working paper

13 04

Liquidity Provision during the Crisis of 1914: Private and Public Sources

by Margaret M. Jacobson and Ellis W. Tallman

FEDERAL RESERVE BANK OF CLEVELAND

Working Paper 13-04 March 2013

Liquidity Provision during the Crisis of 1914: Private and Public Sources

by Margaret M. Jacobson and Ellis W. Tallman

Caught between the end of the National Banking Era and the beginning of the Federal Reserve System, the crisis of 1914 provides an example of a banking panic avoided. We investigate how this outcome was achieved by examining data on the issues of Aldrich-Vreeland emergency currency and clearing house loan certificates to New York City institutions that identify borrower and quantity requested for each type of temporary liquidity measure. Combined with balance sheet data, we illustrate how temporary liquidity borrowing was essential for maintaining transactions volumes among New York City financial intermediaries. We highlight a significant role for clearing house loan certificates that is distinct from the influence of Aldrich-Vreeland emergency currency issues.

Key words: liquidity provision, lender of last resort, correspondent banking, closure of stock exchange, financial crisis, clearing houses, Aldrich-Vreelande-mergency currency.

JEL codes: E42, E59, E65, N22

Margaret M. Jacobson is at the Federal Reserve Bank of Cleveland and can be reached at Maggie.Jacobson@clev.frb.org. Ellis Tallman is at the Federal Reserve Bank of Cleveland and can be reached at Ellis.Tallman@clev.frb.org. The authors thank Mirjana Orovic and Sujit "Bob" Chakravorti for access to the Archives of the New York Clearing House, and Ben Craig and James Thomson for helpful discussions. The authors also thank participants at the workshop "Financial Markets and Financial Regulation: Sources of Instability or Growth? International Historical Perspectives" held at Westfälische Wilhelms-Universität Münster on April 12, 2012 for constructive discussion and the participants in the lunchtime brownbag workshop at the Federal Reserve Bank of Cleveland for their comments.

I Introduction

This paper examines how the United States avoided a banking panic in 1914 despite threatening circumstances following the initial stages of World War I. During the summer of 1914, the U.S. suffered gold outflows, Europe was at war, blockades threatened world trade, and cash was soon to become scarce. Following the actions of worldwide stock exchanges, the New York Stock Exchange was closed on July 31, 1914, isolating banks from their main market for financial liquidity. Although the closure of the stock exchange may have helped forestall the impending financial crisis by preventing mass sell-offs of securities and the related (and feared) outflow of gold, the shutdown also exposed the financial system to the risk of a liquidity shortage. In New York City, two liquidity provision mechanisms, Aldrich-Vreeland emergency currency and clearing house loan certificates, became crucial stop gap measures to prevent vulnerable financial markets from spiraling into a full-scale panic.

We investigate this episode because crisis prevention mechanisms employed before an active Federal Reserve System were able to support deposit levels and thus promote the growth of the aggregate money supply, an outcome consistent with standard policy prescriptions for combating financial distress. There is a widely held perception that powerful market participants and policymakers engaged in a successful intervention to prevent the occurrence of a far more damaging financial event. Existing literature lauds the successful outcome in 1914 as the result of the issuance of Aldrich-Vreeland emergency currency, which made its simultaneous debut and exit in 1914. In New York City in particular, clearing house loan certificates may still have been an important liquidity resource, even though, on their own, clearing house loan certificate issues were unable to prevent full-scale banking panics and financial crises in 1907, 1893, and 1873.

We show that the financial intermediaries in New York City that requested emergency liquidity loans through these two mechanisms were able to maintain (or increase) their level of deposits and hence staved off a contraction in the money supply.[1] We examine data on the issues of Aldrich-Vreeland emergency currency and clearing house loan certificates in New York City institutions which identify the borrower and quantity requested for each type of temporary liquidity measure. We combine these data with high-frequency (weekly) balance sheet data to verify how temporary liquidity borrowing affected changes in deposits.

By borrowing liquidity instruments, we find that banks are generally able to maintain interbank payments despite initial cash drains to the interior and large gold outflows arising from asset liquidations by foreign investors. We base these inferences on direct comparisons of the characteristics of the financial distress in 1914 with previous National Banking Era (1863-1913) panics, namely those in 1907, 1893, 1890, 1884, and 1873. These earlier instances of financial distress employed only clearing house loan certificates as a temporary liquidity mechanism because emergency currency did not exist as an alternative. Several features of 1914 play out differently, and more favorably, compared to these prior crises, which implies that emergency currency played a crucial role in alleviating the financial distress. By examining the use of clearing house loan certificates in 1914, we suggest that they played a secondary, but still consequential, role in forestalling financial panic. Furthermore, our data and statistical examination reveals that financial intermediaries borrowing solely Aldrich-Vreeland emergency currency and, separately, those borrowing only clearing house loan certificates are associated with a net increase in deposits that is larger than the net deposit increase among those

[1] Our empiric analysis focuses on the role of Aldrich-Vreeland emergency currency and clearing house loan certificates in New York City because New York City represented nearly half of the banking assets in the United States in 1914 and New York City institutions would have been acutely affected by the closure of the stock exchange.

intermediaries that did not borrow either form of temporary liquidity. Intermediaries that borrowed both emergency currency and clearing house loan certificates -- a subset of national banks -- experienced a net decline in deposits. We suspect that this observation indicates that these institutions required additional liquidity most intensively.[2] Examining the borrowing characteristics of 1914 -- the evolution of deposits and currency -- and comparing them to data measured during previous crisis episodes, we suggest that the extensive provision of temporary credit to a wide array of financial intermediaries was essential to the successful alleviation of financial distress in 1914. Although the innovation of emergency currency was crucial in preventing a panic in 1914, they were only available to national banks – a subset of financial institutions. Clearing house loan certificates, however, were available to trust companies and state banks that were members of the New York Clearing House and were borrowed by a subset of national banks in addition to emergency currency. As a result, the private (and perceived as inferior) form of temporary liquidity in the form of clearing house loan certificates may have a secondary yet still palliative role that may have been previously overlooked.[3]

II Background

The motivation for our historical comparison arises from both the existing literature which examines the 1914 crisis and the aggregate effects of the liquidity provision mechanisms as well as the challenging circumstances facing the economy in 1914. The existing literature studies the successful alleviation of the financial distress and emphasizes the provision of emergency currency in 1914 as the key liquidity mechanism that prevented anything like the

[2] Further work will investigate the institutional characteristics that generate this distinctive fact.
[3] The Panic of 1907, in particular, demonstrated the importance of access to temporary liquidity when the isolation of trust companies from liquidity sources heightened the severity of trust depositor withdrawals (see Tallman and Moen 1990, and Moen and Tallman 2000).

Panic of 1907, 1893, or 1873 from arising.[4] Friedman and Schwartz (1963: 196) highlight how emergency currency enabled the US financial market to stabilize after the declarations of war in Europe. Silber (2007a) suggests that emergency currency produced an outcome -- the increase in the money supply by seven percent -- that clearing house loan certificates were unable to do on their own. In previous panics during the national banking era, the money supply declined, suggesting that the issuance of clearing house loan certificates failed to reverse the forces of contraction endemic to financial panic. We use our data set to investigate the details that underlie the successful outcome in 1914 and explore whether the palliative effects of clearing house loan certificates in this instance have been unnecessarily overlooked.

Clearing house loan certificates were loans issued by the New York Clearing House to member bank borrowers upon approval by the Clearing House Loan Committee, which hinged on its decision regarding the value of posted collateral by the borrowing bank. The certificates traded at par at the New York Clearing House, paid 6 percent interest to the holder, and were effectively guaranteed by the entire membership of the clearing house. Clearing house loan certificates substituted for specie and legal tender claims that were exchanged at the New York Clearing House to settle transactions balances between clearing house members. Members of the clearing house were obliged to accept them, and non-acceptance was grounds for expulsion from the clearing house association. Functionally, clearing house loan certificates freed up cash and other forms of lawful money to be paid out to depositors and corresponding banks without forcing the liquidation of bank assets (or collapsing the size of balance sheets). One can think of

[4]Friedman and Schwartz (1963) *A Monetary History of the United States*, Silber (2007a) *When Washington Shut Down Wall Street* , Silber (2007b) *What can we learn from Emergency Currency?*, and Wicker (2005) *The Great Debate on Banking Reform.* Note also that Wicker (2005:47) suggests that if a crisis issue of emergency currency occurred prior to the adoption of the Federal Reserve System, the question of panic prevention would have been addressed and perhaps a central bank would not have been established in the United States.

them as allowing a mutually-enforced forbearance on final payments at the New York Clearing House.

