

Birth of the Federal Reserve: Crisis in the Womb

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Abstract

The outbreak of World War I shut the New York Stock Exchange for more than four months. The conventional explanation maintains that the closure prevented a collapse in stock prices that threatened a repetition of the Panic of 1907. This paper shows that the Wilson Administration encouraged the suspension of trading to pave the way for launching the Federal Reserve System, which was in the process of being born. Federal Reserve insiders considered an adequate stock of gold crucial to the success of the new monetary system. Closing the Exchange helped to forestall an outflow of gold. Central bankers can learn how crisis control is supposed to work from the 1914 experience.

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I. Introduction

On July 31, 1914, European investors prepared to liquidate their holdings of U.S. stocks and bonds to transfer gold to Europe to pay for the Great War. America had already lost \$83 million in gold since May 1, 1914, the largest outflow of gold over any consecutive three-month period since 1900.¹ The Wilson administration worried that a stock market crash and increased gold outflow would cause a financial panic and economic collapse similar to 1907.² The crisis called for central bank intervention.³ The problem was that Congressional hearings on President Wilson's nominations to the Federal Reserve Board were still in progress and the regional Federal Reserve banks had not yet been organized.

How did policymakers respond to the crisis? They shut the New York Stock Exchange (NYSE) on July 31, 1914 to prevent a collapse of stock prices and to help stem the gold outflow.⁴ The Exchange remained closed for more than four months, until December 12th, despite the United States not yet being a combatant in the war.⁵ In addition, the Wilson Administration amended the

¹ Source: Annual Reports U.S. Treasury.

² Friedman and Schwartz [1963, p. 158] argue that a \$28.9 million gold outflow from May 1907 through September 1907 set the stage for the panic that began in October 1907.

³ A contemporaneous view of the 1914 crisis is summarized in Noble [1915, pp.13-4] and Sprague [1915]. More recent perspectives appear in Friedman and Schwartz [1963, p.172], Meltzer [2003, p.82], and Sobel [1968, p.327-331].

⁴ The London Stock Exchange closed earlier on July 31, leaving the NYSE especially vulnerable.

⁵ Both the London Stock Exchange and the Paris Bourse suspended normal trading during this period, but, unlike the United States, England and France had already been drawn into the war. The Wall Street Journal [September 28, 1914] indicated that the Bourse remained closed, in part, "because so many exchange members had joined the army." Michie [1999, p.144] makes a similar point when explaining the reasons for London's closing: "Germans were the single most important group of non-British among both members and clerks." Keynes [1915, p. 462] adds that "...the failure of an important firm...who were largely concerned in business with Germany brought home to members of the Stock Exchange the character of the situation." Keynes [p. 461]

Aldrich-Vreeland Act on August 4, 1914 and issued emergency currency to meet the public's demand for cash balances.

Sprague [1915, p. 513], in a follow-up to his classic 1910 study of crises under the National Banking System, applauds the decision to close the Exchange: "If the stock exchange had not closed on Friday, July 31, it is certain that the decline in the price of securities during the day would have been so extreme as to have occasioned numerous failures of brokers and their customers and presumably much loss to the banks as well." Friedman and Schwartz [1963, p.172] accept Sprague's account of the crisis. Chandler, in his celebrated biography of Benjamin Strong⁶ [1958, p.55], extends Sprague's observation: "A general money panic would almost certainly have occurred if the Exchange remained open with falling security prices, widespread calling of loans collateralized by securities, and large foreign sales increasing the burden of foreign payments."

Sprague's contemporary analysis and Chandler's retrospective articulated what could have happened, but my evidence will demonstrate that the threatened stock market crash evaporated before the end of August. My data also undermine Sprague's speculation that stock prices would have collapsed had the New York Stock Exchange been open on July 31st.

also notes that Paris faced a logistics problem: "...the Paris *Parquet* remained...open to a certain extent up to the impending evacuation of Paris by the Government on September 2nd."

