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# **Clearinghouse Access and Bank Runs: Comparing New York and Chicago during the Panic of 1907**

Jon R. Moen and Ellis W. Tallman

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**Abstract:** During the Panic of 1907, New York City trust companies were not members of the New York Clearinghouse whereas trust companies in Chicago were members of the Chicago Clearinghouse. We argue that the apparent isolation of New York City trust companies from the pool of bank reserves controlled by the New York Clearinghouse led to the large-scale depositor runs on the New York City trusts. In contrast, Chicago trust companies had direct access to the Chicago Clearinghouse and their pool of reserves and did not suffer large-scale depositor withdrawals. Statistical evidence on a cross-section of intermediaries in both New York and Chicago supports this contention.

JEL classification: N21, G21

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## **Clearinghouse Access and Bank Runs: Comparing New York and Chicago During the Panic of 1907**

### **I Introduction**

In the Panic of 1907, access to the local clearinghouse is one striking difference separating the institutions that were struck with panic withdrawals and those that were spared. The Panic of 1907 struck the trust companies in New York most severely; the national and state-chartered banks in New York did not suffer panic withdrawals of similar scale.<sup>1</sup> In Chicago, depositors of both national banks and trusts did not engage in large-scale runs during the panic (Huston 1926, p. 360). The different outcomes center on the relationship of banks and trust companies with the private clearinghouses in each city. National and state banks were members of the clearinghouses of both cities. New York trust companies were not members of the New York Clearinghouse, whereas the larger Chicago trusts were members of the Chicago Clearinghouse during the Panic of 1907.

Our main hypothesis is that New York trusts lacked direct access to the New York Clearinghouse and thus were unlikely, in the event of a panic, to tap the pool of reserves controlled by the clearinghouse or, in the event of failure, were not likely to be liquidated at par at the expense of clearinghouse members. The probability that a New York trust would run out of reserves during a panic run was significantly higher than the probability that a bank (or other intermediary) with direct access to the New York Clearinghouse would run out of reserves. Thus, New York trust depositors would be more likely to run their trust than national bank depositors would be to run their bank given conditions that could start a panic.

Our analysis focuses on the relationship of trusts to their respective clearinghouses during that panic, but the inferences may also shed some light on competing theories of banking panics. Models of bank runs differ in their treatment of depositors' perceptions of bank condition. Depositors focus on either bank liquidity, whether the bank has sufficient liquid assets to satisfy demand, or bank insolvency; that is, the liabilities exceed asset value. For example, Diamond and Dybvig (1983) imply that all intermediaries will be subject to bank runs during a panic because the depositors perceive that the entire banking system is illiquid in

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<sup>1</sup> See Moen and Tallman (1992).

the bad equilibrium outcome. In the asymmetric information approach, Calomiris and Gorton (1991) suggest that depositor perceptions of insolvency risk at banks influence the decision to run an intermediary.

It is difficult to disentangle the concept of insolvency from that of illiquidity in the analysis of bank panics. Runs may begin at an intermediary based on unfavorable perceptions of its solvency; however, the subsequent run directly impacts the liquidity of the intermediary, and in panics, liquidity concerns affect the entire intermediation system. Our strategy to address this issue is to generate simple empirical implications that the respective theories provide. Then, we compare these predictions to the recorded events from the panic to suggest which theory better explains the outcomes.

The panic-induced runs at New York City trust companies during the Panic of 1907 appear more consistent with an altered liquidity argument. In this view, depositors choose whether or not to run their intermediary in the midst of aggregate signals of a weakened intermediation system but are unable to distinguish weak from strong institutions because they lack sufficient information. Rather than removing deposits from all intermediaries, depositors choose to run institutions based on the size of the cash reserve pool that the intermediary can draw upon. Depositors would run the intermediary with the most limited reserves supply because those institutions are most likely to have to suspend operations in the face of a panic-induced run and impose at least a transitory cost on depositors.

Members of clearinghouse associations, with potential access to the pool of liquidity under clearinghouse control, would be less likely to be subject to panic-induced runs. Nonmember intermediaries without a likelihood of access to additional liquidity would be more likely candidates for runs. Further, we test our hypothesis that access to liquidity through the clearinghouse was an important characteristic for whether an intermediary was run by using a data set comprised of all New York City and Chicago trusts and state banks.

We employ call report data from state banking authorities in New York and Illinois for August 1907 prior to the panic (August 22 for New York, August 20 for Chicago) to measure

explanatory variables for financial strength (or solvency) and for liquidity (cash relative to demandable liabilities). We use these variables to explain the cross-sectional behavior of the percentage change in demand deposits from the August call report until the next report that follows the run.<sup>2</sup> In addition to the balance-sheet variables, we constructed three dummy variables to control for institution location (New York or Chicago), institution type (trust or state bank), and clearinghouse membership. The results show that only the liquidity proxy and the clearinghouse membership dummy variables have statistically significant explanatory power for the cross-section of the percentage changes in demand deposits. The positive coefficients for each of these variables suggest that liquidity and access to clearinghouse liquidity were important factors for reducing the impact of the Panic of 1907 on this set of intermediaries.

We believe our limited liquidity criterion for bank runs describes several aspects of the Panic of 1907. It also provides an application of a modified version of the Diamond-Dybvig (1983) model of bank runs. Rather than applying it to the entire banking system, we feel it is useful in explaining a systemic run on a single class of intermediary within the banking system, the trust companies.

## **II. Evolution of Trust Companies in New York and Chicago**

Trust companies were initially intended to hold accounts in trust for private estates. During the early 1890s, trusts were typically small and conservative institutions with substantial leeway to invest their assets. The small proportion of assets held by trusts during much of the National Banking Era offered little threat to the payments system through individual trust failures. The growth in trust assets at the turn of the century came about in large part from the efforts to innovate around the restrictions placed on the national banks.

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<sup>2</sup> The call reports for the New York intermediaries took place December 19, 1907, whereas the Chicago call reports were dated November 19, 1907. In both cases, there appeared ample time for the panic to strike each place. The panic began in earnest on October 23, 1907, when the Knickerbocker Trust in New York City suspended.