While the private clearing house system was largely the inspiration for Aldrich-Vreeland emergency currency, the crisis of 1914 presented a challenge for the untested public liquidity provision. At the beginning of World War I, United States Treasury Secretary William McAdoo, in concert with the leaders of the New York Stock Exchange, took dramatic action to close down the New York Stock Exchange to halt a substantial outflow of capital from the United States and prevent the financial repercussions of such a drain (Silber 2007a). The closure hindered the attempts of European investors to liquidate their investments and ship gold from the U.S. to Europe. The action also constrained the effective exchange of transactional liquidity in domestic U.S. financial markets, much of which represented rearrangements of short-term credit collateralized by stock and bond assets.

McAdoo apparently recognized that the closure of the stock market placed significant constraints on domestic financial markets, and took action to ensure that adequate mechanisms were in place for national banks to tap emergency currency to manage unanticipated liquidity demands from customers.[5] The Aldrich-Vreeland Act of 1908 was an outcome of a policy initiative motivated by the Panic of 1907 and its aftermath. In the legislation, policy makers addressed what contemporary economic professionals recognized as an "inelastic" base money supply.[6] The United States' monetary system lacked an effective way to adjust the supply of high-powered money quickly, which was a major obstacle to adequate crisis prevention. The act

[5] McAdoo encouraged Congress to amend the Aldrich-Vreeland Act to ensure that emergency currency issue would be accessible to a wider scope of banking institutions (Silber 2007a:71). Silber highlights that without the amendment many national banks, especially the large, New York City national banks, would not have qualified for emergency currency. It is notable that Laughlin (1908) raised awareness of such shortcomings in the original act.
[6] See Laughlin (1908) and Sprague (1909).

provided for the creation of emergency currency -- a temporary issue of currency – as only an interim solution while policymakers discussed and researched a structure for what was perceived as a more durable solution: a distinct, nation-wide reserve association. The Federal Reserve System, a public entity, was the ultimate product of their travails.

Upon the discretion of the Secretary of Treasury, the Aldrich-Vreeland Act could be invoked allowing banks to post collateral at their local National Currency Association in exchange for emergency notes that were nearly indistinguishable from regular national bank notes and could be paid out as cash to depositors. The organizational structure was largely inspired by the clearing house system but with several key distinctions. While the original legislation stipulated that only national banks could be members of National Currency Association, the amendment allowed state banks and trusts the possibility of gaining access to emergency currency provided that they agreed to join the Federal Reserve System.[7] State banks and trusts for the most part declined membership, preventing them from directly borrowing emergency currency through the duration of the crisis. State banks and trust companies that were members of the New York Clearing House still had the opportunity to borrow clearing house loan certificates, which were essentially the next best option for temporary liquidity expansion.

Before we conclude that the two liquidity provision methods were substitutes, we point out that some national banks in our sample borrowed emergency currency as well as clearing house loan certificates, leading us to hypothesize that national banks found value in borrowing each form.[8] Timberlake (1984) and Gorton (1985) analyze the role of clearing house loan certificates as palliative mechanisms employed during panics of the National Banking Era.

[7]Congressional Record, 63rd Congress, Session II, Chapter 225, page 683.
[8]Table 1 presents a summary of the different characteristics of each form of temporary liquidity and the requirements necessary for the financial institution to borrow each form.

However, in the case of 1914, Silber (2007a) and Wicker (2005) view clearing house loan certificates as a relic; there is no indication in these descriptions of 1914 that clearing house loan certificates play an important role in the solution to the crisis. In contrast, Noyes (1916) provides an account by a contemporary observer in which clearing house loan certificates are relevant for the solution, even though he makes clear the primary role of Aldrich-Vreeland emergency currency.

Previous research makes it seem that emergency currency dominated clearing house loan certificates as a result of its ability to pass as hand to hand currency. Emergency currency, however, was not reserves and was not accepted by the New York Clearing House as final payment. Newspaper accounts (New York Tribune, August 5, 1914: page 4) reported that the New York Clearing House passed a resolution to accept emergency currency in settling balances at the clearing house. However, the same article notes that the New York Clearing House would still prefer to instead accept clearing house loan certificates (over which it had control) as the substitute medium to settle account balances. "No emergency currency has yet been used in settling balances at the Clearing House. The opinion prevailed yesterday that the banks would prefer to use Clearing House certificates in liquidating their Clearing House obligations and employ the money authorized by the Aldrich-Vreeland act for over-the-counter payments and shipments to the interior." (New York Tribune, August 5, 1914: page 5) Furthermore, at no point did the New York Clearing House accept national bank notes as final payment media, and emergency currency was a temporary substitute for (with weaker collateral standards than) national bank notes. In the absence of verifiable and corroborated evidence to the contrary, we believe that emergency currency was not used as final payment at the New York Clearing House.

With evidence indicating national banks used clearing house loan certificates and emergency currency for distinct roles, our view is that the solution to the crisis in New York City in 1914 hinged on the combined issuance of temporary liquidity instruments. The institutional limitations and differing collateral requirements of Aldrich-Vreeland emergency currency described in Table 1 made the availability of clearing house loan certificates crucial in overall credit expansion. As noted earlier, state bank and trust companies were required to join the Federal Reserve System in order to have the ability to borrow emergency currency. Membership in the New York Clearing House was sufficient for borrowing clearing house loan certificates which were the next best option for intermediaries who were not members of the Federal Reserve System.

To illustrate the success of the intervention in 1914 in alleviating crisis conditions, Figure 1 displays a comparison of the monthly path of the M2 money supply relative to the level at the onset of the respective 1907 and 1914 crisis. What is most striking for Figure 1 is the fact that the money supply indeed increased in 1914, even though there was some relative contraction in November and December of 1914. In contrast, the money supply contracted sharply in 1907 and remained below the money supply level in October 1907 for over 9 months. The point, as made in Friedman and Schwartz (1963) and in Silber (2007a), is that the money supply increased relative to its initial level in August 1914, whereas there was substantial contraction in 1907.

The absence of a contraction in the money supply in 1914 (Figure 1) reflects the fact that there was no widespread suspension of convertibility of deposits into cash, which was the bane of the panics of the National Banking Era. In such situations, depositors (both individual and correspondent banking depositors) would try to withdraw cash from banks and thus the banking system to ensure access to their funds. This would lead to an overall contraction of deposits and

a cash shortage. Without partial suspension of convertibility of deposits, depositors need not worry about obtaining cash in exchange for their deposits.

Figure 2 illustrates the lack of cash hoarding by interior banks in 1914. These series represent the net flows between interior banks and New York City banks at the end of each week. In 1914, there are only two weeks where there are net outflows from New York City institutions to their interior correspondents and those two weeks are at the onset of the panic. Although 1914 has a sharp initial drop, comparable to the decline in the 1893 panic, it also has a sharp rebound unlike the panics of 1907 and 1893. In those crises, we see that cash flowed out of New York City banks to the interior for extended periods when cash hoarding and suspensions of payments caused serious payments disruptions. In 1914 there was no dramatic disruption of financial intermediation despite the war in Europe and the closure of the New York Stock Exchange.

We attribute the benign circumstance in 1914 to the success of the temporary liquidity issues, which made suspension of payments unnecessary and prevented cash hoarding. Specifically, we speculate that the provision of Aldrich-Vreeland emergency currency directly to interior banks reduced interior bank cash demands from correspondent banks in New York City and thereby attenuated the dysfunctional flow of cash from New York City banks to interior correspondents typical during crises.

By borrowing temporary liquidity, financial intermediaries prevented an undesirable contraction on the asset side of their balance sheet. The issues of clearing house loan certificates in previous National Banking Era panics were motivated by financial institutions wanting to avoid early liquidation of assets. These issues, however, were unable to prevent cash hoarding and the impositions of restrictions on the convertibility of deposits into cash in either 1893 or 1907. Figure 3 displays the time series data for currency held by the public from 1907 to 1916.

