments, and they built up substantial excess reserve positions before resuming payments to depositors. The New York City banks also built up their excess reserves substantially after they created these certificates in 1860 and 1884, and after the creation of the extraordinary certificates of 1857.

The decreases in reserve ratios at the time of runs were short-lived. Indeed, the quarterly data in figure 3 for all banks in the United States from 1853 to 1935 do not show these sharp declines in the reserve ratio. They do show, though, the increases in the ratio after banks restricted convertibility.

### *Ratio of Currency to Deposits*

We would expect a rise in the ratio of non-bank money held by the nonbank public to bank money in a run on the banking system, at least until banks limited the reserve outflow by restricting payments. The year-end data for 1856 and 1857 show some indication of an effect of withdrawals in the panic of 1857, which occurred in the fall of that year. The ratio of specie held by the public relative to bank notes and deposits rose from 47 percent in December 1856 to 57 percent in December 1857. Figure 4 shows these data and quarterly data on the currency-to-deposit ratio for the U.S. banking system from 1867 to 1935. This ratio generally increases around the dates when banks in New York City issued clearinghouse loan certificates or restricted currency payments.

The most extreme rise in the currency ratio in figure 4 occurs in the early 1930s. Friedman and Schwartz (1963) argue that the rise in the currency ratio was more extreme in the early 1930s than before the operation of the Federal Reserve System because, rather than restricting currency payments, the banks expected the Fed to provide reserves. In the event, the Federal Reserve failed to provide sufficient reserves.<sup>25</sup>

### *Money Growth*

As the example in table 2 illustrates, a bank run results in a decrease in the money stock for a given monetary base. Table 5 shows the quarters with relatively large decreases in the money stock from 1867 to 1935 and zero or positive growth of the monetary base. Every quarter with a decrease in the money stock at greater than a 2 percent annual rate and non-negative growth of the monetary base is included in the table.

Of the six periods in table 5, only one — 1877 to 1878 — is not associated with a restriction of convertibility or the creation of clearinghouse loan certificates in New York City. The decreases in the money supply in 1877 and 1878 occur during the Treasury's retirement of greenbacks prior to resumption of dollar convertibility into gold on January 1, 1879.<sup>26</sup> All of the dates of general restriction — 1873, 1893, 1907 and 1933 — are periods in which the money stock fell and the base increased for at least one quarter. The year 1884 has some characteristics of bank runs: banks in New York City created clearinghouse loan certificates, but conversion of deposits into currency was not restricted. As the table indicates, the highest rates of decrease in the money stock occurred from 1931 to 1933, after the Federal Reserve was established.

### **EFFECTS OF BANK RUNS**

While the previous section presents evidence that there were several episodes of runs on the U.S. banking system before the Federal Reserve was formed, it provides little indication of the importance of their effects. This section provides some perspective on the impact of those runs.

