Banking Panics, the 'Derangement' of the Domestic Exchanges, and the Origins of Central Banking in the United States, 1893 to 1914

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Introduction (in schematic form with apologies)

- 1. An enduring monetary union? The United States during the National Banking Era
  - The evolution of the U.S. monetary union from the Currency Act of 1792 to the formation of the Fedwire in 1918.
  - Intermediate step, the National Banking Acts which instituted a common currency. Two notable features of this period:
    - No central bank
    - No fiscal union
- 2. In light of the Eurozone crisis, how did this currency union endure especially frequent, often severe economic-financial crises?
  - Money-center banks would often "suspend" payments: restrict partially or completely the par convertibility of deposits on demand.
    - Examples: Enforcement of 60-day notification requirement on savings accounts; weekly dollar limits on deposit withdrawals
    - Collective decisions often made by local clearinghouse often in conjunction with their monetary policies.
  - An alternative perspective: banks temporarily "seceded" from the dollar monetary union (or standard).
    - Domestic version of Bordo's gold standard rules of the game.
    - Bank money constituted an alternative local money whose value floated against the official currency.
- 3. What's the issue?
  - Friedman & Schwartz:"... [G]iven the occurrence of the banking panic and the spread of distrust of the banks, the fairly prompt restriction of payments was therapeutic measure that surely kept the contraction from being even more severe and more protracted than it was.... Restriction of payments thus protected the banking system and gave time for the immediate panic to wear off, as well as for additional currency to be made available." (Friedman and Schwartz, 1963, pp. 163, 167; emphasis added)
  - By contrast the view of the William Ridgley, Comptroller of the Currency in 1907: "The greatest hardship to business generally has been the derangement of the machinery for making collections and remittances. ... [T]his has interfered with every kind and class of business and led to a curtailment of business operations of every kind. Factories have been suspended, workmen have been thrown out of employment, orders have been canceled ...."
  - Why the difference? Sprague's answer (1977[1910], p. 293: "There is no part of our banking machinery which has received so little elucidation as that of the domestic exchanges."
    - U.S. monetary union stitched together by a vast but "sparse" economic network, the "domestic exchanges."

- Suspensions by nodal banks, especially in New York, could transmit a liquidity crisis throughout the banking system especially after 1893 and translate a local into a national calamity.
- 4. Outline of paper/talk.
  - Institutional foundations of the private, decentralized interbank payments network during the National Banking Era.
  - A brief narrative account of the 1893 and 1907 crises and their impact on the domestic exchanges.
  - A tale of two cities: explaining the regional divergence in the impact of the 1893 crisis on domestic exchange markets in the Northeast and Midwest and the convergence in the impact of the 1907 crisis.
  - Pre-Fed public-private monetary policy.
  - Conclusion: a reinterpretation of McAdoo's use of the emergency currency provisions of the Aldrich-Vreeland Act.

### 1. A private, decentralized interbank payments network

Between the demise of the Second Bank of the United States and the founding of the Fed, the

U.S. payments-monetary union was stitched together by a largely private, decentralized interbank network (Knodell 1988; James and Weiman 2010). Because of restrictions on branching, banks could not forge vast territorial networks to coordinate interregional flows of funds, either internally or via a consortium organized along the lines of the urban clearinghouse. Instead, they (and other intermediaries) had two options. They could simply ship currency via fast freight companies such as American Express and Wells Fargo along increasingly integrated transregional rail networks. Yet, despite the increased efficiencies and sharp reductions in freight rates, they infrequently used this costly and risky option (Colwell 1860, pp. 135, 190, 262, 447).

As an alternative, banks and their customers preferred paper "credit" instruments, the convertible liabilities of banks and other payments intermediaries.<sup>1</sup> Before the Civil War, bank

<sup>&</sup>lt;sup>1</sup>The adjective convertible is short-hand for the condition that the issuing bank or intermediary would redeem these liabilities for the par equivalent of currency or good funds at its

notes—that is convertible bearer receipts—were a common instrument in long distance trade, especially in more peripheral areas. Following the flows of trade, these notes tended to gravitate to large Northeastern cities, especially New York which was the nation's "jobbing" center. This flow of funds supported an active broker-dealer market in bank notes, but also induced country banks to establish a correspondent, which would hold their clearing balances and redeem their notes at par or an agreed-upon discount (Gorton 1999; Myers 1931; Weber 2003). Reflecting the adage about banking and commerce, by 1850s New York had become the preeminent correspondent banking center. Correspondent or bankers' balances there exceeded the levels in Boston and Philadelphia combined by almost two-fold, and the vast majority (85.7 percent) of chartered banks in the U.S. maintained a New York correspondent.<sup>2</sup>

In establishing a truly common currency, the Civil War-era National Banking Acts effectively nationalized the bank note market and displaced the dominant position of New York correspondents as note redemption agents (Redenius 2007; James and Weiman 2011). Ironically, this banking reform reinforced the centrality of New York correspondents, but in a novel interregional payments system based on bank drafts not notes. The legislation institutionalized the use of bank drafts, essentially cashier's checks drawn on a correspondent, to settle balance of payments deficits and surpluses arising from the interregional flows of national bank notes. Accordingly, all national banks but especially those in official reserve centers would hold

office and on demand. Private banks, for example, simply agreed to meet this condition, but chartered banks, whether by state or the federal governments, were mandated to comply or else suspend their operations.

<sup>&</sup>lt;sup>2</sup>Bodenhorn (2000, p. 196) gives the estimates of correspondent balances in Northeastern centers in 1850; according to Knodell (2010), New York private banks in the 1850s held an equivalent value of correspondent balances. Myers (1931, p. 115) reports the evidence on the number of correspondent relations.

clearing balances in a "central" reserve national bank in New York. Their draft payments to redeem outstanding notes cumulating in distant centers could then be readily cleared and settled via the New York clearinghouse.

## i) The evolution of correspondent banking

By centralizing correspondent relations and deposits in New York, the National Banking Acts yielded a classic demand externality, transforming New York drafts into a common national payments instrument for long-distance wholesale and not just interbank transactions (James and Weiman 2013). After all, as long as the vast majority of banks maintained a New York correspondent, sellers regardless of their location would accept payment in New York drafts, which they could deposit in their local bank usually at par for immediate credit. In turn, their banks could efficiently bundle their New York drafts and remit them directly to their New York correspondent (or indirectly via a regional correspondent) for clearing and settlement at the New York clearinghouse.

Distance decay lessened the pull of a New York correspondent, especially for intraregional transactions. Accordingly, the rapid economic-territorial expansion of the U.S. economy after the Civil War but especially 1880 fueled the spread of deposit banking and correspondent centers across the continent. Yet, despite their declining share of the correspondent market, New York banks anchored what was in effect a more elaborate spatial division of labor along Smithian lines (Conzen 1977; James and Weiman 2010). "Country" banks maintained a regional correspondent to mediate local payments, but also to broker distant transactions. At the same time, regional money center banks cleared and settled their mutual transactions on the books of their New York

correspondents. In other words, like the "Fed wire" today, New York correspondents via the clearinghouse operated the large-value settlement system for interregional interbank transactions.

