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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Current Version: October 2014
First Version: January 2008

*Earlier versions of this paper were presented at the “Federal Reserve Was a Bad Idea” Conference at Wake Forest University, the joint Economic History-Macroeconomics seminar at the University of Michigan, and the Federal Reserve Bank of Atlanta Workshop on Financial and Monetary History. We are grateful to the participants for their comments. We would also like to thank Shira Poliak, Julie Tauber, and Jacob Bressmann for their able research assistance and Barnard College Provost Office for financial support.
The U.S. monetary union evolved over more than a century through successive stages. It originated in the early 1790s as a federation of relatively sovereign states bound together by a common unit of account and “national” bank.¹ By the 1920s, a vaster continental nation was connected through an interbank network formed and supported by the Federal Reserve to realize its goal of par clearing and settlement of check transactions—that is a common national bank money (James and Weiman 2014). A pivotal step along the way occurred during the Civil War era, when a Republican dominated Congress mandated a common national currency, initially legal tender greenbacks and subsequently bearer notes issued by federally chartered “national” banks (Redenius 2007, James and Weiman 2013).

In light of recent woes in the Eurozone, the U.S. experience raises the obvious question of how its currency union endured for more than half a century without an official central bank let alone a fiscal union. These institutional arrangements, needless to say, are not sufficient to avoid disruptive currency and banking crises, but are certainly necessary conditions according to scholars who contemplated the formation of the Eurozone and are diagnosing its current dilemmas.² Our analysis of banking crises under the common currency National Banking Acts provides a clue. Along the lines of the contemporaneous gold standard regime, the American

¹See the special issue on the “formation of the American monetary union” in Financial History Review 13:1 (2006), especially the contribution by Sylla (2006). According to Martin (1977), the territorial U.S. did not become a de facto common “unit of account” union until the 1830s.

²See for example Capie (1998); Grauwe (2005); and Eichengreen et al. (2014). Hartland (1949) and Fels (1950) debate this very question in explaining the viability of the U.S. monetary union during the Great Depression of the 1930s.
currency union operated according to generally accepted “rules of the game” (Bordo and Kydland 1995; Bordo and Rockoff 1996). During severe crises banks in pivotal money centers could collectively agree to “suspend payments,” that is restrict the convertibility of deposits into official money.³

This safety-valve measure relieved the immediate liquidity pressures that threatened the solvency of money center banks, but only by severing the fixed 1-to-1 peg between deposit and legal tender money. In other words, it temporarily created a dual monetary system with a flexible exchange rate between official and bank money, termed the “currency premium.” Implicitly comparing the banking crises of 1907 to the 1930s, Friedman and Schwartz (1963, pp. 163, 167) emphasize the “therapeutic” value of banks’ convertibility restrictions. They ignore, however, the assessment of contemporaries, who blamed the sharp macroeconomic contraction in the last quarter of 1907 on the suspension crisis—a view corroborated by our recent findings (James, McAndrews, and Weiman 2013). The Comptroller of the Currency in 1907, William Ridgely, elaborated this unusual transmission channel. The decision of New York banks to restrict deposit convertibility, he insisted, “derange[d] the very machinery of collections and remittances” between banks that greased the wheels of interregional and international trade (U.S. Comptroller of the Currency 1907, p. 70). A. Piatt Andrew (1908b, p. 497), who carefully tracked the course of the panic, put the point more forcefully: “The autumn of 1907 witnessed

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³By deposit convertibility, we mean the condition that banks must redeem deposits for official money at a par of 1-for-1 on demand but only at their offices. Private banks agreed to meet this condition, but chartered banks, whether by the federal or state governments, were mandated to comply or else suspend their operations. Contemporaries used the term “suspension of payments” to refer to convertibility restrictions, and throughout the paper we treat them synonymously.
what was probably the most extensive and prolonged breakdown of the country’s credit
mechanism which has occurred since the establishment of the national banking system.”

By “machinery,” Ridgely was referring to the complex of private and public networks that
stitched postbellum America into a more integrated monetary-banking union. The private system
rested on correspondents in money centers, notably New York, which held the excess reserves of
banks throughout the country and orchestrated the clearing and settlement of their transactions
paper. By 1907, according to Sprague, the increasing centralization of long-distance interbank
transactions transformed the New York banking-financial sector into a “national clearing-
house,” the central hub of a sparse, hierarchical correspondent network. While highly efficient
in moving funds around the country during periods of normalcy, this network was also highly
vulnerable to banking panics that partially shuttered New York banks’ deposit windows. Their
decision to restrict convertibility not only deprived local customers of immediate access to their
deposits, but sent a liquidity shock to banks throughout the country which had increasingly relied
on New York correspondents to secure and replenish their excess clearing reserves.

Viewed in terms of network economics, the suspension of payments by New York banks had
negative spillover effects that could transform a local into a more severe, systemic banking crisis.
Moreover, because of the increasing centrality of New York correspondents in the national
interbank funds network, these negative externalities had reached a critical tipping point by the

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4In a sparse network all nodes are connected but through a small number of links to more
central hubs, which sit atop the network hierarchy. The star network is the extreme case, as all
nodes are connected through their respective links to a single central hub. In the correspondent
banking system, some banks required additional linkages via secondary hubs (a regional center)
to connect to the central hub (in New York) and so all other banks, and some banks bypassed
New York correspondents altogether.
early 1900s. Consequently, when New York banks restricted deposit convertibility in October 1907 as compared to August 1893, their decision immediately ramified through the correspondent banking system and effectively nationalized what was perceived to be a “bankers’ panic” on Wall Street.  

To illustrate our point, we contrast the impact of New York banks’ suspension of payments on regional domestic exchange markets during the 1893 and 1907 panics, which bracket this pivotal transformation in the American banking-monetary union. Through domestic exchange transactions, banks in regional centers could directly swap New York for local funds instead of actually shipping currency. The “normal” bounds on par deviations in rates, then, gauges the costs of transferring “good” funds to and from New York and so the efficiency of the correspondent banking network. As expected, the “derangement” of this machinery during suspension periods markedly increased exchange rate fluctuations in regional markets relative to levels observed during normal times. Paradoxically, however, these deviations from the norm were more extreme in 1893 when the suspension crisis was more limited in geographic scope. Conversely, the more modest increases in exchange rate deviations in the 1907 episode actually signalled a more widespread, systemic crisis.

5Richardson (2007) and Carlson, Mitchener, and Richardson (2014) analyze this chain-reaction mechanism but in a regional context.

6We also focus on these episodes for the obvious pragmatic reason of data availability. Only after 1884 can we track the evolution of domestic exchange markets on a daily basis during relatively short-lived suspension crises.

7Throughout this paper we follow contemporary practice and only report rates as the deviation from a par value of 1. By normal bounds, we are referring to the limits on exchange rate fluctuations during normal periods when bank deposits were fully convertible.
As further empirical support for our paradoxical claim, we examine the unprecedented monetary interventions by local banks and the Treasury during the 1907 panic. Compared to earlier crises, clearinghouses across the country issued loan certificates in total amounts that significantly augmented the reserves of the entire banking system. In addition, those outside of the Northeast temporarily “seceded” from the fragile currency union by printing their own circulating monies. The Treasury also took decisive complementary steps to alleviate local liquidity pressures but also to overcome the monetary fragmentation caused by the proliferation of local clearinghouse moneys.\(^8\) Though these dramatic measures did not immediately remedy the suspension crisis which lasted three months, they did set the stage for a later even more effective joint private-public intervention under the Aldrich-Vreeland Act to quell the incipient crisis of 1914. Viewed in light of the 1907 crisis, however, we question the claim that Aldrich-Vreeland emergency currency was by itself sufficient to stem banking panics, because it ignores another defect of the postbellum private-public monetary policy, the limits to policy initiative and coordination especially in response to a systemic crisis.

We develop our argument in five sections. The first two delineate the institutional foundations of the private, more decentralized interbank payments network in postbellum America and the salient characteristics of the 1893 and 1907 panic episodes. The latter highlights the divergent regional responses of money center banks to the suspension of payments in New York in 1893 but not 1907. Understanding why is key to corroborating our claim about the increasing nodal position of New York banks in the U.S. banking-monetary union after the

\(^8\)See for example Heckelman and Wood (2005). Treasury intervention in the banking system and money markets was of course widely recognized and often harshly criticized at the time (Andrew 1907; Kinley 1910a; Wildman 1910).
1893 episode and is elaborated in section three through a tale of the two crises in Boston and Chicago. In section four we furnish additional evidence of the systemic impact of the New York banks’ suspension of payments in 1907 and in particular the impact of systemic factors on the private monetary policies of clearinghouses in larger cities throughout the country. The conclusion focuses on the often neglected but significant role of Treasury monetary-banking policy during the 1907 (and later 1914) crisis, which we believe shines new light on the debates over the origins of the Fed.⁹

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 hinged on a largely private, decentralized interbank network (Knodell 1998; 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 urban clearinghouses. Instead, they (and other intermediaries) had two options. They could ship currency via fast freight companies such as American Express and Wells Fargo along an increasingly integrated transregional rail networks. Yet, despite increased efficiencies and sharp reductions in freight rates, they infrequently used this costly and risky option.¹⁰

⁹See for example Heckelman and Wood (2005). Treasury intervention in the banking system and money markets was of course widely recognized and often harshly criticized at the time (Andrew 1907; Kinley 1910a; Wildman 1910).