### *Losses by Depositors*

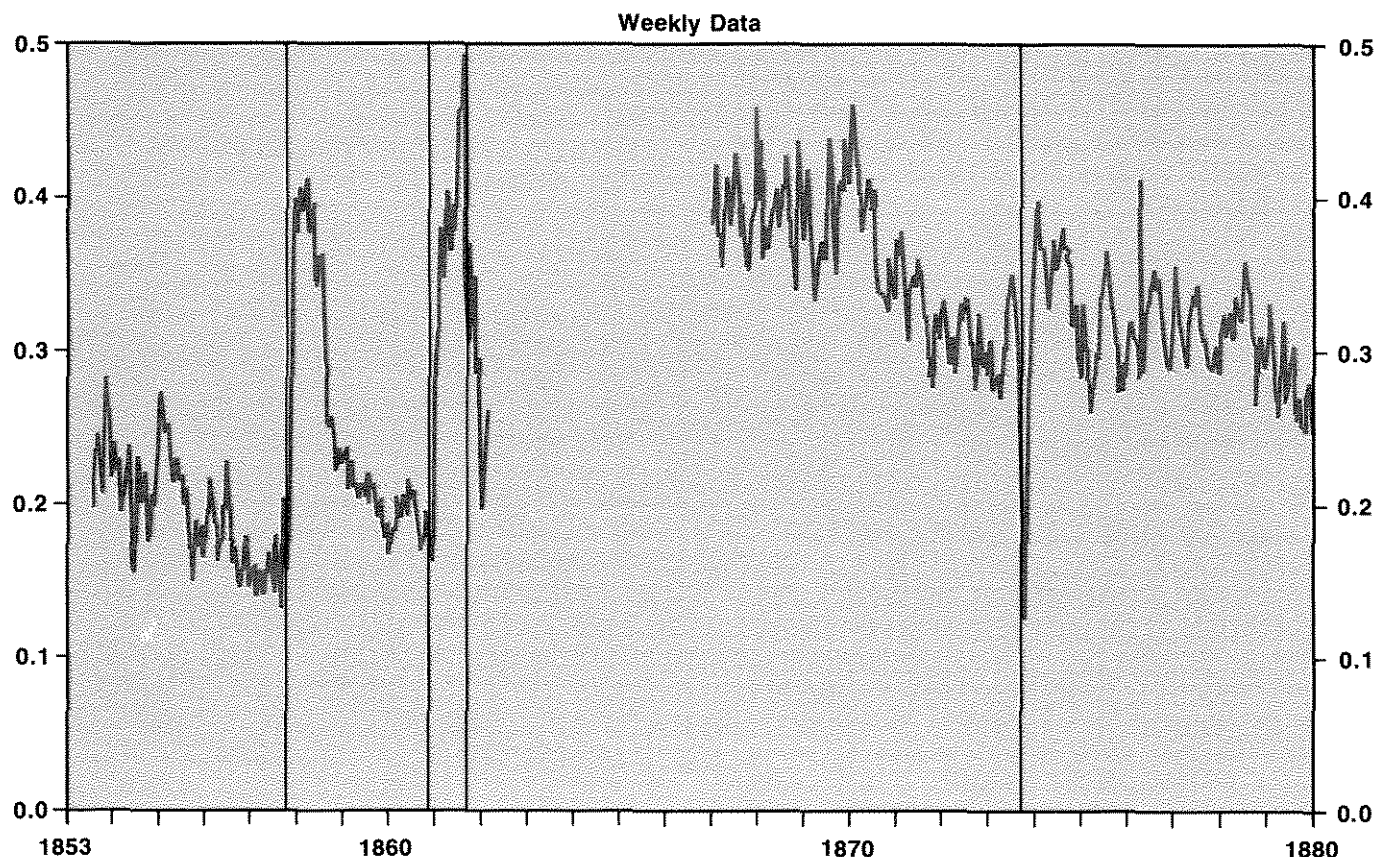
The premiums on currency provide one measure of the cost of runs to bank depositors. In terms of currency, depositors suffered a loss on their deposits during these periods. The premiums indicate that, immediately after runs on the banking system, some people were willing to exchange currency for certified checks at 96 cents or more on the dollar and, within a

<sup>25</sup>See Friedman and Schwartz (1963), pp. 167-72, 308-12.

<sup>26</sup>Friedman and Schwartz (1963), ch. 2, discuss this period in detail. They attribute these movements to runs on banks

outside New York City. Friedman and Schwartz (1963), pp. 56-58, 82.

**Figure 2**  
**Reserve Ratio**



Note: Vertical lines are the dates on which the New York City clearinghouse began issuing loan certificates.

month, the currency premiums were less than 2 percent.<sup>27</sup>

Depositors also suffered losses when banks closed. The total losses borne by depositors in closed banks from 1865 through 1933 were at an annual rate of .21 percent of total deposits. Before the Great Depression, the general trend of these loss rates was downward. The loss rates were .19 percent in 1865-80, .12 percent in 1881-1900, .04 percent in 1901-20, and rose to a peak of .34 percent in 1921-33.