Schematic evidence from the early 1890s delineates the contours of this tiered interbank network, which is rendered schematically by the diagram in Figure 1.<sup>3</sup> Regional correspondents attracted a significant business among country banks in their market area. For example, Chicago correspondents accounted for 30 percent of the draft transactions between national banks in the East and West Northcentral regions, but less than 10 percent elsewhere. Most "country" banks—those located outside of official reserve centers—maintained a New York correspondent as well, but large New York correspondents, which dominated the market, tended to specialize in mediating the payments between regional center banks. Their share of this market was almost three-quarters, as opposed to only one-half of the country bank market.

New York's nodal position in the correspondent banking system, in fact, increased after the Panic of 1893 and subsequent "Great Depression." We explain this change by the diffusion of individual checks and conversely the displacement of bank drafts in long distance payments.<sup>4</sup> While certainly more convenient for banks' customers, check payments dramatically increased

<sup>&</sup>lt;sup>3</sup>The argument in this and the next paragraph draws heavily from our earlier work on the interbank payments network (James and Weiman 2010).

<sup>&</sup>lt;sup>4</sup>Banks in the late postbellum period were increasingly banks of deposit rather than banks of issue (see James 1978, pp. 22-27). Checks, as compared with drafts, offered distinct advantages to bank customers making non-local payments. They were clearly more convenient for payers, who avoided the transactions costs (the trip to the bank) and fees of purchasing drafts. Moreover, a draft purchase debited the payer's account immediately, while a check payment was not debited until the check was collected. Because informational problems, the non-local use of checks in payment was initially quite limited. The use of checks in non-local payments began to rise considerably around 1880, and by the early twentieth century Kinley (1910, pp. 196-99) estimated that about 95 percent of the wholesale trade in the country, transactions most likely to have been non-local, was paid for by checks.

the uncertainty of withdrawal demands on banks' New York accounts. Accordingly, they dramatically shifted the composition of their reserve portfolios and held increasing shares of their clearing balances in New York. At the same time, the diffusion of individual checks represented the integration of local and long distance payments systems, which enabled banks to exploit an economies of scope by using their New York balances to settle local clearinghouse accounts. This practice was especially common in clearinghouses in smaller cities, which report banks settling their accounts by drawing a draft on their New York correspondent and not by transferring cash from their own or the clearinghouse vault.

### ii) The domestic exchange market

Domestic exchange markets in regional centers complemented the more fragmented U.S. banking-payments system. Through domestic exchange transactions, banks could buy or sell funds—that is deposits—in distant centers and in return either deplete or replenish their local reserves, clearinghouse balances or its equivalent (at least in normal times) in vault cash. In other words, through this market, banks could readily transfer funds across space and so manage their portfolios of excess clearing balances in response to customers' largely seasonal patterns of local and long distance trade.

As observed above, New York correspondent balances had become *the* national means of payment by the late 1870s. Accordingly, the trade in New York exchange dominated regional domestic exchange markets throughout the country, and the local exchange rate—the price of New York deposits in terms of local currency—was routinely reported in daily newspapers and

trade journals.<sup>5</sup> Prices, quoted in terms of the deviation from par, expressed the value of \$1000 worth of New York deposits. In the early 1880s, for example, banks in Chicago traded New York exchange at recorded prices hovering between a \$1 premium and discount or at rates between  $\pm 0.1$  percent.

Like its international counterpart, this system of domestic exchange was a fixed rate regime, at least in normal times. As a condition of the 1792 monetary union, the value of a New York dollar in terms of the unit of account (effectively gold after 1873) was equivalent to the value of a dollar in Chicago. The spot price of New York funds in Chicago, however, could deviate from this mint parity exchange rate of one within bounds set by the currency points, the cost of shipping funds from Chicago to New York or *vice versa*. Analogous to the international gold standard, if domestic exchange rates exceeded these bounds, banks and other brokers would arrange to ship currency to or from New York.

According to newspaper accounts, these markets functioned as predicted. On 8 July 1893 just before the suspension in New York, the *Chicago Tribune* reported that the discount on New York exchange had reached \$1, far in excess of the estimated cost of shipping funds, \$0.75 per \$1,000. It further noted that Chicago banks were about to receive currency shipments from New York and had placed orders with their correspondents for "considerable" more.<sup>6</sup> Less than a week later, the exchange rate had plummeted to \$2 discount, which rendered New York funds "unsaleable" in local markets. This evidence implies a simple test to determine periods of

<sup>&</sup>lt;sup>5</sup>Cincinnati, which continued to ship agricultural products to New Orleans along the Ohio and Mississippi Rivers, is a notable exception, and supported a vibrant trade in New Orleans exchange through the postbellum period.

<sup>&</sup>lt;sup>6</sup>This information was gleaned from the daily market reports on 8 July (p. 11) and 14 July (p. 12).

"normalcy" in the system of domestic exchanges; we should expect to observe narrow deviations of exchange rates from par, or reported exchange rates hovering around horizontal axis. Even in regions suffering large chronic balances of payments of deficits, exchange rates should still fluctuate within narrow bounds, albeit around a significant positive value.

To illustrate, we collected weekly domestic exchange rates from *Bradstreet's* magazine for six regional centers: Boston in the Northeast; Chicago, St. Paul, St. Louis in the Midwest; New Orleans in the South; and San Francisco in the West. The data graphed in Figure 2 cover the period between the two major panics, September 1893 to September 1907. The evidence clearly shows that in normal times exchange rates fluctuated narrowly around "equilibrium," that is long-term levels. To continue the Chicago example, rates there in the 1890s varied between  $\pm$  \$0.75, the *Tribune's* estimate of the shipping costs. These data also reveal a sharp decline in exchange rate fluctuations in the late 1890s, which cannot be explained by changes in shipping costs. Rather, they are evidence of innovations in the interbank payments system that enhanced the nodality of New York correspondents as reserve agents mediating the settlement of interbank transactions throughout the country (James and Weiman 2010).

The flip side of our analysis implies an equally simple empirical metric to detect the "derangement" of the domestic exchanges. Banks' suspension, or more accurately restriction, of payments would sever the 1-to-1 peg between deposits and currency (or other good funds). In other words, suspension effectively implies a dual monetary system, in which the value of legal tender currency in terms of bank deposits (i.e., the currency premium) could fluctuate freely in dealer markets, as banks no longer functioned as market-makers buying and selling deposits over

the counter at the fixed par rate. Depending on the circumstances as elaborated below, the value of New York exchange could then soar or plummet far beyond the normal bounds.

#### 2. The 1893 and 1907 panics and their impacts on domestic exchange markets

The panics of 1893 and 1907 occurred during a period of increasingly severe macroeconomic fluctuations, in which monetary disturbances were both cause and consequence (James 1993). According to official dating, the economy contracted in early 1893, nearly two quarters before the panic episode and subsequent suspension of payments.<sup>7</sup> During the depths of what contemporaries would call a "great depression," from August 1893 through July 1894, industrial production fell by over 20 percent relative to 1892 levels, and the estimated unemployment rate soared to 17.1 percent. Sustained recovery did not take hold until the late 1890s, in part fueled by monetary expansion.

The 1907 contraction was sharper, but relatively short-lived. Industrial production plummeted in October, and by the end of the year had declined by over 25 percent. The unemployment rate followed a similar trajectory, and more than doubled from 4.9 percent in 1906 to 11.8 percent in 1908. In this case, however, a sustained recovery took hold in mid-1908. i) The 1893 panic

The New York stock market collapsed in early May 1893 with the failure of the National Cordage Trust. Nevertheless, most of the early financial disruptions occurred in interior cities rather than in New York. In June 1893 bank runs were reported in Chicago, Omaha, and

<sup>&</sup>lt;sup>7</sup>The data in this paragraph are all taken from chapter Cb in Carter et al (2006).