The grey shading indicates the Panic of 1907 as well as the crisis of 1914; both periods indicate a sharp upward movement in currency held by the public relative to the non-crisis periods. In 1907, the sharp increase in currency held by the public was satisfied by a reduction of cash holdings at banks, and associated with a net contraction in deposits at banks. In contrast, the increase in currency held by the public in 1914 was effectively satisfied by the $385.6 million issue of Aldrich-Vreeland emergency currency. Figure 4 further emphasizes the differences in deposits in 1914 and 1907. In 1914, deposits did not contract while they plummeted in 1907 by nearly 5 percent during the panic. In the empirical discussion that follows, we investigate whether the institutions that borrowed these liquidity measures display demand deposit changes different from institutions that did not borrow. We also investigate the changes in net deposits of banks who borrowed only clearing house loan certificates, only Aldrich-Vreeland emergency currency, or both liquidity provisions.

III Data

We employ data measures from the Annual Report of the Comptroller of the Currency for 1915 that lists aggregate data on clearing house loan certificate issues and Aldrich-Vreeland emergency currency for the entire United States as well as for specific National Currency Associations, like New York City. Table 2 lists the total amount of Aldrich-Vreeland emergency currency issued in the entire United States as approximately $385.6 million, and the total amount of those issues to New York City comprised about 37 percent of the total issue. The total amount of clearing house loan certificates issued in the United States during 1914 was $211.8 million, of which nearly 60 percent were issued in New York City. Clearly, the proportion of clearing house

loan certificates issued in New York City relative to the total issued was higher than the relative proportion of emergency currency issued in New York City relative to the total.

In New York City alone, total borrowing of loan instruments during the crisis period amounted to $269,670,960; emergency currency issues totaled $144,975,960 and clearing house loan certificates $124,695,000. The aggregate measures from the Annual Report do not match precisely our data, which is assembled from the daily borrowings by individual institutions recorded from the minutes of the New York City National Currency Association and the minutes of the Clearing House Loan Committee of the New York Clearing House Association. Compiling an aggregate amount outstanding from our data sample, we find a total of $140,934,800 for emergency currency and of $118,180,000 for clearing house loan certificates (CHLC).[9] National banks were responsible for 82 percent of all temporary liquidity borrowing in the greater New York City area taking out the entire $140,934,800 of emergency currency outstanding and 60 percent of clearing house loan certificates totaling $71,130,000. Trust companies borrowed $34,500,000 in clearing house loan certificates representing 13 percent of the total borrowing and slightly less than 30 percent of clearing house loan certificates. State banks borrowed $12,550,000 in clearing house loan certificates, which is only 5 percent of the total borrowing and about 10 percent of clearing house loan certificates. We note that clearing house loan certificates comprised 46 percent of all borrowing in New York City. The fact that

[9] In the 1914 Annual Report of the Treasury of the State of the Finances, the estimate of emergency currency issues in New York City is $141,228,000 which is much closer to our total. This leads us to believe that there were some revisions made to the total estimated for the 1915 Report of the Comptroller of the Currency.

there is substantial borrowing of clearing house loan certificates among all financial intermediaries reveals a preference for them in New York City.[10]

The sum of legal tender and specie – the components of high powered money held by national banks in New York City – hovered at $276.35 million according to the call report data for September 12, 1914.[11] The total of emergency currency issues taken out by national banks in New York City in 1914 represented an increase in their base money supply of over 50 percent in the form of "near" cash provisions Including clearing house loan certificates, financial institutions in New York City were able increase their base money supply by over 75 percent. This proportional increase far exceeds the proportional increase in the "effective" base money supply represented by the issuance of clearing house loan certificates in New York City during any previous National Banking Era crisis. In 1914, we see that financial intermediaries borrowed $118,180,000 in CHLC in our sample. If we adjust the total clearing house loan certificate issues for differences in nominal GDP across the panics, we can see how totals compare. We compare relative to nominal GDP in 1914 so the 1914 number is $118 million. In other crisis period, we see respective adjusted totals of $99.8 (1873), $68.9 (1884), $35.9 (1890), $107 (1893), and $102.7 (1907). Although the totals adjusted for nominal GDP are comparable to 1914 for 1873, 1893, and 1907, we do not see an increase in the aggregate money supply (Figure 1) except in 1914.

[10] New York City borrowed 55 percent of all clearing house loan certificates in the country indicating that the borrowing patterns of New York banks were different from the rest of the country. We attribute this to the distinct money center role New York banks played in the national banking era.

[11] The weekly money holdings (specie plus other money) for New York Clearing House banks (including state banks and trust companies) were approximately $500 million on August 1, 1914 and totaled just over $450 million on September 12, 1914.

Our sample consists of 111 banks representing the greater New York City area.[12] Of this sample, 38 are national banks that make up 34 percent of our sample observations and represent roughly 50 percent of the total assets of our sample. There are 42 state bank observations, which represent only about 12 percent of the total banking assets of the sample and are 38 percent of our sample observations. Finally, there are 31 trust companies that represent 28 percent of the number of institutions in the sample and account for 38 percent of total assets. Measuring the average size of the institutions in terms of total assets, national banks average $50,413,430, trusts companies average a comparable $48,000,620, and state banks are smaller averaging $11,462,010. The data on balance sheets were those reported at the call date of September 12, 1914 for national banks as well as for state banks and trust companies. Balance sheet data for 1915 were those reported on September 2, 1915 for national banks and on September 25, 1915 for state banks and trust companies. Balance sheet data for national banks come from the Report of the Comptroller of the Currency. The call report data for state banks and trust companies come from Reports of the New York Superintendent of Banks. Additionally, we use data from the *Commercial and Financial Chronicle* which publishes select balance sheet items for 74 of the 111 financial institutions in our sample. From August 1, 1914 till December 5, 1914 – our assessment of the duration of the financial distress—the *Commercial and Financial Chronicle* did not publish data on individual financial intermediaries but still provided aggregates for certain series.[13]

[12] This geographical sample includes Manhattan and Brooklyn.

[13] The Appendix Table lists the banks in New York City that comprise the sample. In the first column, we list the name of the bank and indicate in the subsequent columns whether the institution is a member of the New York Clearing House (a necessary condition for borrowing clearing house loan certificates), whether or not data was published in the *Commercial and Financial Chronicle*, whether the institution borrowed clearing house loan certificates, and whether it borrowed emergency currency.

IV Empirical Methods and Results

The premise for the empirical investigation centers on the idea that New York City financial institutions that borrowed either form of temporary liquidity were better able to continue their intermediation operations as a result. The temporary liquidity expansion enabled those banks to return cash to depositors and maintain clearing balances at the New York Clearing House to a greater extent than otherwise. If those institutions that borrowed liquidity were better able to continue financial intermediation as a result of their borrowing, we expect that the institutions that borrowed either clearing house loan certificates or Aldrich-Vreeland emergency currency should have maintained the level of deposits despite the onset of the financial crisis.

We pose a simple argument in support of this hypothesis. National banks borrow Aldrich-Vreeland emergency currency (AVEC) to satisfy cash withdrawal demands from depositors allowing them to provide depositors with cash and simultaneously avoid reducing their legal cash reserves, which might force them to curtail lending or sell interest-bearing assets. Curtailing lending or selling assets may contribute to an overall contraction in credit depending on the replacement (or not) of lending and on the source of the asset purchase (i.e., intermediated or not). Similarly, institutions that borrowed clearing house loan certificates -- either state or national banks or trust companies -- to offset adverse debit balances at the New York Clearing House can satisfy those payment demands with what was effectively a temporary IOU so that legal tender balances would be unaltered by these transactions. In both cases, the preservation of legal tender balances (reserves) would put these institutions in a better position to maintain loans and deposit balances throughout the period of financial crisis.

Another argument centers on the availability of deposit balances and the avoidance of any form of payment restrictions or suspension. Depositors could be encouraged by the availability of balances in the form of cash when an institution requests AVEC. Although clearing house loan certificates were unable to increase the legal tender of a given bank, they had an indirect benefit to depositors by allowing banks to settle balances with other clearing members using the clearing house loan certificates. This action then freed up legal tender from settlement balances at the New York Clearing House to be allocated for other uses such as paying out cash to depositors and at the same time maintaining loan balances.