The activities that trusts could engage in were profitable and desirable for national banks, and they attracted the attention of national banks in New York City and Chicago.

Trusts could invest in real estate, underwrite stock-market issues, make loans against stock market collateral, and own stock equity directly in addition to taking in deposits and clearing checks. Trusts in Chicago were also interested in providing unsecured lines of commercial credit as well (James 1938, p. 702). National banks made loans against stock market collateral (call loans), but the other activities of trusts had been prohibited by the National Bank Acts. National banks were restricted to making commercial loans, issuing bank notes, and taking in deposits. In both New York and Chicago trusts took advantage of their unregulated status only relatively late in the National Banking Era. By 1907, however, trust companies in New York and Chicago were fully exploiting their investment capabilities.

Trusts operated under similar regulatory restrictions in New York and Chicago, although there were a few differences. In Illinois, trusts had the same capital requirements as state banks, whereas New York trusts had higher capital requirements than state banks for similar-sized intermediaries. Both states imposed double liability on stockholders of trusts, and both states began supervision of trusts in the mid-1880s. Illinois had no legislated required reserves for trust companies. New York imposed required reserves on trusts in 1906, and those requirements were lower than those of state banks. New York state banks held reserves in lawful money at 25 percent of demand deposits; New York trusts, on the other hand, held reserves of 15 percent of demand deposits, two-thirds of which had to be in lawful money, and the other one-third could be in New York national bank deposits.<sup>3</sup> New York trusts could hold real estate assets up to 15 percent of total asset holdings; Illinois imposed no such restriction. Deposits or loans at Illinois trusts could not exceed 10 percent of capital and surplus. On net, it appears that New York trusts were under somewhat more legislative restriction than Chicago trusts.

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<sup>3</sup> See Wellton (1910). Lawful money consisted of specie, gold and silver certificates, treasury notes, U.S. notes (greenbacks), and national bank notes. However, national bank notes were not considered legal tender.

Trust company assets and liabilities between 1896 and 1906 grew more quickly than did those at national banks in New York around the turn of the century. Contemporary observers recognized the rapid growth of trust companies in New York and comparable growth in Chicago.<sup>4</sup> One result was that by 1907 the trusts in each city controlled a volume of assets comparable to the national banks.<sup>5</sup>

New York City played a more central role in the U. S. financial system than did Chicago. Table 1 shows that the total assets of all New York City trust, state banks, and national banks were over three times the size of all Chicago trusts, state bank, and national bank total assets. Nevertheless, we can use the different experiences of the intermediaries of these cities to infer the main contributing factors that led to the massive withdrawals from New York City trust companies. There were enough similarities between the two financial markets to justify such a comparison.

The broad responses to the panic were also similar in both cities. Clearinghouse certificates were issued in both cities. Chicago banks, like those in New York, imported gold directly from London to maintain reserves.<sup>6</sup> Thus, while the panic posed similar threats to both money markets, and the responses by intermediaries to protect the payments system were similar, the outcomes were noticeably different.

### **III. Different Responses to the Panic: The Role of the Clearinghouses**

In New York City, the trust companies suffered tremendous withdrawals during the Panic of 1907. The most significant runs on deposits in New York City occurred at the trusts,

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<sup>4</sup> For New York, see Barnett (1910, pp. 234-35). Moen and Tallman (1992, p. 612) use these numbers to highlight the tremendous growth in trust assets. In New York from 1897 to 1907, trust assets grew from \$396.7 million to \$1.364 billion, whereas national bank assets grew from \$915.2 million to \$1.8 billion. For Chicago, loans grew from \$91.4 million to \$208 million at national banks and from \$44.3 million to 204.5 million at trust companies.

<sup>5</sup> During that period of trust growth, there was considerable amalgamation of smaller trusts and savings banks into large institutions that rivaled some of the larger national banks in total assets.

<sup>6</sup> See James (1938, pp. 764-65). See also Sprague (1910, p. 297).

not the national banks. Figure 1 emphasizes how deposits in New York trust companies contracted by almost 40 percent during the Panic of 1907. There is a slight increase in national bank deposits.<sup>7</sup>

In contrast to New York City, the movements in demand deposits at the trust companies in Chicago were much less severe. There was no large-scale withdrawal of deposits from Chicago trust companies and no obvious difference between the treatment of trusts and national banks in Chicago by depositors. Figure 2 presents the movements of demand deposits in Chicago for national banks and trust companies between 1904 and 1909.

Deposits contracted marginally during the panic in Chicago at national banks and at trusts. At the trusts, deposits contracted by approximately 6 percent from August to November of 1907. Deposits at national banks declined by 7 percent over the same period, whereas state bank deposits fell by 9 percent. The overall contraction in deposits among intermediaries was much less severe than observed in New York City at this time. In Chicago, the timing of the contraction in deposits was similar for both types of intermediaries; in contrast, deposits contracted at the trusts in New York City, but they increased at the national banks.

Perhaps the most important structural difference between the trusts in Chicago and New York was the relationship of trust companies to their respective clearinghouses.<sup>8</sup> The private clearinghouses had evolved into a monitoring agency, a mechanism for bank coinsurance as well as the main method of bank check clearing. During a panic, if a clearinghouse member bank appealed for aid, the local clearinghouse, as a private institution, would take into account the potential loss of loans imposed on the clearinghouse if a stricken bank eventually failed.

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<sup>7</sup> State bank deposits in New York contracted by approximately 16 percent during the panic.

<sup>8</sup> One apparent difference between trusts in New York and Chicago was that they were viewed as serious competitors by the national banks in New York. Trusts and national banks in New York had become more intense rivals over time, with the banks believing they had a "trust company problem" (Redlich 1968, vol. 2, p. 178). We have been unable to find evidence suggesting a similar adversarial relationship in Chicago.