Milwaukee, and then spread to the Pacific Coast cities of Los Angeles, San Diego, and Spokane.<sup>8</sup> In the wake of these events New York correspondents experienced cash drains to the interior, and the New York Clearing House Association (NYCHA) authorized the issuance of clearing house certificates as a precautionary measure.<sup>9</sup> Banks with the appropriate asset collateral could apply for loan certificates, and use them to settle adverse balances at the clearing house. They thus functioned as a substitute for legal tender money in settling local interbank balances and limited currency drains to other local clearing house banks.

In July 1893 bank suspensions in interior centers intensified, as Kansas City, Denver, Louisville, Milwaukee, and Portland, Oregon all experienced city-wide panics (Wicker 2000, pp. 65-77). With the continued external drains on their reserves New York banks on August 3 restricted but did not completely suspend cash payments to holders of their convertible deposit liabilities. This decision was followed immediately by many banks throughout the country. Despite the restriction on payments, New York banks continued to ship cash on a discretionary basis to interior banks drawing down their correspondent balances (Sprague 1910, pp. 177-178,

<sup>&</sup>lt;sup>8</sup>Contemporaries identified the drop in the Treasury's gold reserves below \$100 million in April 1893 as the harbinger of the crisis, as it may have amplified fears that government liabilities would be redeemed in silver rather than only gold as had been the practice. Sprague (1910, p. 169), however, noted that bank failures and suspensions "occurred principally in the West and Southwest, where there is no evidence that people were distrustful of silver money... Distrust of the solvency of the banks rather than dissatisfaction with the circulating medium was clearly the direct cause which brought about runs upon banks and the numerous failures and suspensions." As an underlying factor, DuPont (2008) suggests that agricultural distress may have played a role in initiating the panic in the west in the early summer. Hanes and Rhode (2009) argue persuasively that financial crises between 1879 and 1914 were fundamentally rooted in adverse cotton harvests which created fertile financial conditions for disruptions.

<sup>&</sup>lt;sup>9</sup>See Wicker 2000, pp. 65-77; and Andrew 1908a. During financial crises interior banks clearly must have experienced strong cash withdrawal demands for hoarding as well as the more standard (retail) trade and payroll demands (usually in currency).

182). The restriction period in New York lasted around one month with resumption beginning on September 2. A chronology of the panic appears in Table 1.

In Figures 3 and 4 we show the impact on regional domestic exchange markets of the succession of banking crises culminating in the NYCHA banks' decision to restrict cash payments. With data from the *New York Times*, we can track in Figure 3 the daily rates on New York exchange in five major financial centers—Boston, Chicago, St. Louis, San Francisco, and New Orleans. In Figure 4 we supplement this detailed account with the weekly data (collected every Friday) from *Bradstreet's* for Philadelphia, Cincinnati, Louisville, Milwaukee, Kansas City, and Memphis. The "suspension" dates—when New York banks restricted and then resumed payments— are marked by vertical lines.

Regional patterns differed markedly. In the Midwestern centers of Chicago, Cincinnati, Kansas City, and St. Louis exchange rates moved in the expected direction. Faced with panicky customers, banks in these centers responded by liquidating their secondary reserves of New York deposits. The excess supplies of New York exchange (or excess demand for cash) in local markets depressed rates, which began to fall in July. The increasing reluctance of New York banks to ship currency in response to these demands and their ultimate decision to restrict payments removed the currency shipping points floor on domestic exchange rates, which in early August plummeted to points as low as -\$8 in St. Louis, -\$18 in Philadelphia, -\$20 in Milwaukee, and -\$30 in Chicago.<sup>10</sup>

<sup>&</sup>lt;sup>10</sup>In St. Paul and Minneapolis New York exchange was an "unquotable commodity," "unsalable at any price" (*Bradstreet's*, August 5, 1893, p. 496; August 12, 1893, p. 513). But interestingly, the changes in exchange rates in Kansas City and Louisville during the city-wide panics in late July were not as dramatic as in a number of other places.

The experience in Northeastern and Southern cities is more anomalous. Contrary to the Midwestern cases, exchange rates in the Boston and Philadelphia markets actually increased in July and in Philadelphia reached a peak premium of \$10 by the end of the month. Following "suspension" in New York, rates in Philadelphia mirrored those in Midwestern centers and dropped sharply. In Boston, however, rates soared to a peak premium of \$5 and then varied between \$1 and 2 until the end of the month. In the Southern cities of New Orleans and Memphis there was little evidence of disturbance before and even during the restriction period.<sup>11</sup> Rates in New Orleans do fall in early August, but then surge later in the month and early September, just as "normalcy" is returning to other regional markets.

#### ii) The 1907 panic

The 1907 panic more closely resembled those in 1873 and 1884, when an initial crisis in the New York banking-financial sector radiated out to interior cities.<sup>12</sup> On October 16 a copper corner by Augustus Heinze collapsed and brought down two brokerage house which were involved. Nervous depositors ran on three banks affiliated with Heinze, but they were spared by the NYCHA's timely intervention. A full-blown panic began less than a week later with runs on New York trust companies—first the Knickerbocker, followed by the Trust Company of America and the Lincoln Trust. A money pool organized by J. P. Morgan fended off disaster for the trust

<sup>&</sup>lt;sup>11</sup>According to Sprague (1910, pp. 296-97), the balances of payments during the crop moving season largely influenced rates in Southern cities especially those involved in the cotton trade like New Orleans. Contrary also to the situation in the Midwest, *Bradstreet's* report that "New York exchange is scarce" in Charleston (August 5, 1893, p. 496). The Memphis data, mostly par or zero rates, may simply reflect gaps in reporting and not actual conditions.

<sup>&</sup>lt;sup>12</sup>Odell and Weidenmier (2004) argue that financial aftershocks of the 1906 San Francisco earthquake—notably large insurance claims that drained the gold reserves of New York banks—was a contributing factor.

companies in the near term, but could not stem large withdrawals by country banks on their New York correspondents.

As a preemptive measure the NYCHA authorized the issue of loan certificates and suspended cash payments on October 26. Its unusual decision immediately ramified across the country, in cities large and small, and precipitated a virtual nationwide restriction of cash payments. An astute observer of the panic episode, A. Piatt Andrew (1908b, p. 503) could identify only 53 large cities (with populations over 25,000) where a restriction did not occur.<sup>13</sup> New York banks did not resume par convertibility on demand until after the first of the new year, a period of suspension lasting twice as long as in 1893. Again, Table 1 shows the highlights of the panic-suspension episode.