¹⁰Garbade and Silber (1979). According to Colwell (1860, pp. 135, 190, 262, 447), currency shipments were rare even in the late 1850s.
The preferred alternative was paper “credit” instruments, convertible liabilities of banks and other payments intermediaries. Before the Civil War, convertible bearer notes issued by state chartered banks were a common long distance payments instrument, especially in more peripheral areas. Following commercial flows, they tended to gravitate to large Northeastern cities, especially New York where they were actively traded and priced in broker-dealer markets (Gorton 1999; Myers 1931; Knodell 1998; Weber 2003). To support their note circulation, country banks held clearing balances with a metropolitan correspondent, which agreed to redeem these instruments at par or a fixed discount. By the 1850s New York had become the preeminent correspondent banking center. Correspondent 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. reported a New York correspondent.\footnote{The data on correspondent balances are derived from the balance sheets of state chartered banks in the 1850s (Bodenhorn 2000, p. 192-98); according to Knodell (2010, pp. 250-52), New York private banks held an equivalent value of correspondent balances in the 1850s. Myers (1931, p. 115) cites evidence on the prevalence of New York correspondent relations.}

In creating a truly common currency, the Civil War-era National Banking Acts essentially 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.\footnote{A bank draft is a cashier’s check drawn on a bank’s correspondent authorizing payment to a third party. Bank drafts, unlike notes, were not typically transferrable but could only be redeemed at the correspondent bank’s office.} The legislation institutionalized the use of bank drafts to settle balance of payments deficits and surpluses arising from...
interregional flows of national bank notes. Instead of shipping currency, national banks in
official reserve cities could hold deposits with a New York reserve agent and issue drafts on their
accounts to redeem outstanding bank notes cumulating in distant centers.\textsuperscript{13} In turn, New York
banks could readily and efficiently clear and settle these items either directly through an “on-us”
transaction or indirectly through the 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). 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 these drafts and remit them to their New York correspondent (directly or
indirectly via a regional correspondent) for clearing and settlement at the clearinghouse.

Rapid economic-territorial expansion in the United States after 1870 spurred the diffusion of
deposit banking and the formation of a vaster, more elaborate and decentralized correspondent
network organized along Smithian lines (rendered schematically in Figure 1).\textsuperscript{14} Distance decay

\textsuperscript{13}Until 1887 New York national banks were the only central reserve agents authorized to hold
the required reserves of all, not just country, national banks. The growth of interbank draft
transactions contributed to significant efficiencies in New York clearinghouse operations
(Cannon 1910, p. 37), such as two daily clearing sessions and economies in the value of official
money necessary to settle banks’ mutual balances.

\textsuperscript{14}Based on aggregate data for all commercial banks, we date the steady rise in the deposit-
currency ratio from the late 1850s. This trend gained momentum after the Civil War, in
particular the decade of the 1880s with the growth of state-chartered banking (James 1978, pp.
enhanced the value of more proximate correspondents, whose market share rose steadily over
time (Patterson 1913; Conzen 1977; James and Weiman 2010). They afforded their country bank
customers a convenient alternative for clearing and settling local payments and brokering distant
transactions. Nonetheless, New York correspondents continued to occupy the pivotal node in
this emerging spatial division of labor, as they specialized in clearing and settling transactions
between regional money center banks. In other words, like the Fedwire today, New York
 correspondents via the clearinghouse constituted the large-value settlement system for
interregional interbank transactions and so tied banks in regional money centers and those in their
market area into a more integrated banking-payments union.

Importantly, payments innovations after the Panic of 1893 enhanced the centrality of New
York correspondents in the interbank settlement network. By the early 1900s individual checks
had virtually displaced bank drafts as the predominant payments instrument in long distance
trade. This step toward a more integrated local-national payments system increased the
uncertainty of withdrawals from banks’ New York accounts, but also yielded potential
economies of scope from holding New York funds. In response, banks allocated larger shares

22-27; Carter et al. 2006, p. 3-604). On the evolution of the correspondent banking system, see
Conzen (1977) and James and Weiman (2010). By Smithian lines, we are referring to his famous
adage about the “division of labor” and “extent of the market” (Smith 2000, p. 19); Meyer (1980)
applies Smith’s insight to a territorially expanding urban system like in the U.S.

See Conzen (1977) and James and Weiman (2010). By Smithian lines, we are referring to
his famous principle that the “division of labor is limited by the extent of the market” (Smith
2000, p. 19; see also Meyer 1980 for an application of Smith’s analysis to a territorially
expanding urban system like in the U.S.).

Compared to drafts, checks were more convenient for banks’ increasingly cosmopolitan
customers. They avoided transactions costs such as frequent bank trips and fees and exploited
the float during the collection period. Initially, checks were confined to local trade because of
their informational demands and long lags in clearing and settlement. With the greater efficiency
of their clearing reserves to their correspondent accounts. Reinforcing this trend were the significant informational and liquidity externalities generated by the greater centralization of reserves in New York. In turn, New York correspondents could furnish their respondents with valuable brokerage and central bank services, such as credit lines to finance their transitory and seasonal current account deficits, but only in exchange for a modest compensating balance.

ii) The domestic exchange market

Organized by intermediaries in regional money centers, domestic exchange markets complemented the decentralized correspondent interbank network. Through domestic exchange transactions local banks could buy or sell deposits in distant centers in exchange for local reserves, clearinghouse balances or its equivalent (at least in normal times) in vault cash. By readily transferring funds across space, these transactions enabled local banks to manage their portfolios of excess clearing balances in response to customers’ largely seasonal patterns of local and long distance trade.

As the national means of payment, New York deposits dominated domestic exchange transactions in virtually all regional centers. Daily newspapers and trade journals routinely reported this benchmark exchange rate as the local money price of a $1000 deposit in New York. As all banks were on a common dollar standard, rates were expressed in terms of the deviation

in transport-communications services and in the correspondent banking system itself, the use of checks in non-local payment began to rise considerably around 1880, and by the early twentieth century they accounted for 95 percent of all wholesale trade (Kinley 1910b, pp. 196-99),

Between 1893 and 1906 bankers’ balances in New York as a share of base money or assets used in interbank settlements (equal to currency plus these New York funds) grew by more than half, from around 15 to over 25 percent. Similarly, New York correspondent balances relative to the sum of New York exchange and vault cash in state and national banks jumped by around a third between 1896 and 1906 (Carter et al. 2006, pp. 3-635, 3-643).
from a parity of one. For example, in late September 1893 after the panic had faded, the price of New York deposits in (e.g.) Chicago averaged 75¢ (or a premium of 0.075 percent).

A fixed rate regime, the system of domestic exchanges functioned like its international counterpart (Bolles 1888, pp. 131-36). Assuming relatively efficient spatial arbitrage, the discretionary demand for New York balances as a secondary reserve asset implies bounds on exchange rate in Chicago which depend on the relative cost of liquidating bank deposits and shipping the currency between the two locations:

\[ |E_{NY} - (C_{Ch} - C_{NY})| \leq t, \]

where \( C_{Ch} \) and \( C_{NY} \) denote the currency premiums—the price of official currency in terms of bank deposits—in Chicago and New York respectively, and \( t \), the cost of shipping funds between the two locations (assumed to be symmetric). During normal times when banks redeemed deposits at par on demand (i.e., \( C_{Ch} = C_{NY} = 0 \)), the spot price of New York funds should fluctuate within bounds set by the currency shipping points (\( t_{c} \)). If exchange rates exceeded these limits, banks and other brokers would instead ship currency to or from New York.\(^{18}\)

This evidence suggests a simple test to determine periods of “normalcy” and “derangement” in the domestic exchanges. By way of illustration Figure 2 displays weekly domestic exchange rates in six regional centers over the “normalcy” period between the two major panics.

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\(^{18}\)This arbitrage constraint on exchange rates was apparently binding (Chicago Daily Tribune 8 July, p. 11; 14 July, p. 12). For example, Chicago banks resorted to currency imports on 8 July 1893, when local exchange rates fell to $1 discount, just below the estimated shipping point of 75 cents. By the time the exchange rate had plummeted to $2 discount a week later, New York funds were “unsaleable” in the local market.
September 1893 to September 1907.\textsuperscript{19} As predicted, exchange rates tended to fluctuate around the horizontal axis, and the bounds increased consistently (though not linearly) with the distance between each center and New York. Before 1898 they ranged from just under 25¢ in Boston to around 75¢ in Chicago and St. Louis to just over $1 in New Orleans and St. Paul.\textsuperscript{20} These data also reveal a sharp decline in exchange rate fluctuations in the late 1890s, which cannot be explained by reductions in shipping costs alone. Rather, they are further evidence of the innovations in the interbank payments system noted above that increased the value of New York correspondents in mediating the settlement of interbank transactions throughout the country (James and Weiman 2010).

The suspension of payments by New York banks severed this tight link between exchange rates in regional centers. Absent the convertibility peg, the price of official money in terms of bank deposits in New York ($C_{NY}$) fluctuated in dealer markets and altered the arbitrage calculus for banks seeking to repatriate funds in their correspondent accounts. Depending on the circumstances in regional centers, the value of New York exchange could soar or plummet far beyond the normal bounds. If, for example, Chicago banks did not also suspend payments, then the New York exchange rate would fluctuate inversely with the New York currency premium:

\begin{equation}
|E_{NY} + C_{NY}| \leq t_g,
\end{equation}

where $t_g$ measures the cost of actually shipping gold rather than its currency equivalents.

\footnotesize
\textsuperscript{19}The data were collected each Friday from Bradstreet’s magazine for the following cities: Boston in the Northeast; Chicago, St. Paul, St. Louis in the Midwest; New Orleans in the South; and San Francisco in the West.

\textsuperscript{20}The implied shipping cost in the Chicago series is consistent with the estimate given by the Chicago Daily Tribune.
If banks in both locations restricted deposit convertibility, then the currency premiums would largely offset each other, though the costs of transferring money would now include international and interregional gold arbitrage.