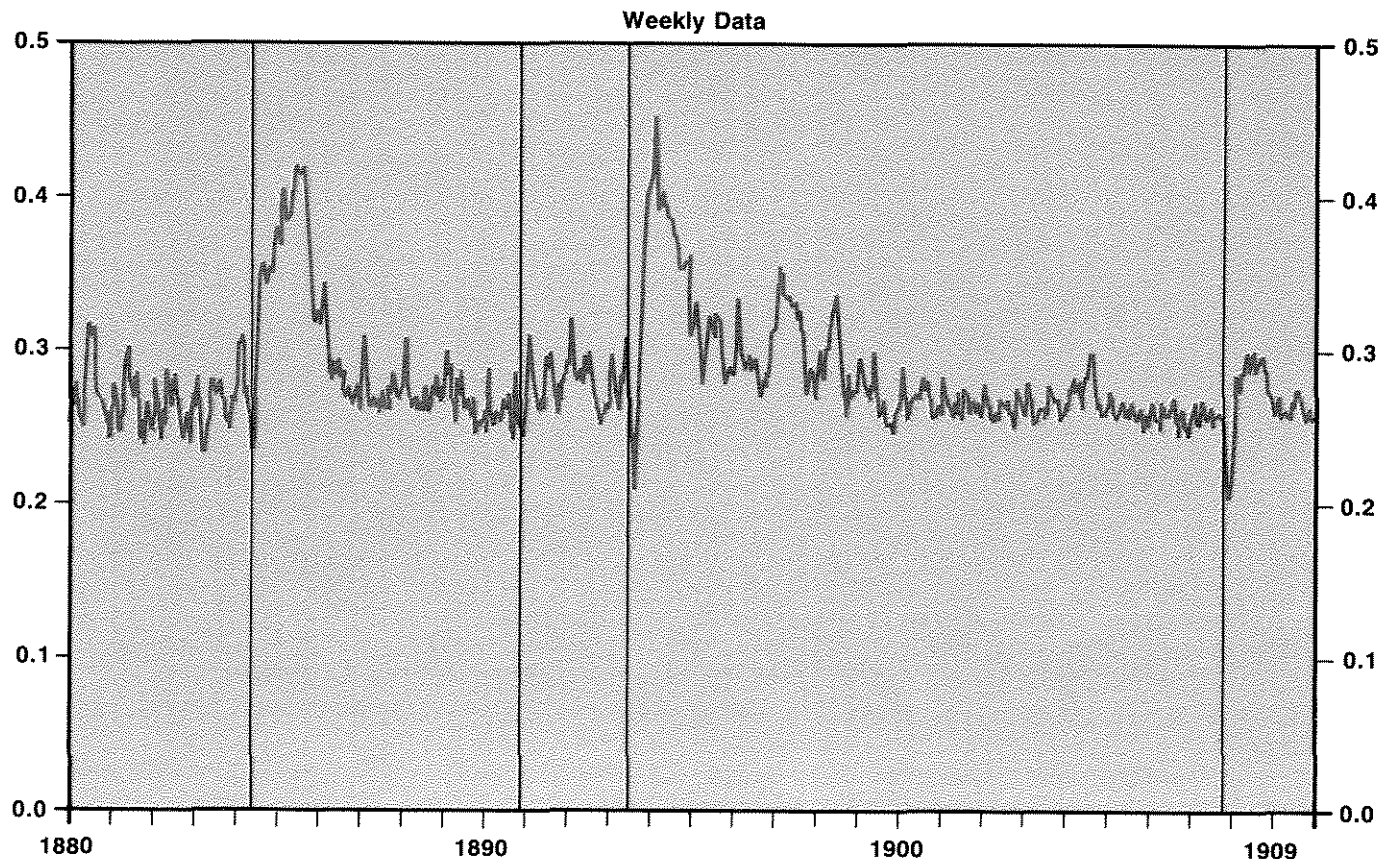
These figures are for all years and understate the loss rates in years with runs. Depositors' losses on total deposits exceed .25 percent in 12 years: 1873, 1875-78, 1884, 1891, 1893 and