To see the ripple effects of the NYCHA suspension decision, we again plot the daily domestic exchange rates in six financial centers including St. Paul (in Figure 5) and the weekly rates in five more (in Figure 6) from mid-October to the end of December. The NYCHA suspension period is again demarcated by vertical line. The evidence clearly demonstrates the distinct trajectory of the banking crisis, with its origins in the New York financial-banking sector rather than in those in interior cities as in 1893. Without exception, regional domestic exchange markets display normal conditions until late October. Then, we observe clear evidence of market "derangement," typically a suspension of or sporadic trading during the last week of October and first week of November followed by a sharp deviation from the norm in the New York exchange

<sup>&</sup>lt;sup>13</sup>In the aftermath of the panic pleas for restraint came not only from government and the financial community but also from above. Archbishop Farley, for example, "pointed out that the chief thing to be feared in connection with the ship of finance was that during the squall some its passengers might jump overboard." Mgr. Lavelle at St. Patrick's cathedral also "cautioned against unwise action on bank depositors"(*Chicago Tribune*, October 28, 1907).

rate. In another striking contrast to the 1893 experience, exchange rates in Midwestern and (with a lag) west coast cities follow the course in Northeastern centers and increase to premiums ranging from a minimum of \$0.75-\$1 in Cincinnati to a maximum of \$8 in St. Louis.<sup>14</sup>

## iii) Summary

Our review of the 1893 and 1907 panics certainly suggest the systemic impacts of the suspension of payments, especially in New York which by the fin de siècle had become quite literally the nation's money center. At the same time, the evidence also points to key differences between these panic-suspension episodes, which we regard as evidence of the increasingly nodal position of New York correspondents and the New York banking sector in forging a more integrated national monetary-payments union after the 1890s "Great Depression." The timing of the "derangement" of the domestic exchanges offers perhaps the clearest evidence. Even in 1893 when the outbreak of panics was more of a local affair, the NYCHA decision to restrict convertibility sent a further shock wave across the country and reinforced the already precarious conditions facing reserve city and country banks. The 1907 case clearly revealed the vulnerability of banks throughout the country and so the national banking-monetary system to "speculations" in New York.

The next two items refer to the direction of and magnitude in exchange rate fluctuations during the panic-suspension periods.<sup>15</sup> While more the exception in the 1893 episode, the surge

<sup>&</sup>lt;sup>14</sup>Weekly rates in Cincinnati, Milwaukee, and Kansas City were only modestly affected by the New York panic and cash restriction. In the Southern cities of New Orleans and Memphis, Sprague (1910, p. 297) notes that exchange was at a discount or at par, as banks accumulated large correspondent balances from the late autumn cotton sales.

<sup>&</sup>lt;sup>15</sup>We use two measures of duration—the first covers the entire panic period and the second, only the restriction period. The onset of the panic is dated from the issue of clearing house loan certificates in New York: June 21 in 1893 and October 21 in 1907; the periods of convertibility

in exchange rates in Northeastern markets was more the rule in 1907. In other words, from the perspective of these panic periods, the regional divide between domestic exchange markets in the Northeast and Midwest (and to a lesser extent the west coast) virtually vanished, as the latter in the 1907 episode resembled closely the former in 1907 and 1893.

Along with the striking change in direction in exchange rate movements, their volatility during the panic-suspension periods declined sharply. The magnitude of the range during the 1893 and 1907 restriction periods, for example, fell from \$6.00 to \$2.88 in Boston \$29.75 to \$3.00 in Chicago. We derive similar results from a comparison of the standard deviation of restriction period exchange rates around the average rates during the preceding period of normalcy. In Boston this metric declines by about one-third, whereas in Chicago not surprisingly it falls by 85 percent.<sup>16</sup>

Finally, regional domestic exchange markets were more prone to closure in the 1907 than in the 1893 panic-restriction periods. As evidence, we report the frequency of "no trade" days across the five cities for which we have daily market reports.<sup>17</sup> A comparison of "no trade" days in the two periods (see Table 7) highlights a rash of market disruptions in the first two weeks of the 1907 restriction period, not evident in the 1893 episode. In fact, excluding San Francisco

restrictions began on August 3, 1893 and October 26, 1907.

<sup>&</sup>lt;sup>16</sup>Sprague (1910, p. 297) cautions that in panic periods "the quoted rates of exchange were often without much significance" since markets might have been so disorganized that the rates were "purely nominal, representing little or no actual transactions." Nevertheless, such extreme values might still be a useful indicator of the state of the market.

<sup>&</sup>lt;sup>17</sup>In some instances the narrative accounts explicitly comment on the absence of trading in domestic exchange on what was otherwise a normal business day. In most cases, however, our evidence is indirect, the absence of a market report. We recognize, however, that the latter could simply reflect normal reporting error.

where the market mysteriously vanishes for two months after suspension, the pattern in 1893 and the latter half of November 1907 could just simply reflect idiosyncratic reporting error and market disturbances.<sup>18</sup>

3. A Tale of Two Cities: Boston and Chicago during the Panics of 1893 and 1907

To understand the divergent trends in domestic exchange rates across regions in the 1893 panic and their convergence by 1907, we examine more closely the Boston and Chicago markets.<sup>19</sup> The reasons for this dramatic transformation are manifold, involving a variety of factors including the "informal" monetary policies of the U.S. Treasury and urban clearinghouses. Nonetheless, we see an underlying thread linking these episodes, namely increasing economic and monetary integration in the territorial U.S. and centrality of New York correspondents in the emerging national "money" market.

### i) Regional divergence in 1893: Chicago

Based evidence from earlier panic episodes, we regard the 1893 experience in Chicago as more the historical norm. Unlike in New York, banks there (and in other regional centers) resisted collective action—issuing clearinghouse certificates and in the extreme imposing limits on deposit convertibility—in response to their customers' large even panicky withdrawals.

<sup>&</sup>lt;sup>18</sup>Perhaps even more interesting is the fact the domestic exchange market disappears completely in Louisville after the 1907 panic (and hence not shown in Figure 5) and flatlines in Memphis.

<sup>&</sup>lt;sup>19</sup>We selected these cases strategically. Not only do they clearly illustrate the changes over the period, but for both cities we have access to a complete run of the leading daily newspaper over the panic periods, which enables us track day-to-day fluctuations in New York exchange rates as well as other quantitative and qualitative data during these episodes.

Forced to rely on their internal resources, they treated their correspondent balances in New York as a secondary reserve asset, which they would draw on or sell to replenish their vault cash.<sup>20</sup>

Banks' reserve allocation problem implies a simple arbitrage condition that depends on the relative cost of acquiring currency locally and in New York. The key variables are the currency premiums in the two places, the price of legal tender money in terms of local bank money. In general, the New York exchange rate in say Chicago—the price of a New York balance in terms of Chicago deposit money— is given by the following equation:

$$e_{NY} \approx C_{Ch} - C_{NY} \pm t$$
,

where  $e_{NY}$  is the New York exchange rate in Chicago,  $C_x$  is the currency premium in location x (the price of legal tender currency in terms of local bank deposits), and t is the transaction cost of shipping funds between Chicago and New York.<sup>21</sup> Under conditions of normalcy defined by par convertibility of deposits on demand, currency premiums were zero (0), and exchange rates were bounded by the currency shipping points (t).

New York banks' complete or even partial suspension of deposit convertibility resulted in a dual monetary system, consisting of legal tender currency and bank deposits. In this context the the currency premium was free to float in local dealer markets. If, as was the case in the 1893 panic, banks in New York but not in Chicago suspended payments, then the New York exchange

<sup>&</sup>lt;sup>20</sup>Needless to say, the uneven response of money center banks only reinforced the liquidity pressures, in this case by magnifying the demands on New York correspondents. We discuss this collective action or coordination problem at greater length below.