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 the official dating, the economy was already contracting in early 1893, nearly two quarters before the panic episode and subsequent suspension of payments.²¹ By the depths of the “depression”—from the last quarter of 1893 to the first quarter of 1894—industrial production had fallen by nearly 25 percent, and recovered slowly and unevenly until the end of the century. Likewise, the unemployment rate jumped into the double-digit range in 1893 (or 1894) and remained there until the late 1890s. The 1907 contraction was sharper, but briefer. Industrial production plummeted in October, and by the end of the year had declined by just 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 by the second quarter of 1908.

i) The 1893 panic

²¹For this overview of the two panic episodes, we rely on the Miron-Romer monthly industrial production index and Weir’s revised estimate of the annual unemployment rate based on the civilian private non-farm labor force (series Cb28 and series Ba476 in Carter et al. 2006, pp. 3-97, 2-82).
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 Milwaukee, and then spread to the Pacific Coast cities of Los Angeles, San Diego, and Spokane. In the wake of these events New York correspondents experienced cash drains to the interior, and on June 21 the New York Clearing House Association (NYCHA) authorized the issuance of clearinghouse loan certificates as a precautionary measure. Banks with the appropriate asset collateral could apply for loan certificates, and use them to settle adverse balances at the clearinghouse. As a substitute for legal tender money in these internal transactions, loan certificates enabled more beleaguered banks to devote their dwindling cash reserves to meet depositors withdrawal demands.

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, members of the NYCHA on August

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22Contemporaries 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.” DuPont (2007) suggests that agricultural distress may have played a role in initiating the panic in the west in the early summer; see also Hanes and Rhode (2013), whose indirect evidence convincingly ties postbellum financial crises to adverse cotton harvests.

23Wicker (2000, pp. 65-77); Noyes (1894); Hoag (2005); and Carlson (2005). 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).
3 took the additional step of restricting cash payments on their deposit liabilities. They continued to ship currency to respondents but on a discretionary basis (Sprague 1910, pp. 177-178, 182). In the wake of this liquidity shock, banks in many regional centers responded in kind though often with a lag. The restriction period in New York lasted around one month with full resumption beginning on September 2. Table 1 chronicles the panic episode and lists its salient characteristics.

To show the impact of New York banks’ suspension on the domestic exchanges, we track in Figure 3 daily New York exchange rates in five regional commercial-financial centers—Boston, Chicago, St. Louis, San Francisco, and New Orleans. The vertical lines demarcate the suspension dates, when New York banks restricted and then resumed cash payments. Compared to the suspension period, the June banking crises are barely evident in the exchange rate data with the exception of the sharp drop in the San Francisco market. In Boston, for example, the average rate fell from $0.112 in May to $0.250 during the first three weeks of June; the decline was greater in Chicago (from $0.155 to $1.167) where banks directly experienced runs.

24 According to our survey of various daily newspapers in July and August (Atlanta Constitution, Baltimore Sun, Boston Globe, New York Times, New York Tribune, San Francisco Chronicle, Wall Street Journal and Washington Post), banks in Boston (8/3) and Minneapolis-St. Paul (8/4) reacted immediately and were later joined by those in Buffalo (8/6), Pittsburgh (8/8), New Orleans (8/9), Cleveland (8/9), Richmond (8/10), Atlanta (8/14), and Little Rock (8/14). The dates in parentheses refer to when the decision was made, not reported. Though our series is no doubt incomplete, it does suggest that the fallout from the NYCHA decision was limited in geographic scope, and in most cases suspensions occurred with a time lag of at least one week.

25 We collected the data from “Domestic and Foreign Exchange” reports in the New York Times, which only listed rates for these five cities.

26 As a simple test, we identified the currency shipping point violation dates in the Boston and Chicago markets (when the absolute value of the exchange rate exceeded 25¢ in Boston and 75¢
The suspension period is characterized by greater turbulence but also regional variation in domestic exchange markets. In the Midwestern centers of Chicago and St. Louis exchange rates moved in the predicted 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 actually began to fall in July. The increasing reluctance of New York banks to ship currency and their ultimate decision to restrict payments removed the currency shipping point floor on exchange rates, which by early August rates had plummeted to -$8 in St. Louis and -$30 in Chicago.27

The experience in Northeastern and Southern cities appears more anomalous. In the Boston market the New York exchange rate actually increased, marginally in July and then more dramatically after August 1. They soared to a $6 (or 0.6 percent) premium in the first week, and then hovered between $1 and $2 until the end of the month. In New Orleans there was little evidence of disturbance before and even during the restriction period.28 Rates in New Orleans do in Chicago). In both cases exchange rates fell within these bounds in all reporting dates in May, but only 59 percent of the dates in Boston and 42 percent in Chicago in June. In August and even July, violations were the norm, not the exception.

27 With the weekly data from Bradstreet’s, we can also trace exchange rate movements in Cincinnati, Kansas City, Louisville, and Milwaukee albeit less frequently. By mid-August they had dropped to -$5, -$3, -$2, and -$20 respectively. In Minneapolis-St. Paul New York exchange was an “unquotable commodity,” “unsalable at any price” (Bradstreet’s, 5 August 1893, p. 496; 12 August 1893, p. 513). During the 1873 panic, sporadic reports in the Chicago Daily Tribune (1 October, p. 6; 2 October, p. 6) show a comparable drop in the rate on New York exchange to a 3 to 4 percent (or $30 to $40 per $1000) discount.

28 Weekly rates in Philadelphia represent an intermediate case between say Boston and Chicago; they increased dramatically in July to a $10 premium and then fell to an -$18 discount after the New York suspension. According to Sprague (1910, pp. 296-97), the balance of payments during the crop moving season largely influenced rates in Southern cities especially those involved in the cotton trade like New Orleans. In Charleston, contrary to Midwestern conditions, Bradstreet’s report that “New York exchange is scarce” (5 August 1893, p. 496).
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. On October 16 a copper corner by Augustus Heinze collapsed and brought down two brokerage houses 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 Lincoln Trust. A joint private-public venture organized by J. P. Morgan and Treasury Secretary Courtelyou fended off disaster for the trust 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 diffused across the country in cities large and small, and precipitated a virtual nationwide restriction of cash payments. 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 (see Table 1 for the highlights of the panic-suspension episode).

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29 Odell and Weidenmier (2004) emphasize the financial aftershocks of the 1906 San Francisco earthquake—notably large insurance claims that drained the gold reserves of New York banks.

30 The Treasury’s role in the “bailout” is elaborated more fully in section 5 below.

31 “So far as one can judge, the banks of the country have never in previous panics suspended payments with quite the same simultaneity as in 1907” (Andrew 1908b, p. 513).
The graphs in Figure 4 show the ripple effects of the NYCHA decision to suspend payments, in this case for four financial centers including St. Paul. The NYCHA suspension period is again demarcated by the vertical lines. Even before the suspension period, we see evidence of the disturbance in the recurrent lacunae in these series. In Chicago, for example, banks ceased trading New York exchange on October 23, and did not return to the market until November 1. The St. Paul and St. Louis markets also experienced frequent “no trade” days over the period from late October to early November.\footnote{32}

Once trading resumed in early November, exchange rates in all four cities moved in the same direction, and increased to rates significantly above the upper bound currency shipping point. The trajectory in Boston is reminiscent of the earlier episode, though rates only peaked at $2 instead of $5 per $1000. In striking contrast to 1893, New York exchange in Midwestern centers also commanded a premium and were much smaller in magnitude, ranging from an average of just under $2.0 in Chicago to just over $6 in St. Louis.\footnote{33}

iii) Summary

Our survey of regional domestic exchange markets during the 1893 and 1907 panics certainly points to the systemic impact of the suspension of payments in New York. The clearest

\footnote{32 According to our market index (based on reporting in the \textit{New York Times}), the New Orleans market was inactive from 25 October until mid-November, and the San Francisco market shut down over the entire suspension period. Because of the large gaps in these series, we excluded them from our analysis.}

\footnote{33 Following the New York suspension weekly rates in Philadelphia, Milwaukee, and Kansas City also increased to premiums well above their local shipping point, but in the latter two they remained relatively flat afterwards. Markets in Cincinnati and Memphis were anomalies, as exchange traded at a discount of $5 in the former and ranged between discounts and par in the latter (Sprague 1910, p. 297).}
evidence, perhaps, is in the timing of the “derangement” in regional markets, gauged by the sharp sustained deviations in rates beyond the normal currency shipping points. In 1893 when the outbreak of panics was more of a local affair, the impacts on exchange rates was milder and more short-lived. 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. Its suspension of payments in 1907 had a more immediate, widespread impact on domestic exchange markets throughout the country, which did not recover fully until the return of “normalcy” in the New York banking sector.

The gyrations in exchange rates also reveal striking differences in how the suspension of payments by New York banks ramified across the country during the two crises. The data in Table 2 succinctly contrast the two episodes, notably in Midwestern money centers. Instead of deep discounts as in the 1893 case, rates in 1907 were on average positive and varied over a narrower range (compare the means and standard deviations in columns 1 and 2). Even in Boston where premiums prevailed in the earlier panic, the variation in rates (as measured by the standard deviation) declined by 45 percent. The pattern of correlation coefficients reinforces the main point. In 1893 rates in the Midwestern centers were negatively correlated with those in Boston and the New York currency premium, our index of the severity of the suspension,

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Sprague (1910, p. 297) cautions against interpreting rates during suspension periods too literally, as they may have been “purely nominal, representing little or no actual transactions.” Nevertheless, such extreme values may be a useful indicator of the state of the market.
whereas in 1907 rates in all centers are positively and significantly correlated, though only weakly related to the New York currency premium.  

Finally, in column 3, we compare the literal disruptions to regional markets, measured by the percentage of “no trade” days in each during suspension periods. In 1893 New York exchange was traded in all three markets during the suspension period with virtually no interruption. “No trade” days were more common in Southern and Western markets, though the erratic pattern does suggest an alternative explanation, lapses in reporting. In 1907, by contrast, disruptions were more prevalent and clearly successive as evidenced by successive days when no transactions prices were recorded. Moreover, in the case of Chicago, the daily market report in the Daily Tribune (24 October, p. 3; 25 October, p. 17) actually noted that no banks wanted to buy New York exchange because of the suspension.