The clearinghouse would typically have enough information on the balance sheet condition of the bank to make an informed decision about whether to aid the member bank.<sup>9</sup> As in Chicago, the New York clearinghouse required members to submit regularly balance sheets that were publicly available through the clearinghouse or the state banking regulator. In both cities the clearinghouse had the power to examine the books of member institutions if there was reason to believe a member was facing insolvency.<sup>10</sup> In general the clearinghouses had a great deal of member-specific information, allowing the clearinghouses to make informed decisions regarding liquidity provision to ailing members. Trusts in New York City, as non-members, were not monitored as regularly nor as intensively by the clearinghouse, and thus the clearinghouse could not make decisive actions without tedious and protracted examination of trust books first. This was the reason given by Benjamin Strong to J.P. Morgan and other bankers in the Panic of 1907 for their inability to grant aid quickly to the Knickerbocker Trust.<sup>11</sup>

Unlike New York, the larger trusts in Chicago were full members of the clearinghouse, and the larger trust companies as well as national banks cleared checks for the smaller banks and trusts. Thus, unlike in New York during the panic, the Chicago Clearinghouse did not isolate the trust companies.<sup>12</sup> In 1907, the Chicago Clearinghouse Committee, made up of six

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<sup>9</sup> Timberlake (1984) noted that clearinghouses were effective in preventing the collapse of a fractional reserve system, emphasizing their ability to gather its members into a single force during a crisis. Although he does not explicitly argue the point, the examination powers and the ability to defend particular members were also important central bank powers held by the private clearinghouses. Gorton (1985) describes the authority the New York Clearinghouse had over member banks, particularly during crises when clearinghouse loan certificates were issued.

<sup>10</sup> The Chicago Clearinghouse formalized the examination powers of clearinghouses when it established an office of independent examiner in 1905. The examiner had the power to examine in detail the books of member institutions at the request of the clearinghouse committee, and many cities followed suit, including New York (James 1938, Redlich 1968).

<sup>11</sup> While trust companies in New York were isolated from the clearinghouse in 1907, trusts had such access at an earlier time. Many trusts had been full members of the New York Clearinghouse up to 1903, but New York national banks complained that the trusts' ability to engage in commercial bank activities without holding the large cash reserves of central reserve city national banks was unfair. In response, the New York Clearinghouse passed a rule requiring member trusts to maintain a cash reserve with the clearinghouse. Rather than pay the larger reserve tax, trust companies quickly terminated their membership to the New York Clearinghouse in response to the rule, and withdrew completely from the clearinghouse (Smith 1928, pp. 346-49).

<sup>12</sup> The Chicago Clearinghouse contemplated imposing a reserve requirement on member trusts comparable to those issued by the New York Clearinghouse, but such a rule was never adopted (James 1938, p. 729).

executives of the clearinghouse, was equally represented by three presidents of large national banks and by presidents of the three largest trust companies in Chicago.<sup>13</sup>

Chicago trust companies held larger cash reserves than New York trust companies, another indicator of higher liquidity.<sup>14</sup> Chicago trusts may have held these reserves in order to retain their membership in the clearinghouse; the Chicago clearinghouse had at some time considered levying *minimum reserve standards*, and though the requirement never passed, that threat likely remained. Secondly, clearinghouse membership and the implicit restrictions that the monitoring imposed may have altered the asset portfolio that the Chicago trusts held. The higher cash reserves in Chicago trusts relative to New York trusts may reflect the evolution of the institutions to the most profitable business in their environment; however, the trusts were similar in the level of legislated regulation. The choice of retaining membership in the clearinghouse may be the most notable difference between the trusts in New York and those in Chicago.

The Knickerbocker Trust was forced to suspend operations as a result of the massive depositor withdrawals and no aid from the New York Clearinghouse in October of 1907. The depositor withdrawals spread among the remaining New York trust companies, but the most notable was the run at the Trust Company of America.<sup>15</sup> Unlike the Knickerbocker Trust, Benjamin Strong determined that the Trust Company of America was solvent, and clearinghouse aid was forthcoming. When the trust panic became widespread and appeared to threaten the banks, the clearinghouse along with J.P. Morgan organized mechanisms to supply liquidity to the trust companies. The solution to the panic required some orchestration by J.P.

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<sup>13</sup> Bank presidents were J.B. Forgan, Ernest A. Hamill, and George M. Reynolds. Trust company presidents included John J. Mitchell, Byran L. Smith, and Orson Smith (Huston 1926, pp. 507, 511).

<sup>14</sup> Calculated from the Reports of the Trusts to the New York Clearinghouse and the Report of the Illinois Auditor of Public Accounts. The total level of reserve assets (including deposits at "approved depositories") was about 20 percent of demand deposits in New York. In essence, New York national banks "taxed" the trusts by "forcing" them to keep higher clearing balances on deposit with national banks.

<sup>15</sup> A run at the smaller Lincoln Trust was also publicized in press accounts.

Morgan and substantial liquidity provided by the clearinghouse banks, the Treasury, and private businesses.<sup>16</sup>

The close relationship between the stock market and the banking system in New York may have contributed in part to the more extreme response to the 1907 panic in New York City than in Chicago.<sup>17</sup> However, both national banks and trusts in New York had the potential for greater exposure to the stock market. For example, national banks in New York invested their banker's balances, deposits from other banks used to meet the reserve requirements established under the National Banking Acts, in the call loan market at the stock exchange.<sup>18</sup> Collateralized loans, a grouping that includes call loans, comprised over 85 percent of New York trust loans and over 55 percent of New York national bank loans in 1907. In Chicago, collateralized loans at trusts in 1909 were over 65 percent of loans.<sup>19</sup> Thus, it is unlikely that exposure of asset value to stock market fluctuations would be a key feature distinguishing New York trusts from New York national banks or from Chicago trusts.<sup>20</sup>

Table 2 displays the average balance sheet ratios for each type of intermediary. The ratio of deposits to total resources presents a notable difference between intermediaries in New York and Chicago. Chicago trusts and state banks held approximately equivalent amounts of deposits in time and demand deposit accounts. New York trust companies held 90 percent of

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<sup>16</sup> For a detailed description of the panic, see Moen and Tallman (1990). See also, Chernow (1990, pp. 121-26).