1930-33. The average loss rate in these 12 years is .78 percent of total deposits. In all but two of these periods, either convertibility of deposits was restricted or clearinghouse loan certificates were issued in New York City. In only one year was convertibility of deposits into currency restricted, loan certificates issued, and the loss rate less than .25 percent: 1907.<sup>28</sup>

In the 1930s, for which data on individual years are available, it is possible to get reasonably accurate estimates of loss rates borne by the depositors in closed banks. The losses were not borne evenly across the population: an average loss rate per dollar of total deposits of .47 percent of total deposits in 1930 does not

<sup>27</sup>It is worth noting that these losses by depositors were counter-balanced at least in part by gains by holders of currency. The bid-ask spread would be a measure of the direct real resource cost of nonpar trades.

<sup>28</sup>Unfortunately, the data before 1920 are provided only as averages for periods of several years; we know that the loss rates in 1907 and 1908 were not as high as .25 percent, but we do not know more about them.



**Note:** Vertical lines are the dates on which the New York City clearinghouse began issuing loan certificates.

convey the losses borne by individual depositors in individual banks. The average loss rates for depositors in banks that failed are about 28 percent in 1930 and 15 percent in 1933.<sup>29</sup>

In sum, two things seem to be clear from these data. First, some holders of bank liabilities did bear significant losses during periods with runs. These losses were not necessarily caused by the runs themselves. The runs and the losses both may have been triggered by events outside the banking system. It is possible, though, that

the runs increased the losses from what they might have been under different institutional arrangements.

Second, before the creation of the Federal Reserve, depositors' loss rate from failed banks were declining over time. In this regard, it is worth noting that depositors' loss rate in 1907 was not as high as in as many previous periods, even though the panic of 1907 was the apparent impetus for the creation of the Federal Reserve System.

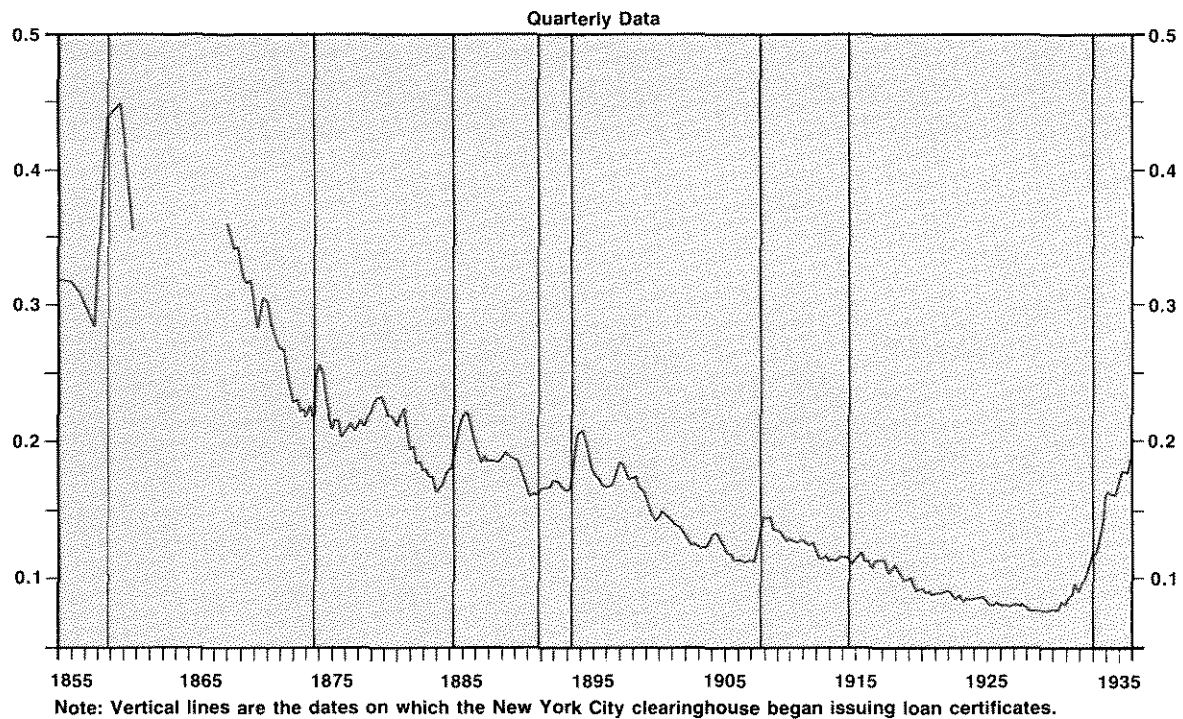
<sup>29</sup>The loss rates in closed banks for every year from 1921 through 1929 are higher than from 1930 to 1933. This decrease in depositors' loss rate in banks closed in years with runs is not necessarily surprising because runs can force banks to liquidate with positive net worth or net worth less negative than it might be otherwise. This latter observation is consistent with the FDIC's observation that