Figure 5 illustrates the evolution of the net deposits[14] series for the national banks in our sample. Data points marked with a circle indicate yearly data from the Comptroller of the Currency while data points marked with a square indicate weekly series from the *Commercial and Financial Chronicle*. Net deposits fall from the beginning of July to August 1, 1914 which is also the day after the closure of the New York Stock Exchange. This decline likely reflects the withdrawal of gold balances as hostilities broke out in Europe and European exchanges began closing. From August 1, 1914 to the September 12, 1914 call date, aggregate net deposits increased making the August 1, 1914 data point a local trough in the net deposit data. Since exchanges at the clearing house and various other balance sheet columns are counted in the net deposits series, it is likely that clearing house loan certificates influence this increase. The co-movement between the net deposits series and the total borrowing series[15] further supports our inference with respect to the relationship between the two balance sheet measures. As total

[14] Net deposits are defined as: gross Deposits + unpaid dividends – (exchanges for Clearing House+ amounts due from all other banks + notes of other banks and checks on non clearing institutions). We attempt to compile a similar series from the Comptroller of the Currency data.

[15] Total borrowing is the accumulated daily requests of clearing house loan certificates and Aldrich-Vreeland emergency currency. For the emergency currency, we were unable to find record of cancellations except for aggregates at various intervals. We linearly interpolated the cancellation of emergency currency based on these select dates.

borrowing increases, net deposits increase as well. Likewise, when total borrowing decreases, net deposits also decline. We also notice that loans and investments[16] generally maintain a level similar to those of deposits except for the September 12, 1914 call date. Although loans, unlike net deposits, decline from August 1, 1914 to September 12, 1914, they increase from a local trough to surpass their August 1, 1914 level by December 5, 1914. This level increase after the crisis indicates that banking business faced a short-term shock but was otherwise able to recover. In the same way Figure 2 indicated the absence of a persistent currency drain to the interior, Figure 5 highlights the absence of a large contraction in deposits. Furthermore, the chart uncovers a relationship between temporary liquidity borrowing and deposit changes that supports our main argument.

The observations in Figure 5 contrast sharply with the characteristic data for the National Banking Era financial crises (1873, 1884, 1890, 1893, and 1907) listed in Table 3. The summary of facts in Table 3 indicate that measures of banking activity -- both intermediation services (loans and deposits) as well as liquidity storage (specie and legal tenders) -- contracted during most of the panics, especially those considered the most severe -- 1873, 1893, and 1907. The most notable contrast between Figure 5 data and the observations in Table 3 is that the aggregate level of net deposits in 1914 remains close to the August 1 level, whereas the net deposits aggregate falls below the pre-panic level at some point in all the previous National Banking Era panics, and in some cases, the contraction is substantial.[17]

The New York Clearing House halted publication of individual bank balance sheet data at the onset of market distress. As a result, we lack data on individual banks from August 1, 1914

[16] Like the net deposit series, the loans series is an attempted reconciliation of Commercial and Financial Chronicle data and Comptroller of the Currency data. Some discrepancies in categories may exist.
[17] Note that the data in Figure 5 are for national banks in New York City. There is some contraction in net deposits displayed in Figure 6.

to December 5, 1914. Instead, we track the aggregate evolution of net deposits and loans in Figure 6, which plots net deposits and loans for national banks, state banks, and trusts that were members of the clearing house. Figures 5 and 6 show similar evolutions of the net deposits series and the loans and investments series throughout the crisis allowing us to use our sample data despite missing data on individual banks for a large portion of our sample. The lack of data for individual financial institutions over this interval prevents us from using the weekly data to do a time series or panel data analysis. In further work, we hope to exploit our data series more completely.[18]

Table 4 displays the sum of deposits on August 1, 1914 – the start of the crisis — and on December 5, 1914 – the end of the crisis. The deposit totals are then divided by borrowing status. Because the deposit data for this analysis is from the *Commercial and Financial Chronicle*, we only have data for 74 of the 111 total financial intermediaries. Borrowers of only emergency currency experienced a 9.29 percent growth in deposits from the start to end of the crisis and borrowers of only clearing house loan certificates saw a 15.3 percent increase. These calculations of total deposit growth come in much higher than the 2.09 percent deposit increase observed by banks that did not borrow. Banks who borrowed both emergency currency and clearing house loan certificates -- national banks -- experienced a contraction in deposits of -3.06 percent. Given that financial intermediaries who borrowed only clearing house loan certificates or only emergency currency experienced deposit growth, it is unlikely that the deposit contraction observed in the group borrowing both instruments is an outcome of borrowing itself. Rather, the borrowing of both types of temporary liquidity was likely a signal of financial distress and the observed contraction in net deposits indicated the need for liquidity of these

[18] For individual financial institutions, we have daily observations of emergency currency and clearing house loan certificate issues outstanding although we have no complementary balance sheet data.

national banks. Additionally, these intermediaries were all national banks and national banks in New York City held the majority of correspondent banker balances, which were typically the source of the funds that were lent in the call loan market. As a result, these large, correspondent banks would have likely experienced the most severe disruption of their banking operations as a result of the closure of the stock exchange and the initial withdrawals of deposits by their correspondent banks in the interior of the country.

V Discussion

During the panics of the National Banking Era, clearing house loan certificate issues were unable to produce an effective increase in the money supply. Friedman and Schwartz view clearing house loan certificates as an ineffective temporary liquidity mechanism because it was not a reliable catalyst for increasing cash availability for depositors or correspondent banks. In essence, the clearing house loan certificate issues could not prevent the suspension of convertibility in the most severe panics of the National Banking Era. In 1914, we argue that national banks used clearing house loan certificates to perform its core mission – to alleviate unfavorable (debit) balances at the New York Clearing House – and national banks used emergency currency to satisfy cash demands. Stricter collateral requirements on emergency currency may have made clearing house loan certificates the best available option for certain national banks, especially those with weaker balance sheets. Trust companies and state banks, unable to borrow emergency currency directly, likely experienced indirect benefits from its existence as it contributed to the availability of cash. Likewise, trust companies and state banks also used clearing house loan certificates as the next best option for obtaining additional liquidity.

We know from the previous National Banking Era financial crises that clearing house loan certificates alone were insufficient to relieve financial distress. On the other hand, if temporary liquidity was only available as emergency currency, then state banks and trusts would have been dependent upon direct credit from national banks. Further, those national banks that borrowed clearing house loan certificates would have faced liquidity constraints relative to what took place. Hence, we suggest that either form of temporary liquidity issued in isolation would not have been as effective as the combined increase in each form.

Figure 7 displays a schematic chart that illustrates how emergency currency and clearing house loan certificates were individually imperfect substitutes for legal tender. The combination of clearing house loan certificates and emergency currency formed a composite good that was a more complete substitute for legal tender money which was thus able to generate a temporary increase in the monetary base. From this perspective, the two forms of temporary liquidity provide a composite good that is a closer substitute for legal tender than either form alone because of the distinct purposes for which emergency currency and clearing house loan certificates could be employed.

We consider two additional elements illustrated in Table 1 that may influence the relative demands for emergency currency and clearing house loan certificate borrowing by national banks –1) the collateral requirements for the respective temporary liquidity instruments and 2) the relative cost of clearing house loan certificates to emergency currency.[19]

[19] With a 3 percent charge imposed emergency currency issues for the thirst three months (and an increasing rate of 50 basis points per month thereafter) and a 6 percent rate on clearing house loan certificates, one could imagine a strategy to borrow emergency currency up to some threshold and then borrow clearing house loan certificates at the higher cost. We, however, did not see any evidence of this behavior when examining the data detailing daily borrowings and it may not be indicative of how banks behave in a crisis.

For national banks, emergency currency had more stringent collateral requirements than clearing house loan certificates and emergency currency was limited to 125 percent of surplus and capital, potentially limiting the supply of this form of liquidity to specific borrowers. As noted, we do not observe requests for emergency currency and clearing house loan certificates as taking place sequentially (e.g., first emergency currency, then clearing house loan certificates). Instead, we suspect that a national bank could allocate its available collateral early in the crisis and take out liquidity in amounts that were tentatively and potentially sufficient for the duration of the financial distress.