<sup>&</sup>lt;sup>21</sup>The transaction costs can enter into the equation positively or negatively and depends whether we are observing the sell or buy side of the market. In the depths of the crisis, for example, newspaper accounts often report activity only among banks on supply (ask), not demand (bid) side of the market.

rate in Chicago should fluctuate with the negative of the New York currency premium (that is,  $e_{NY} = -C_{NY} \pm t$ ).

Quantitative and qualitative evidence gleaned from the money market reports in local newspapers corroborate this perspective. The graphs in Figure 8 track the (negative of the) New York currency premium during the suspension period from August  $3^{rd}$  to September  $2^{nd}$  (denoted by the vertical lines) and the New York exchange rate over a slightly longer time horizon to include periods of normalcy. In the latter—early July and most of September—the New York exchange rate hovered within the narrow bounds (the dashed lines) set by the cost of shipping currency, estimated to be 75¢ to 80¢ per \$1000 of exchange (*Chicago Tribune*, 14 July 1893, p. 12; 19 July 1893, p. 12). During the suspension period proper the premium on legal tender money in New York fluctuated between 1.5 to 3.5 percent (or \$15 to \$35 per \$10000) until a sustained recovery beginning in the last week of August. The New York exchange rate in Chicago, in turn, dropped sharply below its normal lower bound and largely (though not perfectly) followed the movements in the increased opportunity cost of currency in the New York market (correlation coefficient = -0.824).

Contemporary analyses of the crisis episode explicate these parallel trends. Lyman Gage president of the First National Bank of Chicago succinctly summarizes the dilemma facing his and other local banks: "unless...[they] can and will sell drafts on New York at a *discount about equal to the premium paid on money there* nobody will buy them" (*Chicago Tribune,* 27 August, p. 8; our emphasis). He later reiterated the point: to prevent the complete drain of cash in Chicago, its banks must sell New York exchange "*at a discount about equal ... to the premium paid in New York on currency*" (again, our emphasis). Besides the New York currency premium,

the *Tribune* reports measured the severity of the suspension crisis by the share of New York clearinghouse transactions paid in loan certificates rather than in legal tender money. By the end of the first week of August, it claimed, virtually "all balances" in the New York clearinghouse were settled in this "fiat money," which Chicago banks refused because it was "only current in New York" (7 August, p. 6; 9 August, p. 9; 4 August, p. 8). In its retrospective on the crisis, the *Boston Globe* (1 September, p. 9) also related the "most acute point"—when the New York currency premium peaked—to the predominance of "checks and clearinghouse certificates" as means of interbank settlement.

The most glaring anomaly to these generalizations occurred around the second week of July, when the New York exchange rate fell below the lower bound shipping point. As noted in the *Tribune* (14 July, p. 12), New York exchange on this date was "unsalable" at a \$2 discount, because banks could earn greater profits from liquidating their New York deposits instead. Rates rebounded temporarily several days later, but then began to decline gradually and then at an accelerating pace by the end of July. Reflecting the views of local bankers, the *Tribune* reports attribute these persistent and ever widening deviations to the mounting deposit convertibility restrictions imposed by New York (and in fact all "Eastern") banks.

In other words, New York banks did not "suspend payments" abruptly in early August, but took this drastic step only after their partial attempts to limit respondents' access to their funds, what the *Tribune* referred to as a "semi-suspension" (17 July, p. 10). By mid-July Chicago banks were told by "some New York banks...not to draw on them from currency any further, but to sell

their exchange for any price that could be got for it" (*Chicago Tribune* 13 July, p. 12).<sup>22</sup> The critical turning point occurred two weeks later, when Chicago banks were besieged by panicky respondents in the aftermath of a rash of bank failures and then full-blown panics in Indianapolis, Louisville, and Milwaukee. At this point New York banks "flatly refuse[d] to ship currency," and banks could only try to liquidate their correspondent balances at firesale prices (*Chicago Tribune* 29 July, p. 11 and 31 July, p. 31).

#### ii) Regional divergence in 1893: Boston

Banks in Boston, by contrast, followed New York's lead albeit with a slight lag. They issued clearinghouse certificates in late June, and restricted deposit convertibility in early August. On August  $2^{nd}$  the *Boston Globe* (p. 2) reported that savings banks were enforcing the 60-day waiting period on large cash withdrawals, or would meet customers' demands with checks drawn on their national bank correspondent but marked payable "through the clearing house," effectively in clearinghouse loan certificates. The next day, the *Globe* (p. 3) speculated that the extreme "currency famine," especially the scarcity of small denomination bills, would prompt clearinghouse banks to "suspend cash payment altogether and do business entirely on a check basis." Though the clearinghouse made no official announcement, by the end of the week the *Globe* observed that most transactions were conducted in checks, not cash.

Applying the same logic of correspondent balances to the Boston case, we can explain why New York exchange rates ranged only modestly beyond the currency shipping point bounds. With the mounting liquidity crisis in the Boston region, currency also commanded an increasing

<sup>&</sup>lt;sup>22</sup>Apparently, these New York banks offered to make up for the loss at a later date, though the local papers report no evidence of these transfers at least by the end of September.

premium relative to bank deposits. As early as mid-May, the *Globe* reported dual rates on New York exchange, modest discounts for cash transactions and premiums for "checks" which together implied an effective a currency premium of just under  $20\phi$  per \$1000. Premiums soared in early August and then fluctuated between 1.2 and 2.4 percent until the last week of the month. As seen in Figure 9, they are highly correlated with the currency premium in New York (= 0.702) and comparable in magnitude. Consequently, the mutual "suspension" of payments in both cities had offsetting effects on the New York exchange rate.

The question remains why Boston banks paid a premium (in deposit money) for New York exchange, when the relative currency premiums would imply the opposite. We are reluctant to infer exchange rate levels from the currency premium data, because they were less precisely measured than were the former. Moreover, the qualitative evidence suggests that factors other than the scramble for currency influenced the Boston domestic exchange market and placed a premium on New York funds. For example, Boston banks continued to demand New York balances to purchase sterling bills (to finance gold imports) and Treasury securities to back new issues of national bank notes (*Boston Globe*, 9 August, p. 9).

Consistent with our thesis, we emphasize an additional underlying factor—the centrality of New York correspondents in mediating the long distance payments of Boston banks arising from the city's "natural course of business" (*Boston Globe*, 6 August, p. 22). In late June when Boston clearinghouse banks were deliberating whether to issue clearinghouse certificates, the *Globe* (25 June, p. 9) recognized that they could not simply liquidate their large New York correspondent balances. These funds were "all needed there," in part to meet their customers' long-distance payments demands. Additionally, with the increased use of checks rather than drafts as payments instruments, Boston banks relied on their New York correspondents for quasi-central bank services, which they secured by maintaining excess "compensating" balances. While tying up their liquidity in New York during normal times, these benefits paid off in the depths of the "currency famine," as Boston banks continued to draw on their New York correspondents for currency shipments, especially of small denomination notes.<sup>23</sup>

Boston banks, Sprague astutely observed (1910, pp. 294-95), had a self-reinforcing incentive to "hoard" New York exchange, which further restricted supplies to and inflated rates in the domestic exchange market. Under normal conditions banks would settle their clearinghouse balances with cash or New York drafts. With the increasing use of clearinghouse certificates, however, these channels supplying good funds had become increasingly more tenuous. As a result, banks tended to conserve their cash but also New York balances, because they could not be readily replenished.