loss rates are less after the 12 "crisis years" than in other non-crisis years. FDIC (1940), pp. 65, 69.

The loss rates for the national banking period are substantially, but not always, lower than some of the loss rates estimated by King (1983) and Rolnick and Weber (1988) for the earlier free banking period (1838 to 1863).



**Figure 3**  
**Reserve to Bank Money Ratio**



**Figure 4**  
**Nonbank Money to Bank Money Ratio**

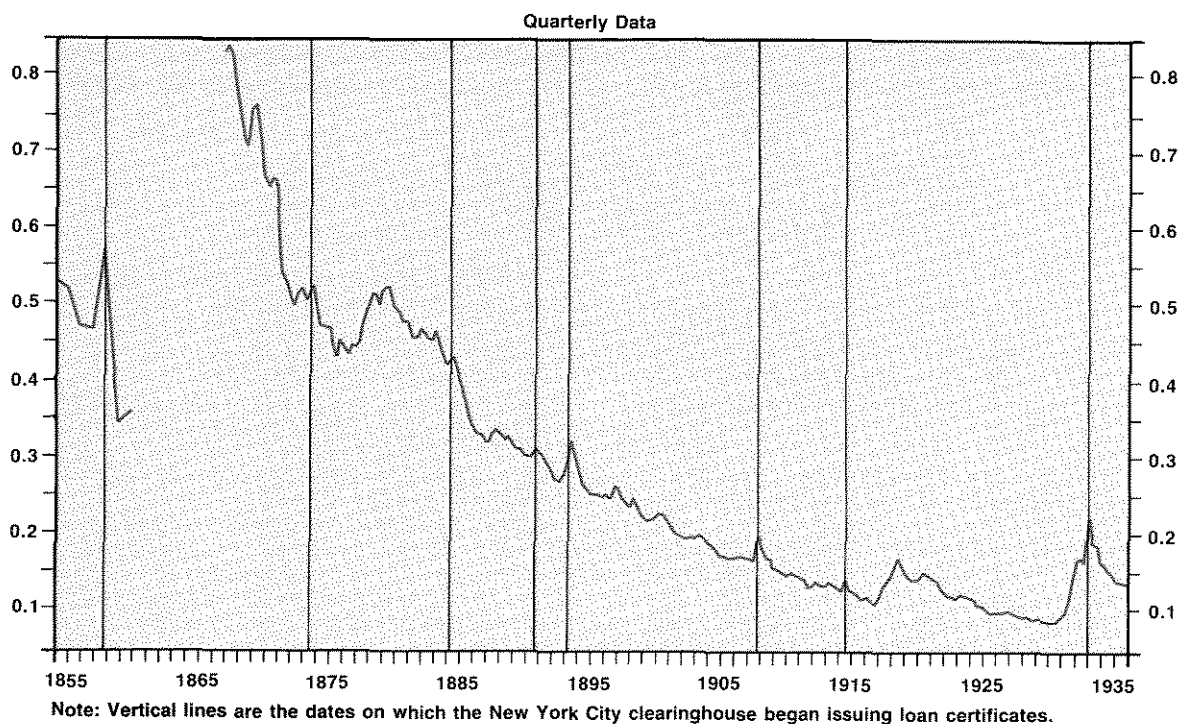


Table 5

**Growth Rates of the Money Supply and the Monetary Base in Periods in Which the Money Supply Declined at More Than a 2 Percent Annual Rate and the Growth Rate of the Monetary Base was Zero or Positive: 1867 through 1935 (annual growth rates of quarterly data, seasonally adjusted)**