Table 1 indicates that the interest cost of emergency currency was 3 percent whereas the interest cost of clearing house loan certificates was 6 percent. Wicker (2005) argues that the interest cost alone should have removed any desire to take out clearing house loan certificates. New York City national banks, however, took out a substantial quantity of clearing house loan certificates despite the obvious price advantage of borrowing emergency currency. Some advantages of clearing house loan certificates are that they did not have to be circulated immediately and would not accrue interest costs unless they were issued. Interest accrued to the holder of a CHLC and thus those costs were not incurred until a bank used a loan certificate to settle payments with another institution. In this regard, clearing house loan certificate requests were effectively an option for liquidity. Table 2 suggests that about 88 percent of clearing house loan certificates issued were eventually circulated, but the duration of the circulation is not available information. The main argument, though, remains pertinent -- that the availability of liquidity in the form of clearing house loan certificates was valuable to New York City financial intermediaries.

VI Conclusions

This paper emphasizes that the borrowing of clearing house loan certificates by New York City financial institutions of all types in 1914 was substantial and important for the continuation of financial intermediation especially during the time when the New York Stock Exchange was shut down. Emergency currency combined with clearing house loan certificates provided temporary liquidity to a wide range of financial institutions in New York City and thereby ensured that large financial institutions had access to some form of liquidity. We find that financial intermediaries borrowing emergency currency issues and clearing house loan certificates maintained and increased deposit levels relative to those banks that did not borrow. While banks who borrowed both clearing house loan certificates and emergency currency experienced a contraction in deposits, this level of contraction is much more subdued when compared to other banking panics. Further research will aim to uncover the characteristics of borrowing versus non-borrowing institutions.

Appendix 1: Data Sources

1. National Bank Balance Sheet data
   Source: *Annual Report of the Comptroller of the Currency* 1914, Vol. II and 1915, Vol. II
   Description: Resources and liabilities of National Banks
   Call dates: September 12, 1914 and September 2, 1915

2. State Bank Balance Sheet data
   Source: *Annual Report of the Superintendent of Banks of the State of New York* for 1914 and 1915
   Description: Resources and liabilities of state banks
   Call dates: September 12, 1914 and September 25, 1915

3. Trust Company Balance Sheet data
   Source: *Annual Report of the Superintendent of Banks Relative to Savings Banks, Trust Companies, Safe Deposit Companies, Personal Loan Companies, and Personal Loan Brokers* for the years 1914 and 1915
   Description: Resources and liabilities of trust companies
   Call dates: September 12, 1914 and September 25, 1915

4. Weekly Balance Sheet Items
   Source: Commercial and Financial Chronicle 1914-1915, Vol 99 and Vol 100
   Weekly averages of daily balance sheet items of select banks in the greater New York City area.

5. Clearing House Loan Certificate Data
   Source: *Annual Report of the Comptroller of the Currency* 1915, Vol. I
   Description: Clearing-house loan certificates issued during the crisis of 1914. Outlined aggregate borrowing and maximum outstanding for each Clearing House Association

   Source: "Minutes of Clearing House Loan Committee of the New York Clearing House"
   Description: Lists the name of institutions who borrowed or cancelled clearing house loan certificates and the quantity borrowed at daily intervals.

6. Aldrich-Vreeland Emergency Currency data
   Source: *Annual Report of the Comptroller of the Currency* 1915, Vol. I
   Description: Summary of final reports of the National Currency Associations. Outlined aggregate borrowing, maximum outstanding, and securities pledged for each National Currency Association

   Source: "Minutes of the New York National Currency Association"
   Description: Lists the name of institutions who borrowed emergency currency and the quantity borrowed for each meeting of the New York National Currency Association.

Appendix Table: National Banks, State Banks, and Trust Companies in New York City

	Bank name	NYCH	C&F	AVEC	CHLC	Assets
1	Brooklyn, First	0	1	1	0	5.68
2	Brooklyn, Greenpoint	0	0	0	0	1.5
3	Brooklyn, Nassau	1	1	0	0	10.59
4	Brooklyn, National City	0	1	0	0	6.75
5	Brooklyn, Peoples	1	0	0	0	1.99
6	New York, First	1	1	1	1	157.33
7	New York, Second	1	1	1	1	21.16
8	New York, Fifth	1	1	1	1	6.02
9	New York, American Exchange	1	1	1	1	81.11
10	New York, Bank of New York	1	1	1	0	40.98
11	New York, Battery	0	1	1	0	2.88
12	New York, Bronx	0	0	0	0	1.73
13	New York, Chase	1	1	1	1	168.67
14	New York, Chatham and Phenix	1	1	1	1	30.63
15	New York, Chemical	1	1	1	1	52.32
16	New York, Citizens Central	1	1	1	1	34.51
17	New York, Coal and Iron	1	1	1	0	10.27
18	New York, East River	1	1	1	0	2.79
19	New York, Garfield	1	1	1	1	13.88
20	New York, Gotham	0	0	1	0	3.52
21	New York, Hanover	1	1	1	1	121.56
22	New York, Harriman	0	0	1	0	16.16
23	New York, Importers and Traders	1	1	1	1	39.58
24	New York, Irving	1	1	1	1	70.37
25	New York, Liberty	1	1	1	1	35.69
26	New York, Lincoln	1	1	1	0	21.97
27	New York, Market and Fulton	1	1	1	1	15.1
28	New York, Mechanics and Metals	1	1	1	1	132.46
29	New York, Merchants	1	1	1	1	33.36
30	New York, Merchants Exchange	1	1	1	1	13.24
31	New York, National Bank of Commerce	1	1	1	0	208.22
32	New York, National Butchers and Drovers	1	1	1	1	3.21
33	New York, National City	1	1	1	0	338.7
34	New York, National Park	1	1	1	1	143.81
35	New York, New York County	1	1	1	0	12.8
36	New York, Seabord	1	0	1	1	37.76
37	New York, Sherman	0	1	0	0	2.86
38	New York, Union Exchange	1	1	1	1	14.55
39	Astor Trust Company, NYC	1	1	0	1	25.2
40	Bankers' Trust, NYC	1	1	0	1	166.2
41	Broadway Trust, NYC	1	1	0	1	19.41
42	Central Trust, NYC	0	0	0	0	116.5
43	Columbia Trust, NYC [Sub Knick]	1	1	0	1	67.62
44	Commercial Trust, NYC	0	0	0	0	4.27

45	Empire Trust, NYC	0	0	0	0	24.49
46	Equitable Trust, NYC	0	0	0	0	86.16
47	Farmers' Loan and Trust, NYC	0	0	0	0	129.43
48	Fidelity Trust, NYC	1	1	0	0	10.52
49	Fulton Trust, NYC	0	0	0	0	9.81
50	Guaranty Trust, NYC	1	1	0	1	262.48
51	Hudson Trust, NYC	0	0	0	0	4.77
52	Lawyers' Title and Trust, NYC	1	1	0	1	24.01
53	Lincoln Trust, NYC	1	1	0	1	13.21
54	Metropolitan Trust, NYC	1	1	0	1	33.02
55	Mutual Alliance Trust, NYC	0	0	0	0	10.92
56	New York Life Insurance and Trust, NYC	0	0	0	0	43.46
57	New York Trust, NYC	1	1	0	1	56.52
58	Title Guarantee and Trust, NYC	1	1	0	0	44.29
59	Transatlantic Trust, NYC	0	0	0	0	3.99
60	Union Trust, NYC	0	0	0	0	69.53
61	United States Mortgage and Trust, NYC	1	1	0	1	60.22
62	United States Trust, NYC	0	0	0	0	83.97
63	BROOKLYN TRUST, Brooklyn	1	1	0	0	32.85
64	Franklin Trust, Brooklyn	1	1	0	0	14.32
65	Hamilton Trust, Brooklyn	0	0	0	0	8.63
66	Home Trust, Brooklyn	0	0	0	0	4.36
67	Kings County Trust, Brooklyn	0	0	0	0	21.88
68	ManufacturersCitizens Trust, Brooklyn	0	0	0	0	14.02
69	Peoples Trust, Brooklyn	1	1	0	1	21.95
70	23rd Ward Bank	0	1	0	0	2.77
71	Bank of America	1	1	0	0	38.8
72	Bank of Europe	0	0	0	0	2.29
73	Bank of Flatbush	0	0	0	0	1.13
74	Bank of the Metropolis	1	0	0	1	18.47
75	Bank of United States	0	0	0	0	3.25
76	Bank of Wash Height	0	1	0	0	2.11
77	Bowery Bank	1	1	0	0	5.11
78	Century bank	0	1	0	0	8.56
79	Chelsea Bank	0	0	0	0	3.25
80	Clinton Bank	0	0	0	0	0.32
81	Colonial Bank	0	1	0	0	9.54
82	Columbia Bank	0	1	0	0	8.44
83	Corn Exchange Bank	1	1	0	1	97.14
84	Cosmopolitan Bank	0	0	0	0	0.63
85	Fidelity Bank	0	1	0	0	1.53
86	Fifth Avenue Bank	1	1	0	0	18.72
87	German American Bank	1	1	0	1	6.33
88	Germania Bank	1	1	0	0	8.57
89	German Exchange Bank	1	1	0	0	5.57