#### ii) Regional convergence in 1907: Chicago

Our analysis of the 1907 crisis references the Chicago market, because only banks there and not in Boston dramatically shifted course after 1893. In the run-up to the formal action by the New York clearinghouse on October 26<sup>th</sup>, leading bankers in Chicago continued to express confidence in the soundness of their institutions (*Chicago Tribune*, 22 October, p. 19). Nonetheless, they closely monitored the deteriorating conditions in the New York banking sector, as they were already bearing their brunt. On October 23<sup>rd</sup> Chicago banks complained of curtailed

<sup>&</sup>lt;sup>23</sup>Consistent with this view, we find that the correspondent balances of Boston bank were less seasonally variable than the correspondent balances held by banks in other regional centers. And though banks' New York deposits did fall by \$9 million (or 20 percent) from early July until August 22, they replenished them almost immediately thereafter.

access to their New York deposits and in response temporarily withdrew from the demand-side of the domestic exchange market (*Chicago Tribune*, 24 October to 6 November). Their actions effectively suspended trading (at least in the "public" market) over the next two weeks, despite notional offers at discount of 50¢ (per \$1000) deemed the new lower currency shipping point (see the break in the series in Figure 10). The spillover effect intensified several days later, as country bankers also unable to obtain their New York funds turned to their Chicago correspondents and withdrew large sums of cash (*Chicago Tribune*, 26 October, p. 19).

To preempt further liquidity drains, Chicago clearinghouse members convened an emergency meeting on the evening of October 26<sup>th</sup>, and agreed to issue clearinghouse certificates and restrict deposit convertibility by the next morning.<sup>24</sup> Defending their actions, the association's official statement blamed "not local" conditions, namely the NYCHA actions. As James B. Forgan chair of the clearinghouse committee elaborated, Chicago banks had learned a painful lesson from the 1893 episode; namely they were not immune from the dire measures taken by banks in Eastern money centers especially in New York. Their convertibility restrictions in late October had already ignited a scramble for liquidity among country banks, and like in late August 1893 were threatening to drive Chicago banks to the brink when they too would have to close their teller windows and rely on clearinghouse certificates. What's more, Fogan observed, banks in 1907 could not expect a *deus ex machina* like the World's Columbian Exposition to fuel offsetting balances of payments surpluses that would replenish their depleted coffers.

<sup>&</sup>lt;sup>24</sup>Banks did not completely close their doors to all customers (*Chicago Tribune*, 27 & 28 October). They imposed a 30- or 60-day waiting period on large cash withdrawals from savings accounts. And they allowed customers to make small withdrawals for "legitimate" or "ordinary" needs, such as cashing payroll checks. These restrictions were intended to block large "panicky" withdrawals, especially by rural country banks.

Forgan also mentioned the rapid diffusion of check transactions since 1893 as a factor influencing the clearinghouse decision. Citing evidence from recent Comptroller of the Currency surveys, he insisted that most individuals and businesses even in smaller cities and towns would hardly notice the temporary reliance on checks "payable through a [local] clearing house" for all, not just the usual 95 percent, of their transactions. For the same reason, no doubt, large employers like Marshall Fields and Armour endorsed the clearinghouse decision, as they and other local businesses could pay their workers with certified checks or the equivalent in script rather than temporarily shutter their factories as they had done during the 1893 cash famine. Forgan conveniently neglected another systemic consequence of this payments innovation, banks' significant reallocation of their clearing reserves from vault cash to New York deposits (James and Weiman 2010). With fewer internal reserves (relative to deposits) to fall back on, they were more vulnerable to the suspension of payments by New York banks in 1907 than in 1893 and so had little choice other than to follow suit immediately. Not surprisingly then, by the end of the week Chicago banks were joined by those in 24 other regional money centers across the Northeast, Midwest and west coast.<sup>25</sup>

The cascade of banks' "suspension of payments" in cities like Chicago essentially replicated the conditions in the 1893 Boston domestic exchange market on an almost national scale. We illustrate this point with evidence from the Chicago market, where we can track albeit sporadically data on the local currency premiums during the suspension period. By November

<sup>&</sup>lt;sup>25</sup>Along with Chicago, 15 other clearinghouses including Boston, Philadelphia, and St. Louis adopted these policies by October 27 (*Chicago Tribune,* 27 October to 29 October). A day later the list had grown to 24. and by the end of the week included the San Francisco and Portland clearinghouses. Of the 24 clearinghouses that did not join the club, 17 were located in the South.

 $2^{nd}$  legal tender money commanded a premium of 3.25 percent, the same as in New York. Despite a few outliers, the currency premiums in the two cities were highly correlated (correlation coefficient = 0.719) and roughly equal in magnitude. Based on our simple model of currency arbitrage, we would predict a sharp decline in the (absolute value of the) deviation in New York exchange rates from an ideal par of zero.

Contrary to our expectations at least, the significantly more muted impact of New York banks' suspension of payments on domestic exchange rates in 1907 as compared to 1893 is actually evidence of a more serious, systemic crisis. Our analysis thus justifies the stark declaration by Andrews (1908, p. 497) in the opening line of his widely cited article on currency substitutes: "The autumn of 1907 witnessed what was probably the most extensive and prolonged breakdown of the country's" banking-payments system. Also like in the 1893 Boston case, the greater centrality of New York banks in an emerging national money market explains the persistent but modest premiums on New York exchange. Though Chicago banks were reluctant to acquire additional New York funds during the suspension periods, they had little choice. Because of the centralization of the gold and U.S. securities markets in New York, they demanded New York exchange to purchase sterling bills or government bonds either for themselves or their country bank customers. Moreover, they still had to maintain sufficient balances in New York to settle their customers' long distance check payments.

#### 4. Towards central banking: public-private monetary policy in the pre-Fed era

Our tale of two cities comprehends the divergent views of Friedman and Schwartz and William Ridgley (and A. Piatt Andrews) on whether the suspension of payments by banks, especially in pivotal money centers, constituted a second best solution to financial crises. The decision by New York banks in 1893 and 1907 to restrict depositors' access to their funds may have spared illiquid banks from insolvency and so checked the spread of a "contagion of fear." But like in the child's game of hot potato, this piecemeal rescue plan only shifted the burden down the correspondent system hierarchy to banks in regional money centers. As in the case of Chicago banks in 1893 and 1907, they could either retrench locally to meet their respondents panicky withdrawal demands or adopt the suspension policy as well, which just passed the problem to banks further down the correspondent hierarchy. The net result was a form of gridlock, in which banks delayed settlement payments to harbor their cash reserves and thereby deprived other banks of expected cash inflows (Sprague 1910, pp. 295-96).

This systemic perspective implies a simple empirical test relating the "derangement" of domestic exchange markets in regional centers to their position in the correspondent banking hierarchy. We gauge the latter factor by their relative "due to" items—correspondent relative to local deposits—and the former by the deviations from the norm in New York exchange rates during the crisis. Because of data limitations our empirical analysis can only be illustrative in the form of a simple scatter plot (see Figure 11). In both crises the observations certainly suggest a strong positive relationship, in other words that the magnitude of the "derangement" varied directly with the ratio of correspondent to local deposit business. This result is consistent with related evidence (again with a modest number of observations) showing a positive connection between cash flows between regional reserve centers and New York and the extent of their correspondent business.