Period	Money supply	Monetary base
1873: 4	-13.7%	2.5%
1877: 2	-4.5	0.1
3	-3.8	0.1
4	-7.2	1.1
1878: 1	-4.9	1.1
2	-3.5	4.3
1884: 3	-2.6	8.0
1893: 2	-8.7	2.9
3	-10.7	16.9
1907: 3	-8.0	0.0
4	-11.1	41.3
1908: 1	-5.5	2.1
1929: 1	-3.1	1.9
1931: 2	-11.2	12.5
3	-14.7	11.2
4	-30.8	13.3
1932: 2	-13.6	13.9
3	-5.9	5.7
1933: 1	-39.8	20.7

Sources: see data appendix available on request.

### ***Losses by Bank Shareholders: Bank Failures***

During restrictions, two things happened. Banks were able to stop the drain of reserves and possibly the sale of assets at distress prices. In addition, they were able to take stock and determine which banks might survive the panic. The importance of this effect perhaps is most clearly indicated by a comparison of Illinois and Wisconsin banks just before the Civil War. Banks in Illinois did not restrict specie payments and, ultimately, 93 out of 112 of the banks closed. With similar portfolios of assets, banks in Wisconsin did restrict specie payments and fewer of them, 50 out of 107 banks, ultimately closed.<sup>30</sup>

Another way of getting an idea of the costs to banks is to compare failure rates in banking panics before 1933 with the failure rate in 1933. At the onset of the Depression, banks did not issue clearinghouse loan certificates or restrict currency payments. While the Federal Reserve increased the monetary base, the base was not increased sufficiently to prevent repeated runs until the restriction of payments in the Banking Holiday. As a result, 1933 provides a contrasting indicator of how serious banking panics can be.

Figure 5 shows that banking panics can indeed be associated with relatively large numbers of banks failing. Nonetheless, it is noteworthy that, before 1933, the only year with restriction and a large increase in the failure rate is 1893.

### ***Macroeconomic Effects***<sup>31</sup>

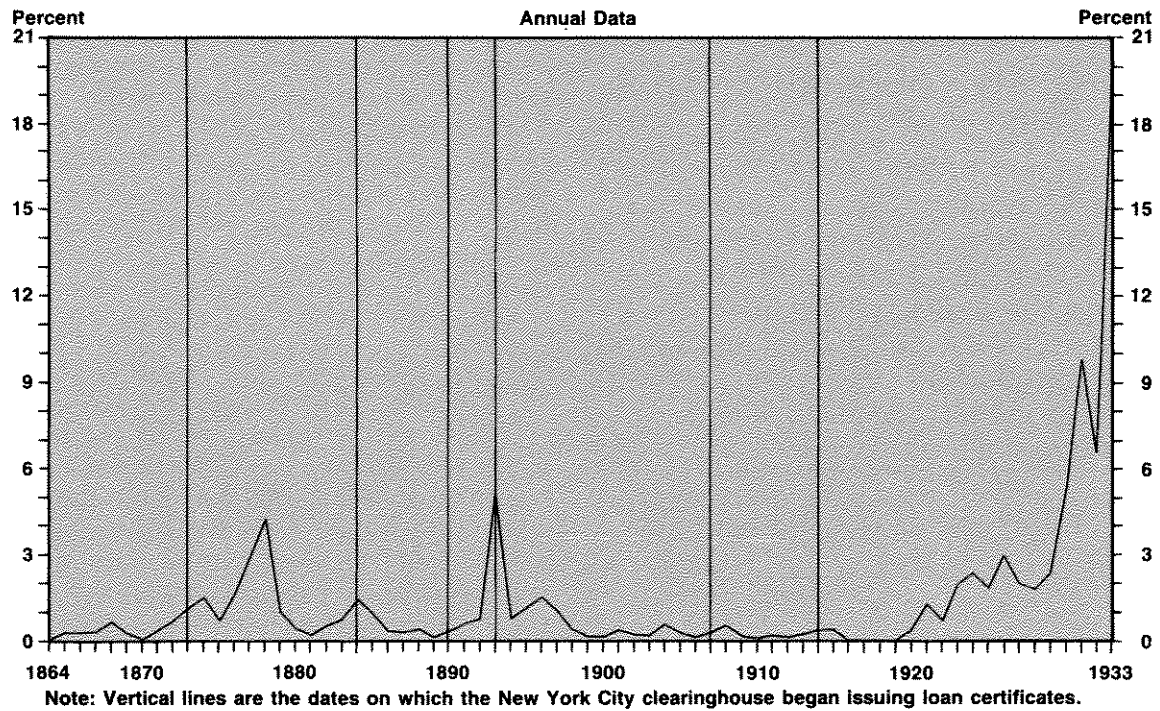
Figure 6 shows the monthly average call loan rate for 1857 through 1935. Call loans are overnight loans with stock as collateral that are callable without notice. Because call loans were a part of their assets that they were not contractually obligated to continue for longer periods, banks in New York City reduced their call loans when they wished to convert part of their assets into reserves. In figure 6, vertical lines denote the periods when banks in New York City restricted convertibility or had large drains