90	Greenwich Bank	1	1	0	1	13.84
91	Homestead Brooklyn Bank	0	0	0	0	0.86
92	International Bank	0	0	0	0	3.02
93	Manhattan Company	1	1	0	1	56.81
94	Metropolitan Bank	1	1	0	0	22.33
95	Montauk Bank Brooklyn	0	0	0	0	0.77
96	Mutual Bank Brooklyn	0	1	0	0	7.73
97	New Netherland Bank	0	1	0	0	4.72
98	Northside Bank of Brooklyn	0	1	0	0	3.65
99	NY Produce Exchange Bank	1	1	0	1	14.56
100	Pacific Bank	1	1	0	0	8.76
101	Peoples Bank	1	1	0	0	3.73
102	Public Bank	0	0	0	0	12.71
103	Security Bank	1	1	0	1	15.99
104	State Bank	1	1	0	1	27.85
105	Westchester Avenue Bank	0	0	0	0	0.88
106	West Side Bank	1	1	0	1	6.21
107	Yorkville Bank	0	1	0	0	7.19
108	Broadway Central	0	0	0	0	0.71
109	Bronx Borough Bank	0	0	0	0	2.46
110	Bryant Park Bank	0	0	0	0	1.69
111	Mechanics Bank Brooklyn	0	1	0	0	22.41

NOTES:
NYCH is 1 for New York Clearing House member institutions and 0 otherwise.
C&F is 1 for banks with balance sheet items in the Commercial and Financial Chronicle and 0 otherwise.
AVEC is 1 for borrowers of Aldrich-Vreeland Emergency Currency and 0 otherwise.
CHLC is 1 for NYCH member borrowers of clearing house loan certificates and 0 otherwise.
Total assets are in millions of 1914 US dollars.

REFERENCES

Annual Report of the Comptroller of the Currency 1914, Government Printing Office.

Annual Report of the Superintendent of Banks of the State of New York for 1914 and 1915. J.B. Lyon Company: Albany.

Annual Report of the Superintendent of Banks Relative to Savings Banks, Trust Companies, Safe Deposit Companies, Personal Loan Companies, and Personal Loan Brokers for the years 1914 and 1915. J.B. Lyon Company: Albany.

Commercial and Financial Chronicle, Various dates between June 1914 and July 1915, Volumes 98, 99 and 100.

Friedman, Milton, and Anna J. Schwartz. 1970. *Monetary Statistics of the United States: Estimates, Sources, Methods.* Princeton, NY: Columbia University Press for NBER.

Friedman, Milton, and Anna J. Schwartz. 1963. *A Monetary History of the United States, 1867–1960.* Princeton, NJ: Princeton University Press for NBER.

Gorton, Gary. 1985. "Clearinghouses and the Origin of Central Banking in the United States." Cambridge University Press, vol. 45(02), pages 277-283, June.

Hoag, Christopher. 2012. Aldrich-Vreeland Emergency Currency as a Lender of Last Resort. *Journal of Economics* (MVEA) 38(1): 73-88.

Laughlin, J. Laurence. 1908. "The Aldrich-Vreeland Act." *Journal of Political Economy*. Vol 16, 8, October, 489-513.

Moen, Jon R. and Ellis W. Tallman. 2000 "Clearinghouse Membership and Deposit Contraction During the Panic of 1907," *Journal of Economic History* (March), 60, 1, 145-63.

Noble, H.G.S. 1915. *The New York Stock Exchange in the Crisis of 1914*. The Country Life Press: New York.

Noyes, Alexander Dana. 1916. *Financial Chapters of the War.* Charles Scribner's and Son: New York.

Silber, William L. 2007a. *When Washington Shut Down Wall Street: The Great Financial Crisis of 1914 and the Origins of America's Monetary Supremacy*. Princeton University Press: Princeton, New Jersey.

Silber, William L. 2007b. "The Great Financial Crisis of 1914: What Can We Learn from Aldrich-Vreeland Emergency Currency?" *The American Economic Review*, Vol 07, No.2 May, pp. 285-289. http://www.jstor.org/stable/30034462

Sobel, Robert. 1968 *Panic on Wall Street*. New York: Collier Books.

Sprague, O.M.W. 1915. "The Crisis of 1914 in the United States." *American Economic Review.* September.

Sprague, O.M.W. 1909. "The Proposal for a Central Bank in the United States: A Critical View." *The Quarterly Journal of Economics,* Vol. 23, No. 3 (May), pp. 363-415.

Tallman, Ellis W. and Jon R. Moen. 1990 "Lessons from the Panic of 1907," Federal Reserve Bank of Atlanta *Economic Review* 75 (May/June): 2-13.

Timberlake, Richard. 1985. *Monetary Policy in the United States.* The University of Chicago Press: Chicago.

Wicker, Elmus R. 2005. *The Great Debate on Banking Reform: Nelson Aldrich and the Origins of the Fed.* Ohio State University Press: Columbus.

Table 1: Characteristics of the Temporary Liquidity Mechanisms

	Aldrich-Vreeland Emergency Currency	***Clearing House Loan Certificates – New York Clearing House***
Eligibility to borrow	Membership in the National Currency Association*	Membership in the New York Clearing House Association
Interest cost	3 percent for the first three months, and rises by .5 percentage points per month until reaching 6 percent	6 percent accrued to the clearing house member bank that held the certificate -- NYCH as intermediary.
Collateral	State and municipal bonds, commercial paper, other securities.	Commercial paper, bills receivable, other securities.
Discount on collateral	State and municipals at 90 percent, commercial paper, other securities at 75 percent	The standard discount on all securities was 75 percent. Discounts were smaller on US Treasury, state and municipal securities, but those assets were rarely used in practice.
Transferability	Emergency currency could pass between banks as repayment for deposits, and could be issued to individual depositors. However, it did <u>not</u> serve as final payment at the New York Clearing House.	Clearing house loan certificates could only pass as final payment between NYCH member banks. It was not designed as a substitute form of cash payment in New York City.
Issued by:	National Currency Association supported by United States Treasury	New York Clearing House (effectively, its membership)
Classification as currency	Emergency currency had all the characteristics of national bank notes except that the collateral backing emergency currency was less restricted than the collateral requirements for national bank notes (US Treasury Debt issues only).	New York Clearing House was unequivocal that only national bank notes could be issued as a currency; if CHLCs circulated outside the NYCH membership, the 10 percent tax on state bank notes may have been triggered, it was feared.

***** Membership in the Federal Reserve System or a commitment to join the Federal Reserve System was a necessary condition for membership in a National Currency Association.

Table 2: Emergency Currency and Clearing House Loan Certificates – Aggregates

Aldrich Vreeland Emergency Currency

United States:

Total amount Issued:	$385,553,905.00		
Total amount in circulation:	$374,029,063.00	as percent of issued:	97

New York City:

Total amount Issued:	$144,925,960.00	as percent of US issue:	37.6
Total amount in circulation:	$137,012,260.00	as percent of US circulation:	36.6

Clearing House Loan Certificates

United States:

Total amount Issued:	$211,778,000.00		
Total amount in circulation:	$195,754,000.00	as percent of issued:	92.4

New York Clearing House:

Total amount Issued:	$124,695,000.00	as a percent of US issue:	58.9
Total amount in circulation:	$109,185,000.00	as percent of US circulation:	55.8

Circulation of Clearing House Loan Certificates relative to Emergency Currency

United States

CHLC / AVEC in circulation:	52.3 percent

New York City

CHLC / AVEC in circulation:	79.7 percent

Source: Annual Report of the Comptroller of the Currency, 1915.