⁶ Benjamin Strong became the first Governor of the Federal Reserve Bank of New York in October, 1914. He is considered the most influential member of the Federal Reserve System during its formative years (see Friedman and Schwartz [1963, p.225, 411] and Meltzer [2003, p.193].

Why did the Stock Exchange remain closed for more than four months? I will show that individuals at the Federal Reserve fostered the delay to insure a successful launch of the System. The Federal Reserve Act, signed into law on December 23, 1913, required that gold be held as backing for Federal Reserve Notes. The Fed would not be effective, according to influential insiders, if it were rushed into existence without sufficient gold. Keeping the Exchange closed helped restrain the gold outflow, paving the way for the new currency system.⁷

Why should we care about this episode in monetary history? The Great Depression demonstrated that the existence of a central bank is no guarantee against financial collapse. In August 1914 the Wilson Administration showed how to control a crisis without a central bank. Central bankers can learn from that experience.

Walter Bagehot's classic remedy for crisis control, "to lend freely at high rates," recognizes that crises frequently pose a double threat: a drain of funds from the banking system and capital flight from the country as a whole. Meltzer [2003, Chapter 5] argues that between 1929 and 1933 the Federal Reserve's discretionary policy did not implement Bagehot's strategy properly. In particular Meltzer says [2003, p. 730] the Federal Reserve ignored Bagehot's ultimate advice to the lender of last resort: "do not try to protect the gold reserve."

In 1914 the Wilson Administration could not afford to sacrifice the gold reserve. The United States was in the midst of a major shift in institutional structure that required gold for credibility, the creation of the Federal Reserve

⁷ The regional Federal Reserve banks opened on November 16, almost a month before the re-opening of the New York Stock Exchange.

System. To lend freely President Wilson and Treasury Secretary McAdoo invoked the Aldrich-Vreeland Act. To stem the gold outflow they employed a second policy tool: shutting the New York Stock Exchange. Although an imperfect weapon, closing the Exchange avoided the damage to American financial credibility that would have occurred had the Wilson Administration suspended the convertibility of the dollar into gold.⁸

Once the Treasury Secretary declared a financial crisis under the Aldrich-Vreeland Act, the initiative for issuing emergency currency came from individual banks. In particular, a bank would decide the timing and magnitude of securities to deposit as collateral for additional currency. Thus high-powered money expanded endogenously to meet a shortage of liquidity. According to Sprague [1915, p. 517] this feature of the Aldrich-Vreeland Act accounted for its success: “For the first time since the establishment of the national banking system the banks exercising the powers conferred upon them by the Aldrich Vreeland Act of 1908 were able to issue bank notes freely in coping with a crisis.”

President Wilson and Treasury Secretary McAdoo sacrificed stock market liquidity to insure a smooth transition to the new monetary order. It would be difficult to explain the longest circuit-breaker in American history -- the four month closure of the New York Stock Exchange at the outbreak of World War I -- were it not to facilitate the birth of the Federal Reserve System. Did the Federal Reserve System forget the lessons of 1914 as the United States slid into the Great

⁸ John Maynard Keynes emphasized the importance of gold in establishing financial credibility. He argued that London’s position as the world’s leading financial center would surely be jeopardized if Britain suspended gold payments. He advised the British government during this time period [Memorandum, August 3, 1914]: “...the vital point is that we should not repudiate our external obligations to pay gold until it is physically impossible for us to fulfill them.”

Depression? Milton Friedman and Anna Schwartz say as much in their celebrated monetary history [1963, p.441]: “The Aldrich-Vreeland Act succeeded on the one occasion it was used, the outbreak of World War I. The Federal Reserve System failed in the early 1930s, though...proper use of its powers could have averted the panic. As these powers were used, however, the existence of the System served only to postpone repeatedly the final crisis.”

During the Great Depression the Federal Reserve knew Bagehot’s principle of lending freely, but it did not implement it consistently and automatically. Central bankers have learned much since then but the analysis of 1914 provides a good illustration of how crisis control is supposed to work.