<sup>30</sup>See Dowrie (1913), Krueger (1933) and Economopoulos (1988).

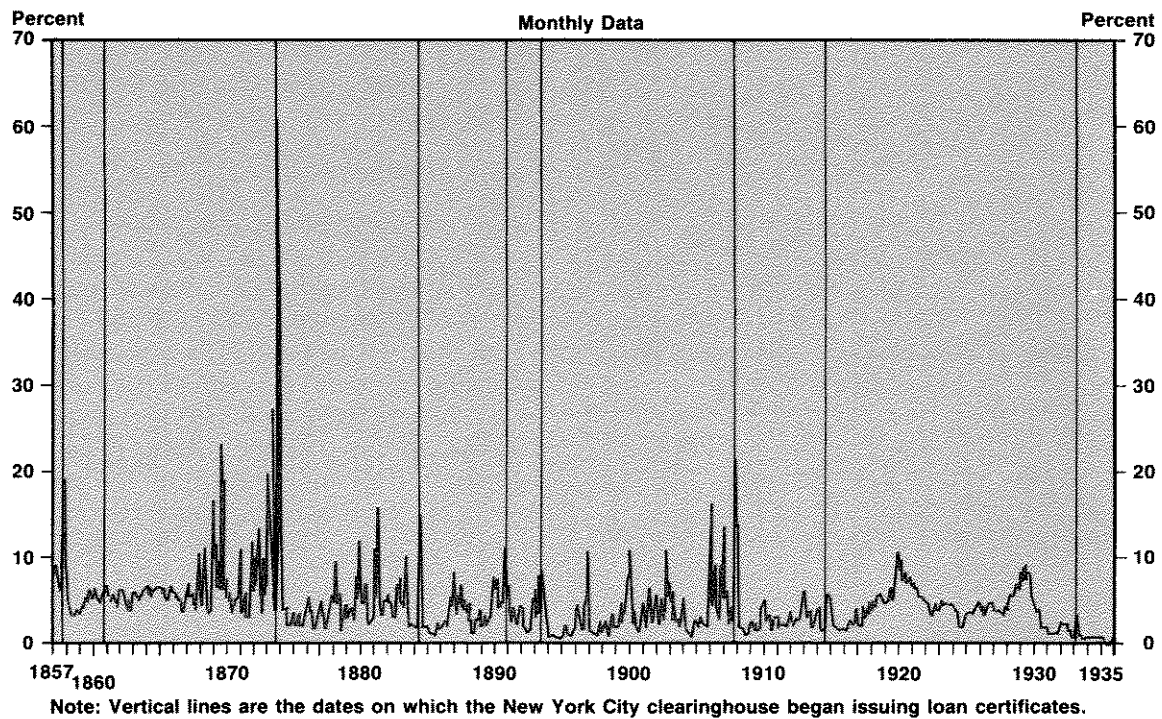
<sup>31</sup>For other discussions of the macroeconomic effects of bank runs, see Friedman and Schwartz (1963), Bernanke

(1983), Bordo (1986), Gorton (1988), Kaufman (1988), Tallman (1988) and Grossman (1989).