Ironically, the payments innovations after 1893 that enhanced the efficiency of long-distance money flows in normal periods magnified this propagation effect during banking crises. The further centralization of banks' reserves and settlement transactions among New York correspondents resulted in a sparser interbank funds network, more vulnerable to disruptions at this critical node. So, in 1907 when New York banks suspended payments on October 26<sup>th</sup>, they triggered a nation-wide disruption to the "machinery for making collections and remittances." A striking parallel to the 1907 crisis occurred in the wake of the 9/11 attack on the World Trade Center, which fatally damaged the Fedwire network. In this case, however, the Federal Reserve's swift and decisive intervention prevented gridlock by flooding money center banks with liquidity (McAndrews and Potter 2002).

We find a historical precedent for the Fed's actions in the steps taken by Treasury Secretary Courtelyou in late October and November. Following in the footsteps of his predecessors especially Leslie Shaw, Courtelyou had already authorized modest monetary intervention from late August to mid-October to accommodate seasonal agricultural demands for cash and credit (see especially Andrews 1907 ; Kinley 1910; and U.S. Treasury Department 1908). Responding to the turmoil in the New York banking sector in late October, he approved an additional deposit of over \$35 million into New York banks to support the bailout of the beleaguered trust companies and several days later the transfer of \$36 million in small bills through the New York sub-treasury to meet the currency demands of reserve and country banks elsewhere. Though the Treasury would subsequently deposit funds in reserve national banks in other money centers notably Chicago, Courtelyou justified his initial, seemingly preferential treatment of New York banks on two grounds.<sup>26</sup> Stemming the panic in New York, he reasoned, would quell the contagion of fear spreading there and throughout the country. More important for our argument, he observed and the evidence in his report to Congress affirms that New York banks "did not retain in their own keeping the public moneys received but were enabled through their extended relations, as reserve depositories with banks...to employ these moneys to meet a large proportion of the calls made upon them" (U.S. Department of Treasury 1908, p. 9). In other words, the very conditions that made the New York banking sector the epicenter of the crisis also rendered the Treasury's targeted intervention an at least partial solution.

Operating at the grassroots level, urban clearinghouses pursued a complementary monetary policy. Beginning with the 1857 panic, they had assumed a critical lender of last resort function, supplying members with large denomination loan certificates as substitutes for cash reserves in clearinghouse settlements (Timberlake 1984; Roberds 1995). What distinguished the 1907 panic from previous crises was the unprecedented scale of this monetary intervention. All told clearinghouses issued nearly \$240 million in large denomination loan certificates in 1907 as compared to less than \$70 million in 1893 (see Table 1).

In the 1907 panic, moreover, clearinghouses greatly broadened their quasi-central bank authority by circulating a variety of currency substitutes.<sup>27</sup> These included issues of small

<sup>&</sup>lt;sup>26</sup>When the Treasury reached the limit of its direct monetary intervention, Courtelyou approved several other extraordinary measures. He allowed banks to substitute state government and railroad bonds for U.S. government securities as backing for Treasury deposits and national bank note issues. He also embarked on an aggressive sale of Panama Canal bonds and 3% certificates to the non-bank public, which would free up idle funds that could then be transferred into the banking system.

<sup>&</sup>lt;sup>27</sup>These instruments were employed in 1893 as well, although not to the extent as in 1907. See Warner (1896).

denomination clearing house certificates, clearing house checks typically in small denominations and payable through the clearing house, cashier's checks in convenient denominations which were "practically circulating notes," small denomination New York drafts (in Birmingham), negotiable certificates of deposit or small denomination payroll checks drawn by employers on their banks and payable via the clearinghouse (Andrews 1908b, pp. 506-512). Of dubious legal authority, this innovation could effectively tide local banks over the potential restrictions storm, if it restored customers' confidence in the banking system, not individual banks. And even though they constituted only 30% of total clearinghouse money, their timely introduction may explain why large employers had less difficulties in meeting their payrolls in 1907 than in 1893 (Sprague 1910, p. 290).<sup>28</sup>

Andrew estimated the volume of cash substitutes outstanding during the 1907 restrictions at over \$500 million, as compared with a currency stock of \$1,810 million in 1907 IV (Friedman and Schwartz 1970, p. 65). To explain the variation in these more informal monetary interventions across cities, we estimated regression equations explaining their total magnitude and composition. The independent variables capture the influence of systemic versus local factors. The former include the value of banks' due to liabilities and due from assets, but also dummy variables for central and reserve city status. The remaining variable, individual deposits, should gauge the latter factor.

<sup>&</sup>lt;sup>28</sup>According to Andrew (1908b, p. 515-16), for several months these imperfect money substitutes "furnished the principal means of payment for the greater part of the country, passing almost as freely as greenbacks or bank-notes from hand to hand" and "worked effectively and doubtless prevented multitudes of bankruptcies which otherwise would have occurred." Still, the *Chicago Tribune* (November 23, 1907) noted that "some plants are idle because of the difficulty experienced in obtaining cash with which to pay employees..."

These results qualify the observations of contemporaries (Sprague 1910; Andrew 1908a), who mainly blamed panicky country banks rather than local depositors for creating pressure on correspondents' reserves and leading to cash restrictions and the issue of cash substitutes.<sup>29</sup> The coefficient estimates clearly show the greater impact of banks' interbank relative to individual balances on clearinghouse issues of large denomination certificates. This conclusion holds even when allowing for differences in official reserve status across cities. In particular, given the level of their "due to" liabilities, central reserve cities seem to have faced much stronger withdrawal demands from their respondents resulting in the issue of more cash substitutes. On the flip side, however, the demands of local deposit customers, most likely large employers, mainly determined banks' issues of small denomination circulating certificates.

The results also imply a striking symmetry in the impact of each type of interbank deposit. All other things equal, banks' due to liabilities increased their borrowing of clearinghouse reserves, presumably so that they could conserve on their cash resources to meet respondents' withdrawal demands. As an alternative, however, they too could draw on their correspondent accounts in higher order centers to replenish their cash reserves.

<sup>&</sup>lt;sup>29</sup> The Comptroller of the Currency (1907, p. 70) for example observed "that there has actually been more of a panic among the banks themselves than there has been among the people.

The banks have been fearful as to what might develop, and finding their usual reserve deposits only partially available, if available at all, they have been compelled in self-protection to gather from every source all the money they could possible reach... With the exception of the first excitement in New York and smaller runs in other places, there has really been surprisingly little excitement or uneasiness among the people."

Note as well that clearing-house certificates, which most directly addressed the needs of country bankers' balances holders by freeing up cash to be paid out to them, constituted the great bulk of cash substitutes created. Local currency substitutes, which would have been of little use to country banks, were quantitatively much less important overall.