<sup>17</sup> Given the smaller stock exchange and lower volume of banker's balances in Chicago, it seems likely that call loans like those in New York were less important in the portfolios of Chicago intermediaries. James (1938, pp. 787-88) notes that banks and trusts in Chicago depended much less on stock exchange business than did those in New York.

<sup>18</sup> A dissertation by H. Peers Brewer (1986) presents detailed evidence on the assets and liabilities of several trust companies in New York in 1885. Their loans were dominated by call loans (Table 3:15b, d).

<sup>19</sup> Unfortunately, this is the first data point that makes the distinction between the composition of trust loans in Chicago.

<sup>20</sup> Except for New York national banks, we do not have direct data on the percentage of collateralized loans that were explicitly call loans.

deposits in the form of demand deposits. For our analysis, we focus on demand deposits because the demandable debt is the type most likely for depositors to withdraw during a panic, because the banks were required by law to honor such withdrawals at par on demand.<sup>21</sup>

The regulations that trusts faced in Chicago and New York were unlikely to cause differential reactions to the Panic of 1907. The state laws regulating trusts do not appear to have differed significantly between New York and Illinois. Indeed, New York's statute was often used as a model by other states drafting regulations covering state-chartered institutions.<sup>22</sup> In both New York and Chicago the trusts were not entirely independent of the banks. In New York national banks sometimes operated trust departments or owned controlling interests in trust companies. Bankers sat on the boards of directors of trust companies, and in Chicago one of the larger trust companies was owned directly by a national bank.<sup>23</sup> Nevertheless, the very largest trust companies in New York and Chicago were independent of the national banks, like the Knickerbocker Trust Company and the Trust Company of America in New York and the Merchants Loan and Trust Company and the Illinois Trust and Savings Bank in Chicago.

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<sup>21</sup> New York state bank balance sheets had no breakdown of deposits between time and demand deposits. We suspect that the state banks held mostly demand deposits because (1) they held the high cash-to-deposit ratio (see Table 2) and (2) New York trusts held 90 percent of deposits as demand deposits, and in Chicago the state banks and trust companies held similar proportions of demand and time deposits. However, we investigated the sensitivity of our regression results to state bank demand deposits as a declining percentage of total deposits. See below.

<sup>22</sup> See Magee (1913), Welldon (1910).

<sup>23</sup> The First National Bank of Chicago, one of the two largest banks in the nation by 1907, had established its own trust company, the First Trust and Savings Bank. James B. Forgan, president of both the First National Bank and the First Trust and Savings Bank, designed an ownership arrangement that gave the bank and several of its officers complete control over its trust company by acting as trustee for the bank's stockholders (James 1938, pp. 693-95). Forgan was apparently concerned that if the stockholders of the First National Bank were given direct ownership of the trust's stock, over time control of the trust company could slip away from the bank as the bank's stockholders sold their trust shares to outsiders.

#### **IV. Contrasting the Illiquidity and the Insolvency Arguments**

This paper contends that the probability that an intermediary would run out of reserves during a panic was a primary consideration for the decision by depositors to run that intermediary. Liquidity-based bank run theories have few direct empirical predictions that are distinct from the insolvency-based theories. However, there are some observable features of the 1907 panic that seem more consistent with one theory than the other.

The liquidity-based story that we propose predicts that bank runs will occur when depositors view the reserves in the intermediary system as insufficient to quell demands for liquid assets. Intermediaries that have lower reserves or less access to excess reserves will be subject to runs despite adequate balance sheets. Those institutions unable to quell the liquidity demands will be forced to suspend operations, but they will reopen after adequate reorganization of asset portfolios.

A solvency-based story predicts that bank runs will occur when depositors view their intermediary as having insufficient assets to cover liabilities. The asymmetric information arguments suggest that depositors are unable to determine whether or not their institution is insolvent, but in the presence of an aggregate indicator of insolvency they withdraw deposits from weak intermediaries. One would expect that there would be a higher rate of failure, that is, permanently closed intermediaries, under the information asymmetries view, during and after bank runs. The types of evidence that will sharpen the distinctions between the two theories are: the numbers of temporarily suspended trusts as well as the numbers of permanently failed trusts in New York and in Chicago and the numbers of trusts that were liquidated by the Chicago Clearinghouse but at par.

Access to the clearinghouse may indicate access to liquidity, the effective monitoring of intermediaries by the clearinghouse, and the coinsurance aspect of clearinghouses.

Clearinghouse membership in the presence of insolvency risk may imply a likelihood that depositors will be made whole in the event of liquidation, the insurance value of membership.

The same clearinghouse access in the liquidity story may suggest that the intermediary has

reserves in addition to its own to quell liquidity demands. We cannot get inside the minds of depositors to distinguish clearly these associated aspects of clearinghouse access. However, the experience of Chicago versus New York provides an observation of whether clearinghouse membership allowed insolvent trusts in Chicago to be liquidated at par.

The two theories make different predictions about the behavior of other unaffected intermediaries during a panic. If the source of the depositor runs was perceived insolvency risk, one would expect substantial insolvencies and permanent closures of the insolvent institutions enforced either by the clearinghouse or the courts. Also, we would suspect that private market participants would not loan to intermediaries that were insolvent. If clearinghouse membership reflected the effective monitoring of the members, then we should expect a higher degree of insolvency among nonmembers. In a liquidity risk-based run, one would expect only temporary suspensions by a stricken trust or large amounts of liquidity provided to an intermediary that remained open.

Evidence from the Panic of 1907 tends to support the liquidity-based theories of bank runs. In New York for the Panic of 1907 with total trust deposits of \$700 million, we find only temporary suspensions, namely Knickerbocker Trust (\$50 million in deposits), Williamsburg Trust (\$7 million in deposits), and the Jenkins Trust (\$4 million in deposits).<sup>24</sup> Both Knickerbocker and Williamsburg reopened as smaller institutions later in 1908, and Jenkins reorganized as the Lafayette Trust.<sup>25</sup> There was an explicit rivalry between New York trusts and national banks.<sup>26</sup> It is unlikely that national banks (the members of the clearinghouse) would extend aid to insolvent trust companies because the private banks risked their own capital. The historical record demonstrates that the New York Clearinghouse and J.P. Morgan, both representing private business interests with profit-making motives, lent heavily to the trust companies during the panic.