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

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35 We also conducted a factor analysis on the exchange rates in the three cities and the New York currency premium. In both cases the first factor explained virtually all of the correlation among the four variables. In 1893 it is positively correlated with rates in the two Midwestern cities and negatively correlated with rates in Boston and the New York currency premium. In 1907 it is positively correlated with all four variables.

36 In some instances the narrative accounts explicitly comment on the absence of trading in domestic exchange on an otherwise 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.

37 To avoid biasing our results, we counted the number of “no trade” days over an extended period, from the week before and after the official NYCHA suspension period; our results (shown in parentheses below the initial estimates for the suspension period) affirm our main conclusion. Again we note the more extreme cases in Southern and Western markets, where the market virtually vanishes after the onset of suspension (Memphis, New Orleans, and San Francisco) or shows no variation whatsoever (Louisville).
To understand why the suspension of payments by New York banks had divergent regional impacts in the 1893 but not in the 1907 panic, we analyze in depth the domestic exchange markets in Boston and Chicago. We recognize that these crises differed along a variety of dimensions, which may have skewed their shocks regionally. In particular, banks in Midwestern centers were geographically and economically closer to the source of and in turn more directly mired in the 1893 than in the 1907 crisis. Nonetheless, our evidence in Figure 3 implies that a suspension in New York sent an independent liquidity shock to banks throughout the country.

Banks’ reaction, we maintain, depended on the nature and extent of their ties to the New York banking sector. Though banks commonly treated New York balances as a store of value for their excess (often seasonal) cash reserves, the increasing centrality of New York correspondents after 1893 created an additional demand for New York funds to settle interregional transactions and provide related central bank-services. This “transactions” demand was augmented by the role of New York correspondents in brokering transactions in related money markets for U.S. government securities, gold imports, and commercial paper. In other words, as the de facto national means of payment, New York funds commanded a premium, the equivalent of seigniorage.

i) Regional divergence during the Panic of 1893

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38 We selected these cases strategically. Not only do they clearly illustrate the changes over the period, but for each city 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.

39 Banks preferred to hold their excess reserves in New York accounts, which paid a modest interest of 2 percent (James 1976b; Gendreau 1983). Unlike this secondary reserve demand, correspondent balances after 1893 were less sensitive to seasonal variations in banks’ current account surpluses and deficits.
From this analytical perspective, we first consider the Chicago and Boston domestic exchange markets in 1893. Even before the NYCHA decision to suspend payments, Chicago banks complained of recurrent withdrawal demands by their panicky country bank customers.\textsuperscript{40} The imposition of convertibility restrictions on New York correspondent deposits (roughly coincident with comparable restrictions on deposits in Philadelphia and Boston) magnified these liquidity pressures. With limited access to their funds in Northeastern money centers, country and even other reserve banks sought accommodation from their Chicago correspondents.

Responding to “prominent men and firms in commercial circles,” the Chicago clearinghouse mustered a bare majority to authorize the issue of loan certificates (\textit{Chicago Daily Tribune}, 28 July, p. 12). Nonetheless, the clearinghouse never issued any loan certificates, nor did it suspend payments. Its decision was influenced by a number of factors, notably divisions within the banking sector as well as the relief afforded by large balance of payments surpluses (due to abundant agricultural exports and the Worlds’ Fair).\textsuperscript{41} The city’s largest banks also saw an

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\textsuperscript{40}This account is based on the daily reports on Chicago banks and money market in the \textit{Chicago Daily Tribune} from 1 July to 28 September 1893.

\textsuperscript{41}By vetoing the issue of loan certificates, the largest clearinghouse banks preserved their integrity but at the expense of “main” street businesses. According to Noyes (1894, pp. 20-22), banks’ refusal to rely on loan certificates to offset large deposit withdrawals resulted in a 15 percent contraction in loans to local enterprises. Their decision further illustrates Goodhart’s thesis on the limits of private central bank-like institutions because of conflicts of interest (Goodhart 1988, pp. 37-43; see also Sprague 1910, pp. 173-74). Like the New York clearinghouse in 1907, the Chicago clearinghouse was constrained by its limited membership and the concern that non-member banks would refuse to accept loan certificates in settlement transactions (Moen and Tallman 2000).
opportunity to assert their independence from the New York banking sector and as result to gain competitive advantage in the correspondent market.\footnote{For example, Chicago banks for the first time directly imported gold from England in exchange for bills earned through the city’s export trade (\textit{Chicago Daily Tribune}, 1 August, pp. 8, 12). And the \textit{Daily Tribune} frequently editorialized in support of the virtues of the Chicago banking sector, which it figured would gain the trust of country banks.}

In pursuing this independent path, Chicago banks were treating their New York balances as mainly a secondary reserve asset. Consequently, when New York banks suspended payments, Chicago banks could still sell their New York exchange, but the new opportunity cost was set by the currency premium in New York (see equation 2). Quantitative and qualitative evidence gleaned from the money market reports in local newspapers corroborate this perspective. The graphs in Figure 5 track the (negative of the) New York currency premium during the suspension period from August 3 to September 2 (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 set by the cost of shipping currency (the dashed lines), equal to 75¢ to 80¢ per $1000 of exchange (\textit{Chicago Daily 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 its movements (correlation coefficient = -0.861; see Table 2, panel A).\footnote{Besides the New York currency premium, the \textit{Daily Tribune} reports measured the severity of the suspension crisis by the share of New York clearinghouse transactions paid in loan}
Contemporary analyses of the crisis episode explicate these parallel trends. Lyman Gage president of the First National Bank of Chicago succinctly summarized 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 Daily 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).

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 *Daily 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 *Daily 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 *Daily Tribune* referred to as a “semi-suspension” (17 July, p. 10). By mid-July Chicago 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 clearing house certificates” as means of interbank settlement.
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 Daily Tribune 13 July, p. 12). 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 Daily Tribune 29 July, p. 11 and 31 July, p. 31).

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\textsuperscript{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.

Applied to the Boston case, the simple economics of correspondent balances can explain the modest deviations in the New York exchange rate beyond the currency shipping point bounds. With the mounting liquidity crisis in the Boston region, currency also commanded an increasing

\textsuperscript{44} 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¢ 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 6 (and Table 2), they are positively and significantly correlated with the currency premium in New York (coefficient = 0.622) and comparable in magnitude. Consequently, the mutual “suspension” of payments in both cities had offsetting effects on the New York exchange rate.

This quantitative evidence does imply that New York exchange should have sold for relatively small discounts (on average -$4 per $1000), not premiums, in the Boston market. 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. On the demand side, Boston banks required New York funds 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). In other words, the New York premium reflected, in part, the city’s preeminent position as the site of the largest, most liquid markets for making official money (either legal tender and more generally circulating currency).

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45Based on the secondary reserve demand for New York funds, the exchange rate in Boston is determined by the difference between the currency premiums in Boston and New York, which was mainly negative over the suspension period. Newspaper routinely report exchange rates in units of 1¢ per $1000 or 0.001 percent as opposed to currency premiums, which were denominated in units ¼ or ½ percent or $2.5 to $5 per $1000. The differential in reporting precision alone can account for the implied negative exchange rate in most years.
The analysis in the *Globe* (6 August, p. 22) also emphasizes the demand for New York funds as *the* means of payment for the city’s “natural course of business.” 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’ payments demands. Additionally, by maintaining minimum compensating balances in New York, Boston banks procured access to critical services during the depths of the “currency famine,” such as recurrent shipments of small denomination circulating currency.46

On the supply side, banks were increasingly reluctant to part with their New York balances because of the greater lags and uncertainty in replenishing them. In July Boston (and Philadelphia) banks had already scaled back on their collections business. They no longer offered customers immediate credit on their non-local deposits (the equivalent today of a daylight overdraft), and exercised greater discretion in remitting funds to non-local banks presenting checks for collection. Even in the clearinghouse exchanges, banks experienced the greater likelihood of deferred payments, as increasing shares (at least 40 percent as of mid-July) of payments were made in clearinghouse certificates rather than official money or New York exchange.

46Consistent with this view, we find that the correspondent balances of Boston bank were less seasonally variable than those held by banks in other regional centers. And though their “excess” New York reserves did fall by $2.7 million (or 75 percent) from June to mid-August, they never dipped below $1 million (see the aggregate Boston bank balance sheet reports every Tuesday in the *Boston Globe* (from 1 October 1907 to 28 January 1908). By contrast, over the same period local excess reserves fell by $1 million into negative territory. Moreover, a simple statistical analysis suggests that issues of clearinghouse loan certificates responded more to banks’ New York than local reserve positions.
ii) Regional convergence in the Panic of 1907

During the suspension period in the 1907 panic, domestic exchange rates in Chicago closely paralleled rather than sharply diverged from those in Boston (compare Figure 7 to Figures 5 and 6). At one level our explanation for this striking turnaround is simple. During this liquidity crisis Chicago banks for the first time authorized and issued clearinghouse certificates and restricted the convertibility of deposits. In other words, they responded to the New York suspension just like Boston clearinghouse banks did in 1893 and 1907. The immediate consequence of their collective action is evident in the comparably parallel trends in the currency premiums in Chicago and New York (see Figure 7 and Table 2, panel B; correlation coefficient = 0.719). Their offsetting effects then limited the impact of the New York suspension per se on the gyrations in the local domestic exchange rate.