Table 3: Banking Aggregates in New York City During the National Banking Era Crises Contractions From Levels Prior to Panic				
	Aggregate measures of New York Clearing House Banks (in millions)			
		Change in level of the respective aggregate measure relative to the level observed prior to the onset of panic		
Dates of Panic	**Clearing House loan certificates**	**Loans**	**Net deposits**	**Specie and legal tenders**
Defined by the initiation of CHLC, the imposition of suspension of payments, and or the lifting of suspension, the cancellation of CHLC	*Maximum issued; value at end of panic*	*Minimum; value at end of panic*	*Minimum; value at end of panic*	*Minimum; value at end of panic*
Sep 20-Dec 27, 1873	22.57; 2.83	-36.5; -26.5	-56.5;-12.2	-37.5; 11.0
May 17-Aug 30, 1884	21.89; 5.4	-45.8; -46.5	-49.2; -25.7	-19.3; 20.3
Nov 15, 1890, Jan 10, 1891	15.155; 0	-14.9; -1	-15.5;18.8	-3.7; 31.1
May 27-October 14, 1893	38.28; 0	-24.8; -19.6	-68.3; -5.4	-57.5; 23.0
Oct 19, 1907-Jan 11, 1908	87.87; 68.35	-12.2;43.8	-13; 11.7 ??; *-120	-46.0;-11.2
Aug 1-Dec 5, 1914	118.18; 1.53	0.072; 100.14	0.048; 0.006	-102.11; -102.11

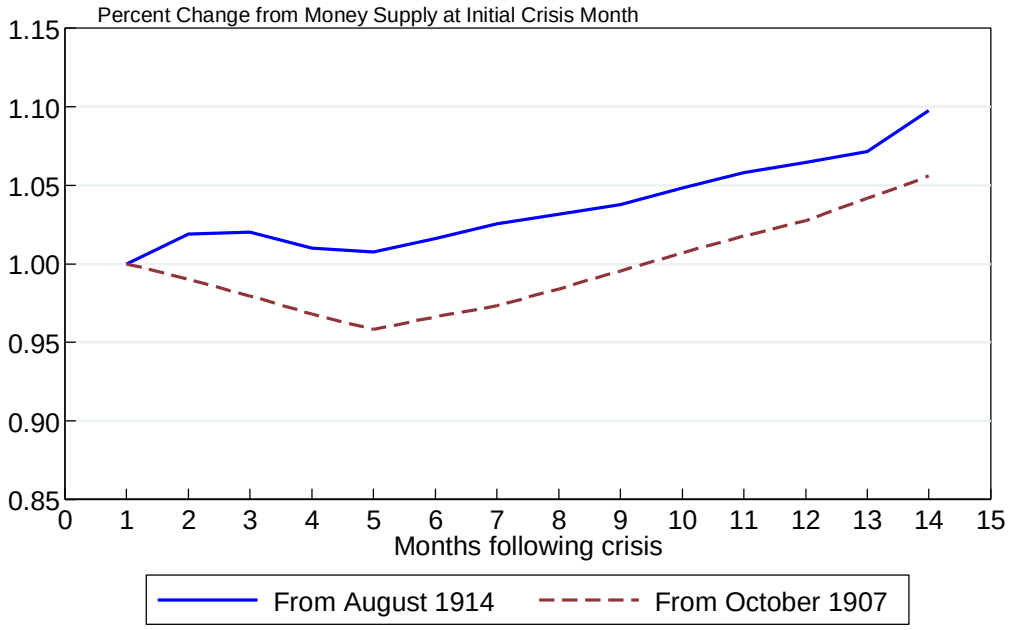
Sources: Minutes of the Clearing House Loan Committee, New York Clearing House, various dates. Commercial and Financial Chronicle, various issues. Andrew, A. Piatt. Statistics of the United States, 1867-1910, Table 28, pages 75-118. Superintendent of Banking of the State of New York, Annual Report, 1908.

* Includes figures imputed from the aggregate totals for trust companies in New York City.

Table 4: Total Deposits by Borrowing Status				
Millions of dollars	***Borrowing Status***			
	AVEC only	**CHLC only**	**Both AVEC and CHLC**	**No Borrowing**
August 1, 1914 total deposits	373.442	643.685	809.443	179.037
December 5, 1914 total deposits	408.143	742.026	784.695	182.777
December August difference	34.701	98.341	-24.748	3.74
Percent Change December August	9.29%	15.28%	-3.06%	2.09%
Total borrowing	54.533	47.551	157.6205	-
Number of banks	11	21	21	21

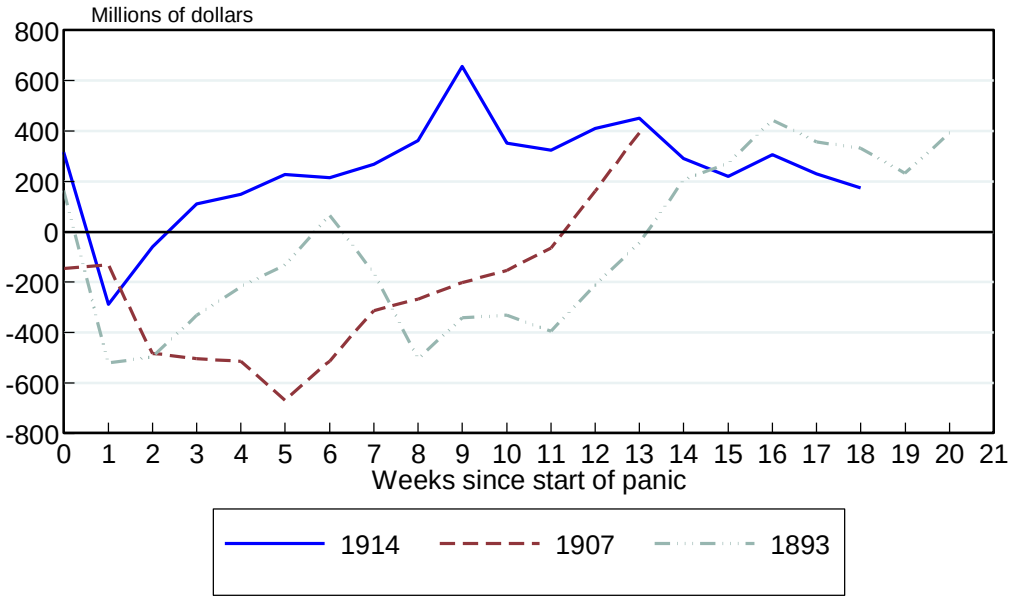
Sources: Commercial and Financial Chronicle, various issues.
Notes: Data does not include full sample of all 111 financial institutions. The institutions included in the sample break down as follows: 32 national banks amounting to 98.5 percent of total national banks assets, 15 trust companies representing 47.5 percent of total trust company assets, and 27 state banks amounting to 90 percent of state bank assets.