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<sup>24</sup> The figures are taken from the August 22, 1907, clearinghouse report on the condition of New York City trusts.

<sup>25</sup> Annual Report of the Superintendent of Banks of New York State, 1908, page 9.

<sup>26</sup> See McCulley (1992, pp. 202-205).

For Chicago, no trusts permanently closed as a result of the Panic of 1907. Trusts in Chicago were not hard hit by the panic, nor were there any failures of banks in Chicago as a result of the Panic of 1907 (Huston 1926, p. 380). It also appears that there were no temporary suspensions of trust companies, at least observable at the frequency of our data.<sup>27</sup> This outcome is not surprising given that trusts were not run in Chicago.

## V. Empirical Evidence from Cross-section Regression

### *Empirical Model*

We examine how clearinghouse membership influenced the percentage change in demand deposits among individual trusts and state banks in New York and Chicago during the Panic of 1907 in a regression that employs data from state banks and trusts in New York and Chicago, respectively.<sup>28</sup> We employ proxy measures for solvency, or “financial strength,” and liquidity in the regression specification to capture the variation across intermediaries of these two concepts. For a liquidity proxy, we use the ratio of cash (specie, legal tender notes, and national bank notes) to demand deposits; solvency is measured by capital and surplus and undivided profits relative to total resources. To capture the role of the clearinghouse, we employ a dummy variable that is one for an intermediary type that has clearinghouse membership and zero for a nonmember.<sup>29</sup> We create a location dummy to account for any systematic differences between New York and Chicago not already accounted for by the balance sheet data, which takes the value of one for Chicago and zero for New York. Finally,

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<sup>27</sup> The reports of the Illinois auditor of public accounts contain balance sheets for trusts as of August 20, 1907, and November 19, 1907. All trusts reporting in August also reported in November. No failures of trusts were reported between August and November of 1905, September and November of 1906, and September and November of 1908. One small trust failed between September and November of 1909.

<sup>28</sup> We were unable to identify a balance sheet data source for individual national banks in New York and Chicago.

<sup>29</sup> We assign membership in the clearinghouse to any institution of an intermediary type in which some institutions are members of the clearinghouse. We suggest that this type of intermediary has access to the clearinghouse because there are other institutions of that *intermediary* type that are members of the clearinghouse. At this time, this definition of clearinghouse membership is crude; however, the trusts in New York were explicitly outside the clearinghouse, and this dummy variable adequately picks up that point.

we employ an intermediary type dummy that is one for trusts and zero for state banks. The regression appears below:

$$\% \Delta DD = \alpha + \beta_1 (\text{Cash}/\text{DD})_{.1} + \beta_2 (\text{Capital}/\text{TR})_{.1} + \beta_3 \text{DUMTR} + \beta_4 \text{DUMCHI} + \beta_5 \text{DUMCLR} + \varepsilon$$

where:  $\% \Delta DD$  -- percentage change in demand deposits from before to after the panic;  
 $(\text{Cash}/\text{DD})_{.1}$  -- ratio of cash to demand deposits before the panic (-1);  
 $(\text{Capital}/\text{TR})_{.1}$  -- ratio of capital (plus surplus and undivided profits) to total resources;  
DUMTR, DUMCHI, and DUMCLR are dummy variables for trusts, Chicago, and clearinghouse membership, respectively; and  
 $\varepsilon$  -- the random error term.

The two balance-sheet ratios indicate the adequacy of the intermediary's capital and liquidity position prior to the panic. A higher ratio for either measure indicates a stronger position for the intermediary. The higher the amount of cash relative to reserves, the longer an institution can undergo a run by depositors; an institution with a higher capital-to-total-resources ratio can withstand larger losses without falling into insolvency. We expect positive signs for the coefficients on these two balance-sheet variables. For the dummy variables, one might expect the Chicago dummy to have a positive coefficient and the trust dummy to have a negative coefficient. For the clearinghouse dummy, we suggest that clearinghouse membership implied a likelihood that the clearinghouse would issue additional liquidity to a solvent member institution if it were subject to a run. Thus, we expect the clearinghouse dummy to have a positive coefficient in this regression.

### *Empirical Results*

The data set consists of balance sheet data for 120 intermediaries (state banks and trusts in New York and Chicago) in total, but we eliminate 12 observations based on either missing data for the intermediaries or particular characteristics of the intermediary that make the



institutional classification questionable. Five institutions suspended operations during the panic, so we do not have the percentage change in deposits observations for these intermediaries.<sup>30</sup> The Queens County Trust apparently had most of its demand deposits converted into certificates of deposit, so the virtual depletion of demand deposits appears suspect. In Chicago, Drovers and Pearson-Taft state banks held no demand deposits. Farwell Bank and Stockyards Trust held very few deposits relative to other liabilities.<sup>31</sup> The Commonwealth Trust in New York and the U.S. Trust in Chicago held capital, surplus, and undivided profits of nearly 95 percent of total resources, displaying behavior more like an investment fund than an intermediary in the payments system. Figure 3 presents graphical plots of the transformed data used in the estimations below.

The estimation results in Table 3 support the inclusion of the clearinghouse membership dummy variable in the cross-sectional regression. The positive and significant coefficient estimate suggests that clearinghouse members have a mean percentage contraction in demand deposits that is 20 percent smaller than those of nonmembers, suggesting that depositors withdrew deposits from clearinghouse member institutions much more modestly than from the nonmember trusts. The coefficients on the other two dummy variables are not significantly different from zero. The coefficient on the solvency variable is positive, consistent with our hypothesis, but is not significantly different from zero. In contrast, the positive and significant coefficient on the cash to deposits ratio measure provides further evidence to support the idea that an intermediary's liquidity position influenced the probability that the intermediary would be run (the intermediary's demand deposits would contract).<sup>32</sup>

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<sup>30</sup> The institutions were the Knickerbocker Trust, Williamsburg Trust, Jenkins Trust, the Borough Bank of Brooklyn, and the Brooklyn Bank in the City of New York, all of which were located in New York City.