The critical question then is why did Chicago banks succumb to the liquidity pressures in 1907 and not in 1893. Based on local accounts, we rule out the idiosyncratic impact of the economic-financial crisis itself. Just prior to the NYCHA suspension, the Chicago clearinghouse had audited its member banks and with one exception declared them to be financially “sound” (Chicago Daily Tribune, 22 October, p. 19; 23 October, p. 12). Put another way, the “acute” events in the New York banking-financial sector were their only cause for “concern,” and as an initial precautionary step many banks had curbed their lending especially to non-local customers to prevent external cash drains.

More abruptly on October 23 local banks withdrew en masse from the demand-side of the domestic exchange market. Complaining of convertibility restrictions on their New York balances and anticipating a formal suspension by NYCHA members, they were unwilling to
purchase increasingly illiquid New York funds. Ironically, their actions further diminished the liquidity of their New York balances by effectively suspending trading in the “public” market over the next two weeks (see the break in the Chicago series in Figure 7).47

In addition to their immediate liquidity impacts, New York banks’ convertibility restrictions effectively transmitted what was a local panic down the correspondent banking hierarchy to regional money centers like Chicago. According a *Chicago Daily Tribune* report (26 October, p. 19), country banks had begun to run on their Chicago correspondents in the days before the New York suspension, only because they were unable to “draw down” their New York balances. Then, on the evening of the 26th, members of the Chicago clearinghouse took the unprecedented step of restricting deposit convertibility and issuing clearinghouse loan certificates when banks opened for business the very next morning. According to the association’s official statement, these measures were intended for the “self-protection” of members against external, “not local,” conditions. Consistent with this rationale, the association’s members would impose convertibility restrictions mainly on panicky country banks seeking to liquidate their accounts and not on local customers conducting their “legitimate” transactions.48 As James B. Forgan chair of the clearinghouse committee elaborated, Chicago banks had learned a painful lesson from the 1893 episode, when they suffered large external cash drains because of convertibility

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47 The *Daily Tribune* reports notional offers of New York exchange at a 50¢ discount, deemed the new lower currency shipping point. We find no real evidence of a hiatus in trading in the Boston domestic exchange market.

48 Their decision made the front pages of the *Chicago Daily Tribune* on October 27 and 28. Banks imposed a 30- or 60-day waiting period on large cash withdrawals from savings accounts, but allowed customers to make withdrawals for “ordinary” needs, such as cashing payroll checks.
restrictions in Eastern money centers especially New York and were almost driven to the brink of closing their teller windows and relying on clearinghouse certificates.\textsuperscript{49}

According to Forgan, the rapid diffusion of check transactions since 1893 also influenced 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 for \textit{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 currency famine.

Forgan failed to mention the other systemic changes occasioned by this payments innovation. Following the national trend, Chicago banks had allocated increasing shares of their excess clearing reserves from their vaults to accounts with New York reserve agents and correspondents.\textsuperscript{50} And with the spread of checking accounts among national and state banks in their market area, they greatly enlarged their correspondent relative to local deposit business. As a result, they were more vulnerable to runs by country banks because of their greater shares of these more volatile correspondent balances and their fewer local cash sources to meet them.

\textsuperscript{49}Forgan also observed that banks in 1907 could not expect a \textit{deus ex machina} like the large infusion of cash in 1893 from the World’s Columbian Exposition.

\textsuperscript{50}In the call dates leading up to the 1907 crisis, Chicago national banks held only 47 percent of their primary and secondary reserves in vault cash and 42 percent with correspondents and reserve agents. For the same period in 1892-93, the figures are 52.3 and 33.0 percent respectively. Over the same period, they dramatically expanded their correspondent business, which accounted for over 56 percent of their deposits in 1906-07 as opposed to only 40 percent in 1892-93 (U.S. Comptroller of the Currency 1893, pp. 304-05; 1907, pp. 542-43).
Just as in the 1893 Boston case, the greater centrality of New York banks in the national money market explains the persistent but modest premiums on New York funds in the Chicago domestic exchange market in the month following the resumption of trading on November 5. Though Chicago banks were reluctant to acquire additional New York funds during the suspension period, 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 for themselves but especially their country bank customers. Moreover, they still had to maintain sufficient balances in New York to settle their customers’ long distance check payments. Reinforcing this trend, many banks were “hoarding” New York exchange because of its more limited and uncertain supply in routine interbank transactions and domestic exchange markets (*Chicago Daily Tribune*, 5 November, p. 10).

4. Private Monetary Responses to a Systemic Shock

The tale of two cities in the previous section reconciles the apparent paradox between Ridgley’s dire assessment of the 1907 “suspension crisis” and its relatively modest quantitative impact on New York rates in regional domestic exchange markets. In contrast to the 1893 episode, conditions of “normalcy” prevailed in regional money centers until New York banks began to restrict deposit convertibility in late October. The initial response to an admittedly local banking-financial crisis triggered a chain reaction, initially by country banks with funds tied up in New York and then in regional money centers. Facing normal autumn cash demands and increasingly worried customers, country banks turned to their regional correspondents for funds.
To limit these panicky cash withdrawals, banks in regional centers, mainly in the north and west, instantly followed the New York clearinghouse and voted to suspend payments. According to the Chicago Daily Tribune reports (27 October, p. 1; 28 October, p. 2; 29 October, pp. 1-2), clearinghouse banks in 14 centers—from Boston and Philadelphia in the Northeast to Kansas City and Denver in the Plains-Mountain states—took this step on the evening of October 26. They were joined by banks in 8 more cities in these regions the very next day and by San Francisco and Portland on the west coast by the end of the week. Of the 21 “unaffected” cities where banks took no immediate action, 18 were located in the South including the border states.51

Survey data collected by Andrew (1908b) delineate more systematically the spatial-economic contours of the suspension crisis. They cover banks in virtually all large, “independent” cities and inquire about their collective action to limit cash payments, which ranged from the enforcement of the 30- or 60-day notification period on withdrawals from time deposits to quantity withdrawal constraints on demand deposits (typically $50/day up to a maximum of $100/week).52 State and federal banking authorities “tacitly tolerat[ed]” these private exceptions to bank regulations or charter requirements, but in several states, mainly in the West and

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51 Sprague 1910, pp. 296-97. See also Atlanta Constitution 28 October 1907, p. 2; Boston Globe 28 October 1907, p. 6.

52 Andrew limited the sample to cities with at least 25 thousand people, which were outside of the immediate orbit of a large metropolitan center and its clearinghouse. He received responses from 145 of the 147 cities in this category, but also collected data from a smattering of smaller centers mainly in the South. Intermediate restrictions included requiring large customers to “mark their checks ‘payable only through the clearing house’.”
Midwest, they also declared bank holidays or explicitly sanctioned these emergency measures (Andrew 1908b, pp. 498-500).

Over the entire suspension period, banks in nearly 60 percent of “large” cities adopted convertibility restrictions. The most common were quantity (45.2 percent) and discretionary (27.4 percent) withdrawal limits on demand deposits. Despite differences in the timing of banks’ reaction to the NYCHA decision, no region was spared the ultimate impact. For example, nearly 60 percent of banks in Southern cities suspended payments, even though they responded with a longer lag than those in the Midwest and West. Suspensions were more prevalent among banks in the largest cities (with at least 100 thousand people) that occupied pivotal positions in the National Banking System reserve hierarchy.53

The NYCHA decision, in other words, sent a liquidity shock throughout the entire banking system, evident in the sudden but relatively small increase in New York exchange rates across regional centers. Their nearly simultaneous suspension of payments in effect offset the direct, negative impact of the surging New York currency premium on domestic exchange rates evidenced in the Chicago market during the 1893 panic (see Figure 5). Moreover, as in the case of Boston in 1893 (and 1907) and Chicago in 1907, banks continued to demand (and to hoard) New York balances to ensure access to the national interbank funds and other pivotal money markets centered there.

To relieve the mounting stresses in the banking system, local clearinghouses functioned as lenders of last resort effectively expanding the money supply by circulating a variety of “cash

53On 16 November Wall Street Journal reported (p. 6) that clearinghouses in “nearly every reserve city of the country” had imposed some restrictions on deposit withdrawals.
substitutes.” In addition to inquiring about convertibility restrictions, the Andrew survey also collected data on the timing and magnitude of these monetary issues. The most familiar, dating back to the panic of 1857, were large denomination loan certificates, an internal money used to settle interbank reserve transactions within formal clearinghouses or organized bank clubs.

According to Andrew (1908b, p. 506), during the 1893 panic only 8 clearinghouses mainly in the Northeast authorized and issued a total of $69.1 million in these instruments (see Table 1). In 1907, by contrast, 42 clearinghouses across the country—six located in the same large Northeastern centers as in 1893 and the rest in the Midwest (20), South (9), and West (7)—authorized issues totaling $238.1 million, of which $188.1 million (or 80 percent) actually circulated at any one point in time. Attesting further to banks’ perception of the emergency, over 70 percent of the affected clearinghouses voted to authorize these issues within a week of the NYCHA decision.  

Banks in 56 large cities, mainly located outside of the Northeast, also circulated a variety “external” or transactions monies for use by the non-bank public. In nearly half of the cases clearinghouses authorized the issue of small-denomination currencies, in the form of notes carefully designed to mimic official money or checks redeemable for a clearinghouse balance (see Figure 8). They also agreed to monetize “credit instruments” such as cashiers’ (or

54 Alternative measures are the median length of time between the decision to issue large-denomination certificates and when they (1) reached their maximum level outstanding and (2) were finally retired: 26 days (for the 27 reporting clearinghouses) and 77 days respectively.