#### 5. A reinterpretation of McAdoo's use of the Aldrich-Vreeland Act in 1914

Anticipating a large gold outflow if the British liquidated their holdings of American securities in the days leading up to the outbreak of World War I, Secretary of the Treasury William McAdoo pressured the governing board to close the New York Stock Exchange on July 31, 1914 (and it remained shut for over four months, until December 12). The closure had the effect of making call loans collateralized by securities, which constituted a significant portion of the asset portfolio of New York banks, illiquid and especially of those with a substantial correspondent banking business. As Sprague (1915, p. 514) noted, "Obviously, the payment of collateral loans could not be insisted upon when there was no market in which either borrowers or bankers could sell securities."<sup>30</sup> He goes on: "At the time of the closing of the stock exchange, indications were not lacking that the same influences were at work which in past crises had occasioned the dislocation of the banking machinery of the country. . . It is evident that anxiety over the situation was having its customary effect in precipitating withdrawals of balances by banks in other parts of the country and Canada" (1915, p. 517). Furthermore, the gold outflows in late July might "inspire fear" and lead to a stampede into cash (Silber 2007, p. 66).<sup>31</sup>

At this time the Federal Reserve System was still being set up, with opening day not coming until November 16. However instead the executive committee of the New York Clearing House met on Sunday, August 2, and agreed, as in previous crises, to the issue of clearing-house loan certificates. More importantly, liquidity was injected into the banking system through the

<sup>&</sup>lt;sup>30</sup> This was not quite true in practice since there was a Curb market on New Street during this time, although its volume was just a fraction of that on the NYSE (Silber 2007, pp. 104-115).

<sup>&</sup>lt;sup>31</sup> A *New York Times* editorial (August 4) argued: "Probably never has the world witnessed a more general embarrassment of commercial relations. Its relation to our troubles in 1907 is about the same as a conflagration to a fire" (quoted in Silber 2007, p. 66).

provisions of the Aldrich-Vreeland Act, a temporary measure passed in the aftermath of the Panic of 1907 to provide some breathing room while the configuration of a central bank could be established. It was originally scheduled to expire on June 30, 1914, but the Federal Reserve Act extended its final date for one more year. In times of financial crisis national banks would be allowed to issue asset-backed emergency currency, with a nationwide ceiling of \$500 million set. A progressive tax on currency outstanding based on time in circulation would ensure timely retirement.

On July 31, the day the stock exchange closed, McAdoo invoked the Aldrich-Vreeland Act, although in its original form it offered little relief to New York banks. Emergency currency could only be issued by banks which had already issued national bank notes valued at at least 40 percent of their capital, and most New York banks had many few national bank notes outstanding than that. In a meeting on August 2 New York bankers told McAdoo that they needed emergency currency. Frank Vanderlip of National City Bank said, for example: "We certainly do. . . Probably more than anybody else. We have more country correspondents than any other New York bank" (Silber 2007, p. 71). As a result, an amendment to the Act suspending the 40 percent requirement, allowing banks to issue emergency currency up to 125 percent of capital and removing the \$500 million ceiling sped through Congress.

Even before the passage of the bill (on August 3) \$46 million of emergency currency had been delivered to the New York Subtreasury (and "if a greater amount should be required many millions could be transferred within five or six hours" (*New York Times* August 4, 1914, p. 4)). The largest initial demanders were the banks with the most correspondents– National City, Chase, Park National. But once the currency was available, the need for it in New York waned.<sup>32</sup> No suspension of cash payments occurred in New York or anywhere else in the country. By the end of August the *Wall Street Journal* was already asking, "Is emergency currency surfeiting the interior?" with the usual August outflow of cash from New York replaced in 1914 by an inflow (*Wall Street Journal* August 31, 1914, p. 8; also September 7, 1914, p.8). Total emergency currency outstanding peaked at \$368.8 million in the last week of October.

The issue of Clearing House loan certificates began on Monday, August 3. Some \$20 million of them, it was estimated, were used in Monday and Tuesday clearings, however once the emergency currency became available, it quickly displaced the loan certificates. Emergency currency was allowed to be used in settling balances at the Clearing House and could be paid out to depositors as well. Moreover, the Clearing House loan certificates cost the banks 6 percent interest, while the emergency currency cost 3 percent for the first three months *(Wall Street Journal* August 5, 1914, p. 8)

The 1914 experience reinforces the importance of New York settlement media in the national payments system, this time the remedy coming in the form of Aldrich-Vreeland emergency currency rather than Clearing House loan certificates. But it is clear that New York, particularly those with many interior correspondents, banks were the principal focus in the expeditious amendment and implementation of the Aldrich-Vreeland Act. If building up the cash balances of

<sup>&</sup>lt;sup>32</sup> "An officer of one of the largest banks in New York says: 'The emergency currency issue has obviated any fright which may have been caused. My bank had telegrams from nearly every out-of-town correspondent asking "can we get it," meaning money or anything to build up reserves. I replied "yes." The result of my telegrams was that the out-of-town banks wired in return "I do not want it." " (*Wall Street Journal* August 6, 1914, p. 1).

interior banks had been the principal concern, that could have been done directly rather than shipping currency to the New York Subtreasury even before the amended act had passed.

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# Table 1: Panics of 1893 and 1907

	1893	1907
Panic Onset	May 1	Oct. 21
Issue of Clearing House Loan Certificates by NYCHA	June 21	Oct. 26
Aggregate Loan Certificate Issue, NYCH (\$ million)	\$41.5	\$101.1
Maximum Amount Outstanding (\$ million)	\$38.3	\$88.4
Bank reserves of NYCH members (\$ million)*	\$95.6	\$121.0
Ratio of Maximum Certificates Issued to Reserves	15.9%	31.7%
Loan Certificate Issue Nationwide (\$ million)	\$69.1	\$261.1**
Restriction of Cash Payments in NYC	Aug. 3	Oct. 26
Resumption of Cash Payments in NYC	Sept. 2	Jan. 1

\* on May 6, 1893; Oct 19, 1907.

\*\* included large and small denomination loan certificates. Large denomination alone, \$238.1 million; small denomination alone, \$23 million.

Sources: Andrew (1908b), p.507; Sprague (1910), pp.34,145,163,261-62, 432-33; Roberds (1995); Wicker (2000), pp.9,121; Cannon (1910).

# Table 2: Cash Substitutes Regressions

Dependent variables:	<u>Total</u>	Large-value	<u>Others</u>	
Independent variables:				
duetobanks	0.2792** (7.44)	0.2472** (7.37)	0.04989* (1.68)	
duefrombanks	-0.2357** (-4.39)	-0.2970** (-6.04)	-0.3367**	(-4.37)
individualdeposits	0.0236* (1.63)	0.0468** (3.64)	0.1086** (7.01)	
centralreservecity	13230.4** (6.74)	9710.87** (5.65)	2382.13 (2.23)	
reservecity	623.003* (1.79)	213.39 (0.49)	-401.52 (-1.51)	
constant	198.639 (1.05)	163.35 (0.46)	233.78* (2.34)	
NOBS	101	41	68	
Adjusted K <sup>2</sup> Prob>F	0.9825 0.000	0.9941 0.000	0.8354 0.000	

\*\* Statistically significantly different from zero at 1% level\* Statistically significantly different from zero at 10% level

# Figure 1: Tiered Interbank Correspondent Network (based on Chang et al 2008)





Figure 2: Weekly Domestic Exchange Rates for Selected Cities, 1894-1906



Figure 3: Daily Domestic Exchange Rates in the Panic of 1893











Figure 6: Weekly Domestic Exchange Rates in the Panic of 1907









# Figure 8: New York Exchange Rate in Chicago vs. the New York Currency Premium during the 1893 Panic



# Figure 9: New York Exchange Rate in Boston vs. the Boston and New York Currency Premiums during the 1893 Panic



Figure 11: Explaining Deviations in the Average New York Exchange Rates during the Crisis Relative to Levels in the Preceding Month