<sup>31</sup> We performed sensitivity analysis for the suspended institutions by assuming a percentage contraction in demand deposits. The results for the clearinghouse dummy variable remain statistically significant when the percentage contraction for the suspended institutions is between 0 and 70 percent. Similarly, we investigated the impact of lowering the percentage of state bank deposits that might be demand deposits. The clearinghouse dummy coefficient remains statistically significant at the 5 percent level even if demand deposits went as low as 66 percent of total deposits; it remained statistically significant at the 10 percent level as low as 55 percent.

<sup>32</sup> We estimated regressions that include an institution size variable (total assets) as well as one with an asset composition variable (loans relative to total resources). In both cases, the additional variable coefficients were not

### *Discussion*

The results of the cross-section regression are consistent with the view that liquidity and access to liquidity via clearinghouse membership were important indicators of the contraction of deposits during the Panic of 1907. It is notable also that the solvency variable is not statistically significant in this regression. The evidence does not disprove the idea that insolvency perceptions are important during banking panics because we are unable to measure the anticipated losses on loan portfolios among these intermediaries. However, we are able to use measurable data that provide statistical evidence consistent with an important role for liquidity and clearinghouse access to liquidity consistent with our hypothesis.

### **VI. Some Implications of the Panic in Chicago and New York**

Considering the structural similarities and differences in the New York and Chicago money markets, we suggest the following interpretation of the differences in depositor behavior. Despite panic circumstances, direct access to the liquidity of the clearinghouse appeared crucial to prevent panic and runs at Chicago trusts. As general members of the Chicago Clearinghouse, trust companies were perceived as having access to the pool of reserves under the control of the clearinghouse.

We suggest that the isolation of trusts from the pool of reserves controlled by the clearinghouse was the key element in propagating the runs on the New York City trust companies. In Chicago, as in New York, the government regulated the trusts differently than the federally chartered national banks but not so differently from state banks. The disparity in official regulation between trusts and banks in Chicago, however, was offset by reliable access to additional reserves through the clearinghouse. These results caution, however, that the simple existence of a clearinghouse is not enough to provide stability to a banking system, particularly if the coverage of the clearinghouse is circumscribed. The broader coverage of the

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significantly different from zero and the results for the remaining coefficient estimates were virtually unchanged from the original regression.

**Chicago clearinghouse may have been critical in preventing widespread runs on specific financial intermediaries in Chicago.**

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**Table 1: Total Assets of Intermediaries in New York and Chicago**

*Total assets as reported in August 1907 Call Reports*

<u>Location</u>	<u>National Banks</u>	<u>State Banks</u>	<u>Trust Companies</u>	<u>Total</u>
<i>New York</i>	\$1,365 M	\$ 296.6 M	\$1,205 M	\$2,865 M
<i>Chicago</i>	\$ 391.5 M	\$ 54.3 M	\$ 375.3 M	\$ 804.9 M

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Trusts in New York held approximately 42 percent of the total assets in the New York market.

Trusts in Chicago held over 45 percent of the total assets in the Chicago intermediary market.

**Table 2: Comparison of Balance Sheet Ratios of Intermediaries***Cash to Deposits Ratio<sup>a</sup>*

<u>Institution</u>	<u>August 1907</u>	<u>December 1907<sup>b</sup></u>
New York Trust Companies (n=46)	7.84 (.43) <sup>c</sup>	9.26 (.46)
New York State Banks (n=24)	26.3 (3.42)	25.0 (3.18)
Chicago Trust Companies (n=14)	18.3 (3.12)	31.4 (4.81)
Chicago State Banks (n=24)	9.55 (1.22)	18.0 (1.94)

*Capital-to-Total Resources Ratio*

<u>Institution</u>	<u>August 1907</u>	<u>December 1907<sup>b</sup></u>
New York Trust Companies (n=46)	22.0 (2.13)	25.3 (1.69)
New York State Banks (n=24)	24.0 (1.45)	17.5 (1.04)
Chicago Trust Companies (n=14)	15.0 (1.32)	16.5 (1.70)
Chicago State Banks (n=24)	22.7 (2.08)	23.0 (1.70)

*Demand Deposits-to-Total Resources Ratio*

<u>Institution</u>	<u>August 1907</u>	<u>December 1907<sup>b</sup></u>
New York Trust Companies (n=47)	56.7 (2.15)	52.3 (1.93)
New York State Banks (n=24)	74.0 (2.25)	71.9 (1.92)
Chicago Trust Companies (n=14)	37.0 (3.40)	36.1 (3.50)
Chicago State Banks (n=24)	37.8 (2.39)	34.9 (2.40)

<sup>a</sup> Cash consists of specie, legal tender, and national bank notes held in the vault.

<sup>c</sup> Standard error of the mean in parentheses.

**Table 3: Percentage Change in Demand Deposits Across Intermediaries**

Dependent Variable -- Percentage Change in Demand Deposits

*Regression Statistics*

<u>Independent Variable</u>	<u>Coefficient</u>	<u>Standard Error</u>	<u>t-statistic</u>
Constant	-37.84	(7.41)	-5.10*
Cash-to-Demand Deposits Ratio	.52	(.19)	2.73*
Capital-to-Total Resources Ratio	.18	(.16)	1.14
Dummy for Trusts	-.52	(5.21)	-0.10
Dummy for Location	-3.11	(4.26)	-0.73
Dummy for Clearinghouse Member	20.14	(7.54)	2.67*

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Regression R Bar Squared: .40

Number of Observations: 110 (12 missing, explained in text)

Mean of the dependent variable: -18.12

Standard error of the estimate: 13.60

Standard error estimates employ White's heteroskedastic consistent estimator.