55 In about half of the cases banks in these cities issued large-denomination certificates as well. Small-denomination certificates or notes were pioneered by banks in Southeastern (mainly Georgia) cities during the “currency famine” of 1893 (Warner 1895, p. 6; Andrew 1908b, pp. 507-08). Andrew’s “fragmentary” evidence (p. 503) suggests that in the 1907 panic they were also common in smaller cities without formal clearinghouses where banks could organize
certified) checks, negotiable certificates of deposit, New York drafts, and payroll script by accepting them to settle their mutual balances. Andrew’s tabulation (p. 9) of these circulating currencies was “very incomplete,” precisely because of their variety and informality, and yields a lower-bound estimate (in his view) of only $96 million in authorized issues. The actual total authorized, he conjectures, may have exceeded $260 million. Unlike in the case of large-denomination certificates, local banks waited nearly two weeks after the onset of the crisis to authorize these currencies, perhaps because they could at least initially still draw on their correspondent accounts to satisfy customers’ cash demands.

Clearinghouses authorized the use of these monetary instruments preemptively, but their actual issues depended on the cumulative liquidity demands on member banks. These pressures derived from two sources, local “individual” depositors and more distant correspondents, which likely had differential impacts on the size and composition of the currency substitutes. Individual depositors, for example, withdrew funds mainly for local transactions and so would be more inclined to accept small denomination certificates or equivalent cash substitutes, which circulated at par within the metropolitan region. More distant correspondents, by contrast, insisted on payment in legal tender money rather than clearinghouse certificates which were not current in

temporary committees solely to authorize the use of informal monetary instruments.

56Enumerating payroll and related script was especially problematic. Its extensive and documented use in Pittsburgh accounted for nearly one-half of Andrew’s lower-bound estimate. At the same time, his data omit its adoption in other locales such as New York City where the municipal government paid employees in an equivalent currency—checks stamped “Payable through the New York Clearing House” (New York Times 8 November, p. 3; see also the report on 23 November, p. 1 on the use of script in Pittsburgh).

Put in perspective, Andrew’s upper-bound estimate of $500 million in total issues of large- and small-denomination moneys represents 17.4 percent of the total stock of official high-powered money in 1907 (See series Cj141 in Carter et al. 2006, p. 3-631).
their local markets and did not count as official reserves. Large-denomination certificates could fund these external cash drains albeit indirectly, as they enabled banks to economize on other, that is local, uses of their official cash reserves.

Through regression analysis, we gauge the impact of local versus external cash demands on clearinghouses’s total large- and small-denomination currency issues. The unit of analysis is, accordingly, the local banking sector, and the data come from the monetary and balance sheet aggregates compiled by Andrew and the Comptroller of the Currency. We estimate separate equations for each currency type, because the qualitative evidence referenced above implies that they circulated in distinct, relatively segmented markets. Because of data limitations, we limit the samples in each equation to the banking centers that actually issued the relevant type of monetary instrument, and so can only identify the proximate determinants of their monetary issues. The independent variables include total individual (or local) deposits and bankers’ balances—both due to and due from other banks—as well as the city’s location in the National Banking System reserve hierarchy. As the impact of NYCHA suspension was transmitted through the correspondent and National Banking systems, the last two “external” factors also capture the proximate influence of more systemic rather than local factors on the liquidity pressures on and in turn monetary policies of banks in each center.

The results presented in Table 3 are consistent with our view that total issues of these distinct moneys reflect clearinghouses’ segmented monetary policies, responding to either external (that is, systemic) or local liquidity pressures. They also underscore banks’ significant reliance on

57The balance sheet data are based on the fourth call date in 1907, just prior to the onset of the panic.
their correspondent deposits (the “due from” items on their balance sheets) to meet their customers, whether local or distant, withdrawal demands, and so the liquidity shock from the suspension of payments by banks atop the reserve hierarchy. As the regression results suggest, banks in lower tier centers had to improvise monetarily when they could not readily draw on these funds.

Consider equation (1) for large-denomination loan certificates. Total issues were positively correlated with the nodality of the center in the correspondent and National Banking networks. The coefficients on the “Due to banks” and “Central reserve city” variables are positive, large, and statistically significant (at the 1 percent confidence level). The relatively large negative and statistically significant coefficient on the “Due from banks” variable does suggest that when feasible banks could offset systemic liquid demands by repatriating funds from their distant correspondents.\textsuperscript{58} An alternative specification, including all (67) cities without missing observations, yields similar results except in this case the coefficient on the “Reserve city” variable is also positive and statistically significant (at the 5 percent confidence level) but as expected far less than that for “Central reserve” cities.\textsuperscript{59}

In equation (2) the dependent variable is the total value of all small-denomination circulating currencies, whether issued directly or just validated by clearing-houses. As we predicted, these issues were positively and significantly correlated with local liquidity pressures gauged by total individual deposits. As in equation (1), the negative and statistically significant coefficient on

\textsuperscript{58}The hypothesis that the estimated coefficients on the “due to” and “due from” variables are of equal magnitude but of opposite signs—that large-denomination issues varied with net correspondent balances—cannot be rejected at the 10 percent significant level.

\textsuperscript{59}In this case we used the Tobit model to estimate the regression equation.
the “Due from banks” variable implies that these issues were substitutes for banks’ secondary reserve accounts during suspension periods. Recognizing the gaps in Andrew’s enumeration of circulating currencies, we estimated the same equation but only for instruments actually issued by clearing-houses—small-denomination certificates and checks. In this case both local and distant (“due to”) liquidity pressures mattered; moreover, the magnitude of the coefficient on the “due from” variable is larger, exceeding the sum of the coefficients on local and correspondent (“due to”) deposits.

5. Towards Central Banking? Treasury Monetary Policy and Aldrich-Vreeland Revisited

Bank’s collective monetary interventions blunted the more dire impacts of the 1907 panic. The clearest example was the diffusion of small-denomination currency substitutes. Readily embraced by large employers, their workers, and retailers, they effectively substituted for official money in local transactions and so prevented another “currency famine” which had idled plants and workers in the 1893 crisis (Warner 1895). Likewise, because of their access to large-denomination loan certificates, banks could devote their cash reserves to meeting customers’ “legitimate” withdrawal demands, including currency shipments to distant correspondent banks.

Still, these instruments could only provide limited relief. Clearinghouse currencies circulated at par but within the institution’s market area, the city limits or larger metropolitan region for those with a “country” department such as the Atlanta clearinghouse.\(^{60}\) In other words, the proliferation of these substitute currencies segmented the country into distinct currency regions,

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\(^{60}\) Atlanta clearing-house currency circulated as far as Athens, Georgia, a distance of about 70 miles (Atlanta Constitution 1 November, p. 1 and 8 November, p. 7; see also the Chicago Daily Tribune 17 November, p. 4).
reminiscent of the “chaos” that characterized the pre-Civil War—that is pre-National Banking Act—monetary system (Gorton 1999, Redenius 2007).

The benefits of large denomination loan certificates were also bounded economically and spatially. They mediated settlement transactions between member banks within the clearinghouse, but were not negotiable outside of these institutional confines (Moen and Tallman 2013). Once certificates exceeded a critical threshold of clearinghouse transactions, they disrupted (or to use contemporary terminology, “deranged”) the interregional flow of funds within the banking system, that is the “domestic exchanges.” Paid mainly in loan certificates, banks could no longer expect to replenish their cash reserves and New York deposits through daily clearinghouse settlements. As a result, they increasingly hoarded these primary and secondary reserves to the detriment of trade during the crop-moving season. In Chicago, for example, banks refused to ship currency to their country correspondents within several days of their decision to suspend payments and issue large-denomination loan certificates.⁶¹

Analogous to the coordination problem resulting from banks’ deferred settlement through the Fedwire, the solution to this systemic crisis demanded a large injection of liquidity in the form of a nationally, not locally, acceptable means of payment (McAndrews and Rajan 2000; McAndrews and Potter 2002). In the absence of a central bank, the Treasury had historically filled this void in response to monetary “emergencies” (Kinley 1910a, esp. chs. 8-10; Friedman and Schwartz 1963, pp. 149-62; Heckelman and Wood 2005). Until the early 1900s, however, its main policy levers—deposits in banks, the “prepayment” of interest, and early bond

---

⁶¹According to a report in the Chicago Daily Tribune (29 October, p. 1), one of the intended purposes of loan certificates was “to prevent Chicago’’s supply of cash from being taken away by demands from other cities” (italics in the original).
redemptions—were subject to exacting legal-fiscal constraints. After the 1890s crisis but especially under the Shaw administration (from 1902 to 1907), the Treasury assumed greater central banking powers, exceeding those of de jure European central banks according to some (Andrew 1907; Kinley 1910a, pp. 256-63; Wildman 1910; Timberlake 1993, ch. 13). To this end, Shaw took considerable liberties to ease the transfer of funds from Treasury vaults into national banks by (1) treating national banks as de facto Treasury branches for this purpose, (2) voiding reserve requirement on government deposits, and (3) allowing banks to collateralize these deposits with state, municipal and even railroad rather than U.S. bonds. And to minimize the contractionary impact of its bond sales, the Treasury allowed national bank depositories to hold the proceeds.

Shaw’s policies were a response to the persistent financial pressures during the 1902 and 1903 crop-moving seasons that had resisted more conventional measures. They were only fully tested by his successor, George Cortelyou, during the 1907 panic (U.S. Congress, Senate 1908a; U.S. Congress, House 1908, pp. 153-66). Following in Shaw’s footsteps, Cortelyou had already initiated modest monetary expansion from late August to mid-October to accommodate seasonal

---

62 The literal reading of the relevant statutes implies that the Treasury could only fund deposits in national banks with current budget surpluses, not accumulated balances. It also had greater leeway immediately after the Civil War because of the large outstanding stock of federal debt and corresponding flow of interest payments. The stock of debt was especially important, because early redemptions and direct deposits competed with banks’ alternative use of government debt to back their note issues. In other words, the Treasury could effectively sterilize its monetary operations by increasing one kind of circulating currency at the expense of another (see for example James 1976a).