Figure 1: Aggregate U.S. Money Supply



Source: Monetary Statistics of the United States

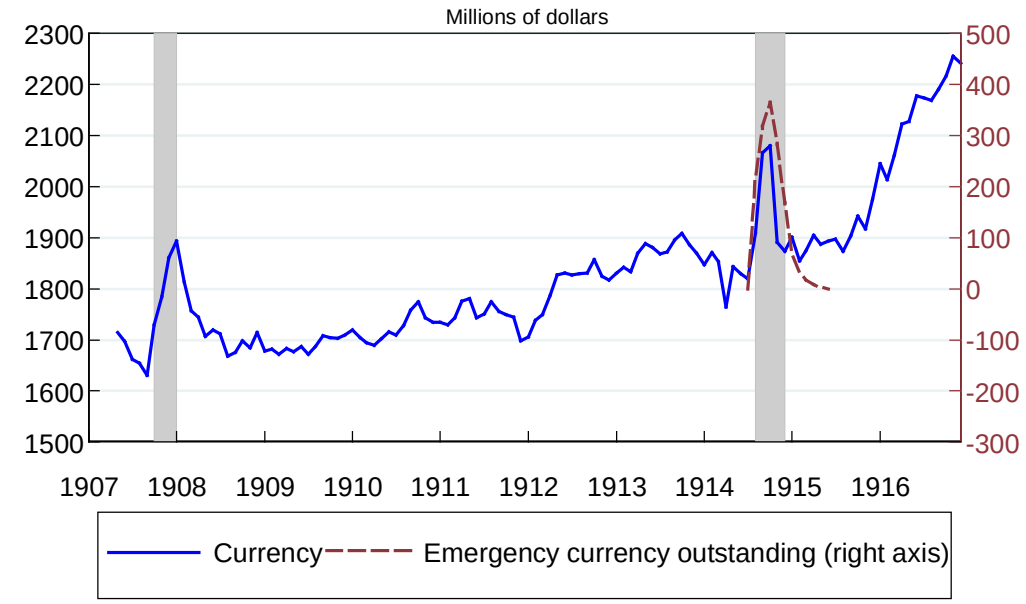
Figure 2: Net Flows to the Interior from New York Banks



Note: Flows series are scaled by nominal GDP for each respective year

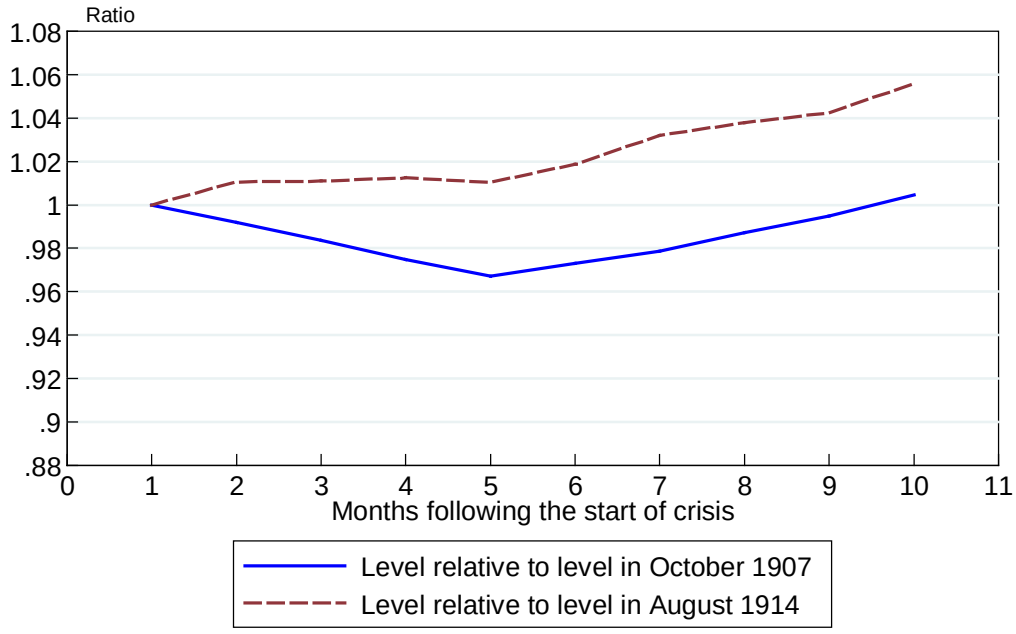
Source: Commercial and Financial Chronicle, various volumes/Johnston and Williamson, MeasuringWorth

Figure 3: Currency Held by the Public



Note: shaded areas indicate crisis periods
Currency held by the public is defined as currency in circulation outside of the Treasury and federal reserve banks minus vault cash of all banks
Sources: Friedman and Schwartz (1970) and Annual Report of the Comptroller of the Currency (1915 vol. 1)

Figure 4: Demand Deposits, All Commercial Banks



Source: Friedman and Schwartz, Monetary History of the United States, TableA1, NBER Series 14145

Figure 5: National Bank Borrowing, Net Deposits, and Loans

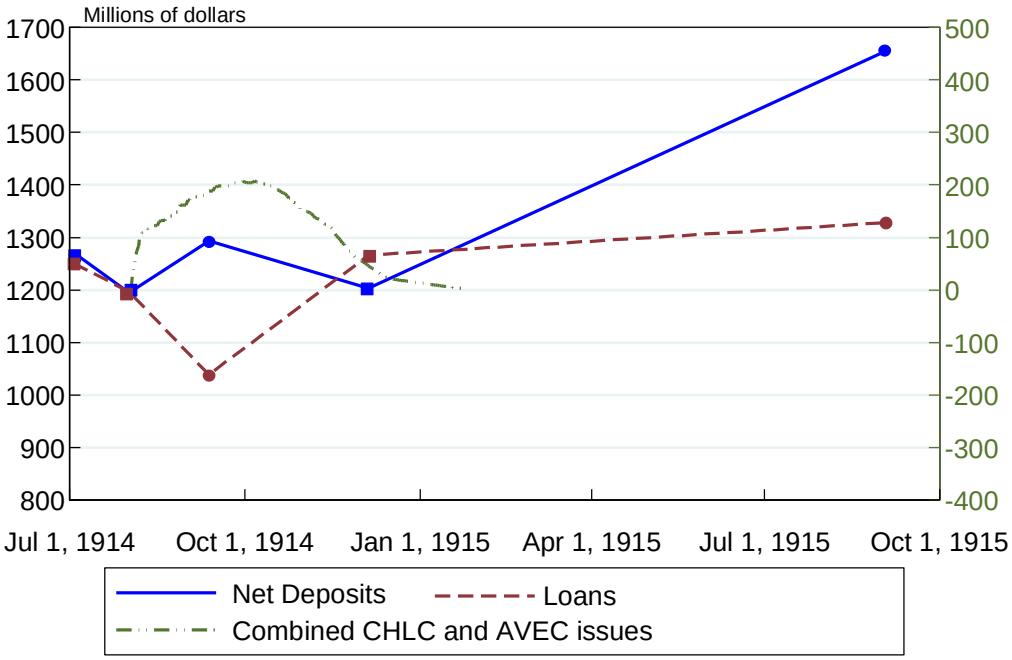
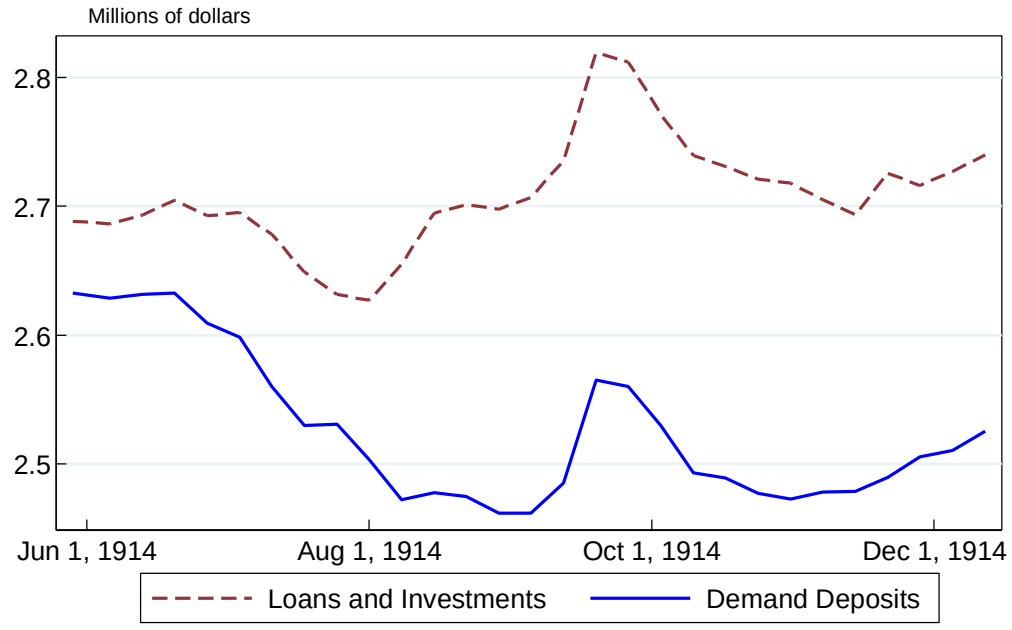


Figure 6: Clearing House Banks and Trusts in Greater New York City



Source: Commercial and Financial Chronicle Volume 99 and Volume 100

Figure 7: Base Money Supply Constraint