**Figure 5**  
**Bank Suspension and Failure Rate**



**Figure 6**  
**Call Rate**





**Table 6**  
**Bank Runs and the Timing and Severity of Recessions**  
**1857 to 1933**

Recession peak	Recession trough	Clearinghouse loan certificates issued	Restriction of currency payments	Percentage change in production
June 1857	Dec. 1858	<sup>1</sup>	Oct. 1857	n.a.
Oct. 1860	June 1861	Nov. 1860		n.a.
April 1865	Dec. 1867			n.a.
June 1869	Dec. 1870			-2.8%
Oct. 1873	March 1879	Sept. 1873	Sept. 1873	-19.3
March 1882	May 1885	May 1884		-13.7
March 1887	April 1888			-9.2
July 1890	May 1891	Nov. 1890		-29.2
Jan. 1893	June 1894	June 1893	Aug. 1893	-54.9
Dec. 1895	June 1897			-21.9
June 1899	Dec. 1900			-6.7
Sept. 1902	Aug. 1904			-20.0
May 1907	June 1908	Oct. 1907	Oct. 1907	-50.8
Jan. 1910	Jan. 1912			-21.1
Jan. 1913	Dec. 1914	Aug. 1914		-45.8
Aug. 1918	Mar. 1919			-8.8
Jan. 1920	July 1921			-71.3
May 1923	July 1924			-53.8
Oct. 1926	Nov. 1927			-17.9
Aug. 1929	Mar. 1933		March 1933	-85.6

<sup>1</sup> Banks created certificates backed by bank notes.

Sources: see data appendix available on request.

of reserves to which they responded by issuing clearinghouse loan certificates. While the increases in the call loan rate associated with restrictions and drains are not unique, some are extraordinary.

Evidence that would support the view that bank runs had adverse effects on the economy would be as follows: bank runs occurred just prior to the onset of recessions, and more severe recessions followed banking panics. Table 6 provides information on the timing and severity of recessions and the timing of bank runs. The data do not support a simple conclusion on the macroeconomic effects of bank runs. Other than the episode in 1873, banks created clearinghouse loan certificates and restricted currency payments several months

after the beginning of the recessions. While some of the more severe recessions occurred when banks restricted currency payments, this is consistent with two very different conclusions: restrictions led to severe recessions, or severe recessions led to restrictions.

Table 6 also indicates that several recessions occurred without runs on the banking system. These observations provide information about the stability of the U.S. banking system without a federal safety net. Several recessions, with declines in real output and losses to businesses, occurred apparently without undermining the confidence of the public in the safety of bank deposits to the point of starting runs on the banking system.

## CONCLUSION

The federal safety net for the banking system includes the Federal Reserve as the lender of last resort, federal deposit insurance, and bank supervision and regulation designed to limit the risk assumed by banks. The rationale for this safety net is that, in its absence, the banking system would be vulnerable to the kind of run on the banking system that occurred in the early 1930s. The run in the early 1930s, however, was, perhaps, the most extreme run on the banking system in U.S. history.

While several runs on the banking system took place before the formation of the Federal Reserve System in 1914, banks took actions that limited their effects. By issuing clearinghouse loan certificates that other banks accepted to clear checks, banks operated temporarily with relatively low reserve ratios. In the more severe runs, bankers jointly restricted payments but continued operating. Moreover, even prior to the creation of the federal safety net in the United States, runs on the banking system were infrequent. The banking system can operate for many years without runs on the banking system, even in recessions.

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