63 The Treasury also virtually eliminated the cost of importing gold through the equivalent of a “for future delivery” transaction, in which banks could withdraw gold from a subtreasury branch in exchange for a proof of purchase rather than the actual shipment (Andrew 1907, p. 543-45).
demands for cash and credit. Because of the mounting turmoil in the New York banking sector in late October, he promptly shifted gears and authorized the transfer of funds from the Treasury to large New York depository banks, which by the end of the month totaled nearly $35 million. With a lag of about one week, the Treasury also began to deposit funds into national banks in “every important locality where assistance seemed to be required.”\textsuperscript{64} These transfers amounted to just under $5 million by the end of October and $10 million in mid-November.

The Treasury’s interventions extended beyond these more obvious measures. They also included bond sales essentially to fund deposits in national banks; a further relaxing of collateral requirements on government deposits to free up U.S. securities for additional national bank note issues; and the postponement of the fifth call date from November during the height of the crisis to early December among others (U.S. Congress, Senate 1908a, pp. 8-29). As a simple summary statistic to gauge their overall magnitude, Figure 9 plots monthly data on the Treasury’s actual (versus reported) balances of official money and the share held in depository banks from January 1890 to the end of 1908.\textsuperscript{65} The depository share series shows the fraction of its total (including required) balances held in national banks.

\textsuperscript{64}U.S. Congress, Senate 1908a, p. 9. The timing of Treasury deposits may help to explain the stretch of “no trade” days in regional domestic exchange markets. Banks were unlikely to liquidate their increasingly scarce New York funds, when they could expect these cash deposits.

\textsuperscript{65}The data come from Kemmerer (1910, Table 19, pp. 391-93). After passage of the Gold Standard Act in March 1900, the Treasury only reported its discretionary balances net of the mandated $150 million reserve to back the dollar. The share of the Treasury’s discretionary (or reported) rather than total balances deposited in banks may more accurately gauge its monetary policy response to the 1907 crisis.
The official series identifies one constraint on Treasury monetary policy during the 1893 crisis. From mid-1890 to the end of 1893, its total balances fell sharply and actually dipped below the sacred $100 million level for six months beginning in September 1893. Despite shrinking coffers, the Treasury modestly increased its bank deposits by nearly $2 million (or about 4 percentage points from about 9.0 to 13.4 percent) during the second half of 1893. Shifting gears in January 1894, it devoted budget surpluses to replenishing its total balances but mitigated the contractionary impact of this policy by diverting increasing shares of these net flows to bank deposits beginning in July 1898.

By early 1900, Treasury deposits in national banks reached a new norm of about one-third of its total balances. From this perspective, Cortelyou’s policies clearly stand out. During the last quarter of 1907, Treasury deposits in banks increased by $83.2 million (from 37.5 to 57.3 percent of its actual balances). About one-half of these funds were initially lodged in New York banks, though according to Sprague’s calculus they ultimately supported their continued but discretionary cash shipments during the depths of the crisis (Sprague 1910, pp. 263-66). After the new year, the Treasury quickly unwound these positions and returned depository balances to their normal levels.

As additional monetary stimulus, the Treasury devoted its routine exchange operations in New York to expediting gold imports (or their monetary equivalent) to interior destinations. In normal times the subtreasury mainly brokered cash flows between New York and country banks during the crop-moving season by first converting deposits of large denomination gold

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66The other constraint was more ideological, reflecting the conventional wisdom that monetary interventions even during a crisis would fuel inflation.
certificates into small denomination silver certificates and coins and then shipping this circulating currency to branches in agricultural regions. Between September and December, these transfers averaged $4.7 million per month, and nearly two-thirds was sent to the New Orleans branch (see Figures 10).\(^{67}\) In the last two months of 1907, by contrast, the New York subtreasury “facilitated” unusually large gold imports by banks in regional centers, which greatly “relieved [their] pressing needs for currency.” In the first week of November the Treasury advanced “$36 million in small bills” to the New York branch in anticipation these gold flows, and by the end of the year had shipped over $50 million mainly to Chicago and St. Louis and San Francisco (see Figures 10 and 11).\(^{68}\)

The Treasury’s unprecedented actions complemented banks’ collective policy responses, notably by providing money center correspondents especially those in New York with the funds to meet external cash drains. Yet, despite their joint efforts, they could not stem the deepening crisis, nor quickly restore normalcy to the money markets and domestic exchanges. Two constraints limited the effectiveness of this private-public version of central banking. The first stems from the segmentation of the alternative policy instruments and more fundamentally of banks’ monetary liabilities and total money supplies.\(^{69}\) Only the Treasury could increase the supply of a generally accepted means of payment in all realms—from clearinghouse to long-

\(^{67}\)The series in Figures 10 and 11 clearly show that the Fed did not originate seasonal monetary operations to relieve stress in money markets, but continued Treasury policy with a more flexible instrument and on an expanded scale (Heckelman and Wood 2005; Miron 1986).

\(^{68}\)U.S. Congress, Senate 1908a, pp. 8-9; Kemmerer 1910, Table 11, pp. 361-63. These cities received 61 percent of the funds transfers, and New Orleans, only 8 percent.

\(^{69}\)Friedman and Schwartz (1963, p.172) refer to this “interconvertibility crisis” resulting from the limited substitutability between different kinds of money; see also Rockoff (1993).
distance transactions—but only by depleting its own resources. Once the Treasury reached this limit in 1907, it resorted to bond sales to free up idle funds, but full relief ultimately depended on fresh injections of high-powered money through gold imports (U.S. Congress, Senate, 1908a, p. 10; see Tallman and Moen 1998, Hanes and Rhode 2013, and Rodgers and Payne 2014).

The second reflects the checks on policy initiative and coordination. The Treasury and the clearinghouses ultimately responded to the crisis, but both have been criticized for initially dragging their feet and allowing the panic to deepen.\textsuperscript{70} And even though their more coordinated actions constituted a national monetary policy, they could only be effected indirectly through the correspondent banking hierarchy.\textsuperscript{71} This mechanism operated efficiently during normal times, but was prone to considerable lags and uncertainty during panics, which according to Andrew (1908a) contributed to the “extensive hoarding” by the public and banks.

It also seemed to privilege the New York banking sector, which many saw as the main culprit. In his defense Cortelyou emphasized the centrality of New York banks in the correspondent network.\textsuperscript{72} Arresting panic conditions in New York, he insisted, was a necessary first step to restoring the smooth, efficient flow of funds through the entire banking system. Moreover, he acknowledged, New York banks were more effective conduits to transfer cash throughout the country because of “their extended relations...as reserve depositories” as

\textsuperscript{70} Sprague (1910, pp. 252-54 ) criticizes the dominant New York banks for not immediately aiding the Knickerbocker Trust, which allowed bank runs to spread to other Trust companies and commercial banks. Timberlake (1993, pp. 195-96) has depicted Cortelyou as a more diffident, indecisive version of his predecessor, Shaw.

\textsuperscript{71} The NYCHA functioned as a “dominant” firm, which by communication and example orchestrated an almost nation-wide suspension of payments, akin to a national bank holiday.

\textsuperscript{72} Cortelyou explained the Treasury’s strategy in his “Response” to Senate resolution No. 33 (U.S. Congress, Senate, 1908a, pp. 14-15).
compared to the more skeletal sub-treasury network. Corroborating his claim, Treasury department evidence shows that New York banks “did not retain in their own keeping the public moneys received but were enabled...to employ these moneys to meet a large proportion of the calls made upon them.”\textsuperscript{73} Ironically, as in the 2008 financial crisis, the Treasury’s “bailout” of the New York banking sector was justified by the very conditions making it the epicenter of the emerging crisis.

The emergency currency provision of the 1908 Aldrich-Vreeland Act only partially remedied these institutional defects. Based on the clearinghouse model, it empowered local banks to respond more effectively to local liquidity shocks.\textsuperscript{74} Through currency associations, they could issue the monetary equivalent of national bank notes, but backed by their holdings of commercial paper and state, municipal, and even corporate bonds. This more “elastic” asset-backed money could transcend the geographic boundaries that circumscribed clearinghouse currencies, though like national bank notes they did not qualify as official and (at least initially) clearinghouse reserves. What’s more, the Aldrich-Vreeland mechanism relied on multiple bureaucratic steps to deliver the relief—the formation of a sufficient quorum of and consensus among member banks, approval of their request and collateral by the Comptroller of the Currency and Secretary of the Treasury, and the production and shipment of the engraved notes to their final destination.

\textsuperscript{73}U.S. Congress, Senate (1908a), p. 9. According to Sprague (1908, p. 362), New York banks suffered only a net $13 million reserve drain in late October because of the Treasury’s cash injection of $25 million. The Treasury, in other words, directly funded nearly two-thirds of the cash payments (including shipments) by New York banks during this pivotal moment.

\textsuperscript{74}Andrew (1908c) reproduces the Act and briefly reviews its legislative history (see also Wicker 2005). Laughlin (1908) dissect the law, which he regarded as a “clumsy” attempt to redress the problem, while Sprague (1915, p. 518) refers to its “somewhat complicated provisions.”
Treasury officials could greatly expedite the process, as they clearly did during the incipient 1914 crisis especially in New York City (Silber 2007, pp. 65-85). Even before New York banks issued their requests, Treasury Secretary McAdoo had already taken the first steps to deliver the needed liquidity, including the production and shipment of engraved bank notes to the New York subtreasury. As important, he pressured Congress to amend the original act to embrace money center banks, even though most had not reached their quota of national bank note issues. And finally, through his public display of support for the banks and the emergency money at the time (and in a trial run a year earlier), he lent his authority to legitimizing this new money. Consequently, immediately upon application for emergency currency, New York banks were flush with cash and could quiet any fears of another round of convertibility restrictions.