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\* Denotes statistical significance at the 1 percent significance level.



Figure 1

# Demand Deposits in New York Trust Companies Versus National Banks

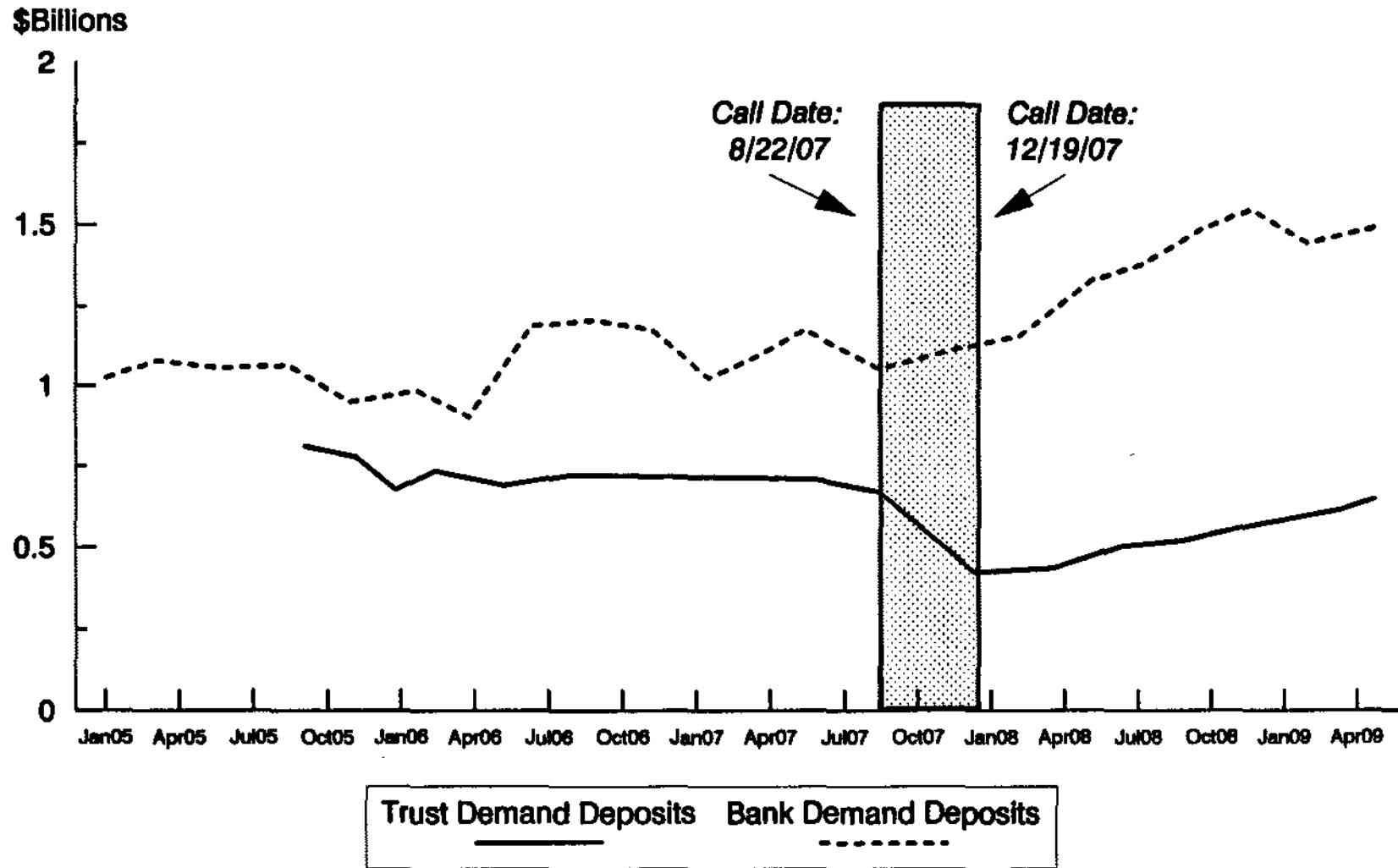
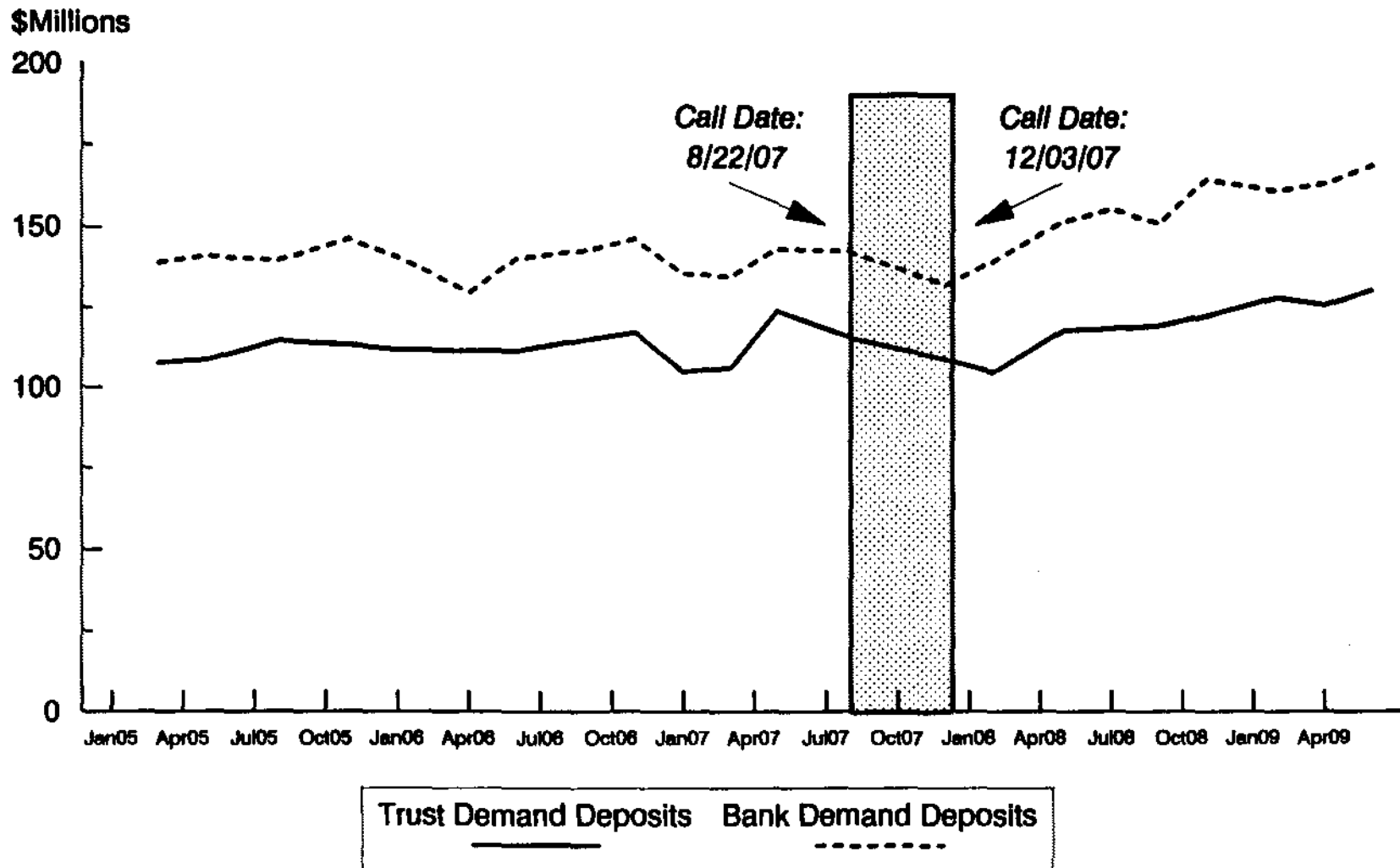