In other words, like his immediate predecessors, McAdoo assumed central banking authority and under the guise of the Aldrich-Vreeland Act orchestrated a preemptive, coordinated monetary policy response to the looming crisis (for an analogous case, see Carlson, Mitchener and Richardson 2014). We do not dispute the effectiveness of his policy intervention, but question the lesson to be learned from this singular example for several reasons. Most obviously, unlike in previous crises McAdoo knew the precise timing and incidence of the liquidity shock from the suspension of trading on the New York Stock Exchange. Consequently, he could and did alert clearinghouse banks in reserve cities throughout the country to the impending crisis and with New York bankers directed their initial responses.

Outside of New York, moreover, the Aldrich-Vreeland mechanism operated with predictable, significant and costly time lags. In Chicago, for example, the local currency association applied for funds on August 3, the day when McAdoo accompanied the Treasury’s currency and gold
shipments to New York (James 1938, pp. 838-50). Even though he assured Chicago bankers that the Treasury would immediately dispatch $50 million in bank notes, which had already been engraved, they only arrived during the second week of August. Anticipating delays of “several days or even weeks,” Chicago clearing-house banks had taken emergency steps of their own. On 31 July they had authorized the issue of loan certificates, but also voted to restrict the convertibility of time and “commercial” deposits. And though the influx of emergency currency quelled the worst of the panic, Chicago banks retained convertibility restrictions until the end of the month, when additional Treasury gold shipments bolstered their dwindling reserves of official money.

This last point is a reminder that the speedy resolution of panic conditions in 1914, at least as compared to 1907, depended on a four-pronged policy at the local level by clearinghouses and currency associations and at the federal-national level by the Treasury (Jacobson and Tallman forthcoming). In other words, it was far from a “bottom up” monetary policy, which many believe would have prevented the banking crises of the 1930s (most notably Friedman and Schwartz 1963, pp. 171-72). In our view it resembles more closely the preemptive steps taken by the Fed in response to the “Y2k problem” and especially the 9/11 attacks on the World Trade Center (McAndrews and Potter 2002).
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*Boston Globe* (1893, 1907, 1908), various issues.

*Bradstreet’s* (1893, 1907), various issues.


*Chicago Daily Tribune* (1893, 1907, 1908), various issues.


U.S. Congress, Senate (1908a). *Response of the Secretary of the Treasury to Senate Resolution No. 33 of December 12, 1907*. Senate Document No. 208, 60th Congress, 1st session.


*Wall Street Journal* (1893, 1907), various issues.


Figure 2: Weekly Domestic Exchange Rates for Selected Cities, 1893-1907

Note: Domestic exchange rates are measured in dollars per $1000 of New York funds and are expressed as a deviation from a par of 0. Source: *Bradstreet’s* (1893, 1907), various issues.
Figure 3: Daily Domestic Exchange Rates in the Panic of 1893

Source: *New York Times* (1 May to 30 September, 1893)
Figure 4: Daily Domestic Exchange Rates in the Panic of 1907

Source: Wall Street Journal (1 October to 30 December, 1907)
Figure 5: New York Currency Premium and New York Exchange Rate in Chicago during the 1893 Panic

Note: The dotted line graphs the inverse of currency premium; the vertical lines demarcate the suspension period; and the dashed lines denote the currency shipping points.
Source: Chicago Daily Tribune (1 July to 30 September, 1893).
Figure 6: New York Exchange Rate in Boston vs. the Currency Premiums in Boston and New York during the 1893 Panic

Notes: The lines demarcate the suspension period in New York.
Source: Boston Globe (26 July to 12 September, 1893).
Figure 7: New York Exchange Rates in Boston and Chicago and the Currency Premiums in Chicago and New York during the 1907 Panic

Notes: The lines demarcate the suspension period in New York.
Source: Boston Globe and Chicago Daily Tribune (1 October 1907 to 31 January 1908).
Figure 8: Small-denomination Currency Issued by the Los Angeles Clearinghouse

Source: Cannon (1910a), p. 25
Figure 9: Treasury Balances and Percentage Deposited in National Banks, January 1890 through December 1908

Source: Kemmerer (1910), Table 19, pp. 391-93
Figure 10: Monthly Deposits in the Chicago, New Orleans, and San Francisco Subtreasuries, January 1899 through December 1909

Source: Kemmerer (1910), Table 11, pp. 361-63.
Figure 11: Monthly Deposits in the New York Subtreasury for the years 1899 to 1905, 1906, and 1907

Source: Kemmerer (1910), Table 11, pp. 361-63.
<table>
<thead>
<tr>
<th>Event</th>
<th>1893</th>
<th>1907</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panic Onset</td>
<td>May 1</td>
<td>Oct. 21</td>
</tr>
<tr>
<td>Issue of Clearing House Loan Certificates by NYCHA</td>
<td>June 21</td>
<td>Oct. 26</td>
</tr>
<tr>
<td>Aggregate Loan Certificate Issue, NYCH ($ million)</td>
<td>$41.5</td>
<td>$101.1</td>
</tr>
<tr>
<td>Maximum Amount Outstanding ($ million)</td>
<td>$38.3</td>
<td>$88.4</td>
</tr>
<tr>
<td>Bank reserves of NYCH members ($ million)</td>
<td>$95.6</td>
<td>$121.0</td>
</tr>
<tr>
<td>Ratio of Maximum Certificates Issued to Reserves</td>
<td>15.9%</td>
<td>31.7%</td>
</tr>
<tr>
<td>Loan Certificate Issue Nationwide ($ million)</td>
<td>$69.1</td>
<td>$261.1</td>
</tr>
<tr>
<td>Restriction of Cash Payments in NYC</td>
<td>Aug. 3</td>
<td>Oct. 26</td>
</tr>
<tr>
<td>Resumption of Cash Payments in NYC</td>
<td>Sept. 2</td>
<td>Jan. 1</td>
</tr>
</tbody>
</table>

Notes:

1 On 6 May 1893 and 19 October 1907 respectively.
2 Includes large and small denomination loan certificates. Large denomination alone totaled $238.1 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: The Impact of New York Bank Suspensions on Regional Domestic Exchange Markets

#### A. Panic of 1893

<table>
<thead>
<tr>
<th></th>
<th>Descriptive Statistics</th>
<th>Correlation Coefficient$^2$</th>
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<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>“No Trade Days”</td>
<td>Boston</td>
<td>Chicago</td>
<td>St Louis</td>
<td>New Orleans</td>
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<td>Boston</td>
<td>1.678</td>
<td>1.535</td>
<td>3.2%</td>
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<tr>
<td>Chicago</td>
<td>-11.172</td>
<td>8.395</td>
<td>3.2%</td>
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<tr>
<td>St Louis</td>
<td>-4.448</td>
<td>2.728</td>
<td>3.2%</td>
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<tr>
<td>San Francisco</td>
<td>6.683</td>
<td>6.660</td>
<td>9.7% 11.6%</td>
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<tr>
<td>NYC Currency</td>
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<td>10.545</td>
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<tr>
<td>Boston Currency</td>
<td>11.306</td>
<td>9.508</td>
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Note: (number) indicates the sample size.
Table 2: The Impact of New York Bank Suspensions on Regional Domestic Exchange Markets (Cont.)

<table>
<thead>
<tr>
<th>Panel B: Panic of 1907</th>
<th>Descriptive Statistics</th>
<th>Correlation Coefficient</th>
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<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
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<tr>
<td>Boston</td>
<td>0.303</td>
<td>0.848</td>
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<tr>
<td>Chicago</td>
<td>0.630</td>
<td>0.899</td>
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<tr>
<td>St Louis</td>
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<td>St. Paul</td>
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<td>San Francisco</td>
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<td>NYC Currency</td>
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<tr>
<td>Chicago Currency</td>
<td>19.846</td>
<td>9.553</td>
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</tbody>
</table>

1The variable measures the percentage of days during the suspension period when daily newspaper accounts explicitly mentioned no trading or did not report an exchange rate. The second figure below is our estimate of “no trade” days, when we extend the reporting period to include the week before and after the official NYCHA suspension dates.

2The figures in parentheses are the number of observations. Correlation coefficients in bold are statistically significant at the 5 percent confidence level.

Sources: See Figure 2.
Table 3: Proximate Determinants of Clearinghouse Monetary Policies

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Large-denomination Certificates</th>
<th>Circulating Currency</th>
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</thead>
<tbody>
<tr>
<td>Due to banks</td>
<td>0.179*</td>
<td>-0.005</td>
</tr>
<tr>
<td></td>
<td>(7.92)</td>
<td>(-0.27)</td>
</tr>
<tr>
<td>Due from banks</td>
<td>-0.136*</td>
<td>-0.132*</td>
</tr>
<tr>
<td></td>
<td>(-6.74)</td>
<td>(-2.86)</td>
</tr>
<tr>
<td>Individual deposits</td>
<td>0.017</td>
<td>0.128*</td>
</tr>
<tr>
<td></td>
<td>(1.08)</td>
<td>(4.28)</td>
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<tr>
<td>Reserve city</td>
<td>403.28</td>
<td>223.15</td>
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<td></td>
<td>(0.81)</td>
<td>(0.62)</td>
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<tr>
<td>Central reserve city</td>
<td>5864.89*</td>
<td>-806.72</td>
</tr>
<tr>
<td></td>
<td>(3.67)</td>
<td>(-0.62)</td>
</tr>
<tr>
<td>Constant</td>
<td>121.74</td>
<td>25.49</td>
</tr>
<tr>
<td></td>
<td>(0.31)</td>
<td>(0.12)</td>
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<tr>
<td>N</td>
<td>40</td>
<td>39</td>
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<tr>
<td>Adj. R2</td>
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<td>0.760</td>
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<td>Prob&gt;F</td>
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<td>0.000</td>
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*Statistically significant at the 1 percent confidence level.

Sources: Andrew (1908b); U.S. Comptroller of the Currency (1907).