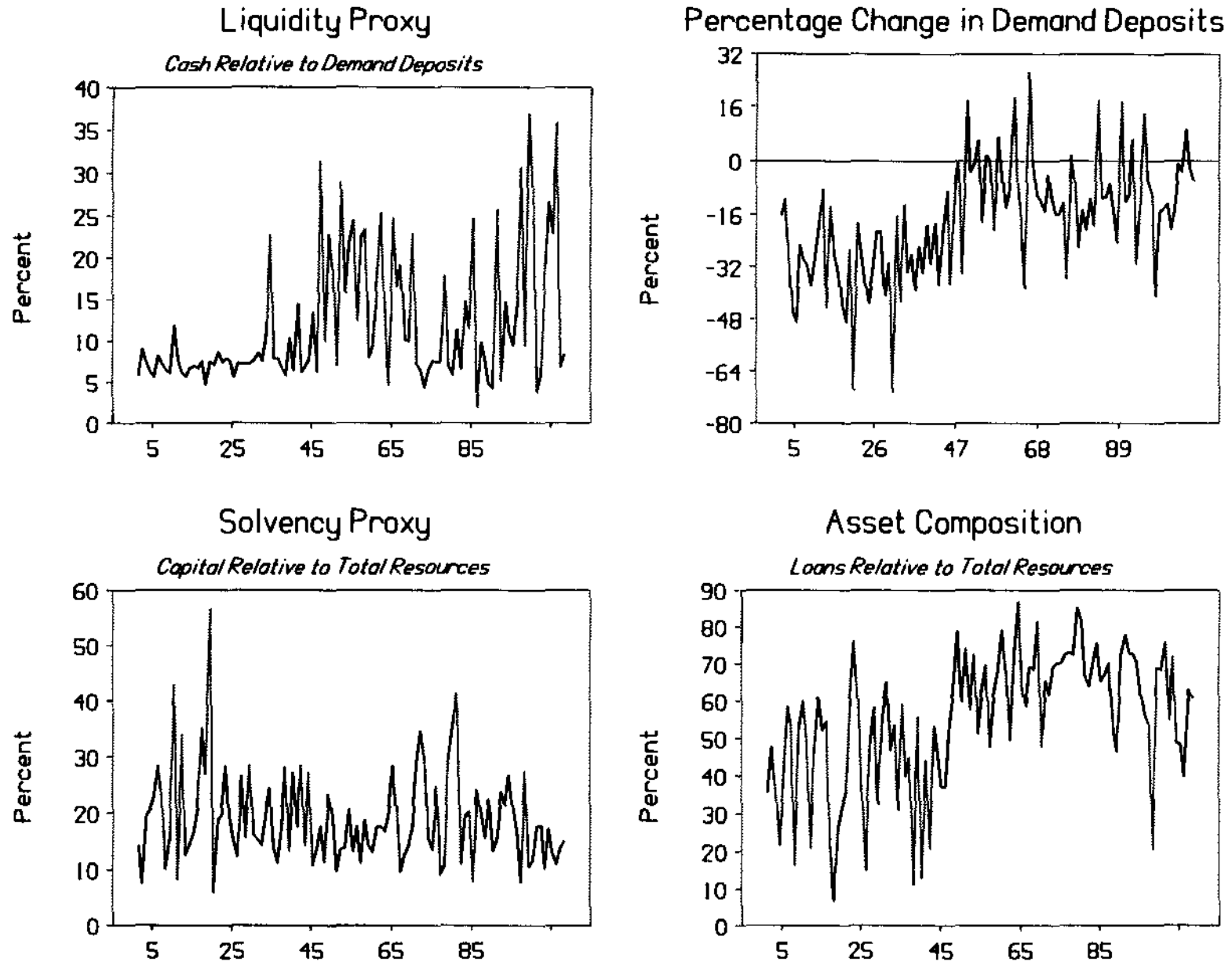


Figure 2

# Demand Deposits in Chicago Trust Companies Versus National Banks



### Figure 3



Observations 1 through 46 are New York City trust companies, 47 through 70 are New York City state banks, 71 to 94 are Chicago state banks, and 95 to 108 are Chicago trust companies.