II. Countering the Immediate Threat

Like many crises under the national banking system (see Sprague [1910]), the outbreak of World War I threatened to force banks to suspend the convertibility of deposits into legal tender if they could not meet their customers’ demand for currency. This time it was European investors who would liquidate their dollar denominated securities on the New York Stock Exchange, receive checks drawn on U.S. banks and then demand payment in gold, as was their right under the gold standard. With a fractional reserve system there simply was not enough gold to go around. And without a central bank to supply an alternative reserve asset, bank suspensions would trigger a repeat of the economic contraction that followed the Panic of 1907.

On August 1, 1914 the Wall Street Journal reported a three-pronged defense against the financial threat: “President Wilson has taken strong steps to protect the United States against the tremendous financial and commercial pressure caused by the European war. He practically made up his mind to send one and possibly two nominations for the Federal Reserve Board to the senate before the close of the day... He directed Secretary of the Treasury McAdoo to take all possible steps to insure the financial stability of the nation and he approved the closing of the New York Stock Exchange...McAdoo said: ‘The Aldrich-Vreeland Act, as amended by the Federal Reserve Act, is still in force...currency may be issued under that act... to meet any emergency.’”

Wilson succeeded almost immediately in legislating each part of his crisis management strategy. Of the three components, the relatively obscure Aldrich-Vreeland emergency currency was by far the most important in combating the economic threat. Closing the Exchange merits an assist but the Federal Reserve System arrived after the battle had been won.

II.1 Aldrich-Vreeland Currency

The issuance of emergency currency, originally authorized by the Aldrich-Vreeland Act of 1908 and extended by the Federal Reserve Act until June 30, 1915, was designed precisely to avoid a repetition of the Panic of 1907. The Aldrich-Vreeland Act enabled a bank to convert assets into high-powered money by depositing securities or commercial paper with a local group of banks that had formed a National Currency Association under the Act. The National Currency

Association then applied to the U.S. Treasury on behalf of the bank for emergency national bank notes, with the bank's assets serving as collateral. Thus a National Currency Association functioned like a Clearing House that issued clearing house loan certificates during a crisis.⁹ The key distinction was that emergency currency issued under the Aldrich-Vreeland Act was, by design, indistinguishable from other circulating national bank notes, hence served as a generally acceptable medium of exchange throughout the country, and not just at the local clearing house. Thus a bank that faced a sudden currency withdrawal could create emergency national bank notes to meet the demand.

In August 1914 a number of features of the Act were outdated, especially the provision that the emergency currency could be issued only by banks already having national bank notes outstanding secured by U.S. bonds equal to 40 percent of their capital. Many large banks had no such currency notes outstanding.¹⁰

On Tuesday, August 4th, Congress amended the terms of the Act to expand its scope and magnitude. The New York Times [August 5, 1914] reports: "President Wilson signed the bill amending the Aldrich-Vreeland Emergency Currency Act to provide *a practically unlimited supply* [my italics] of emergency currency. More than \$1,000,000,000 may be added. Under the amended

⁹ See Sprague [1910, p. 45ff] for a discussion of clearing house loan certificates.

¹⁰ The Wall Street Journal [August 5th] reports: "Although a great many banks in New York city have applied for emergency currency, so far the majority have not been able to obtain the notes...[because] they have not the requisite...circulation already outstanding. This applies to the National City Bank among others." This provision of the Act was designed to encourage banks to provide currency under normal, as well as emergency, conditions.

bill...banks will be able to issue currency notes equal to 125 percent of the combined capital and surplus of the banks.”

The Wall Street Journal reported on August 5th and 6th that \$11 million of the emergency currency has actually been issued and that “\$100 million had been shipped to the sub-treasuries in New York, Chicago, St. Louis, Cincinnati, San Francisco, Boston and Philadelphia in order that the needs of the banks may be promptly supplied.” At the peak, on October 24, 1914, banks used \$368.6 million of the emergency currency, representing about ten percent of high powered money.¹¹

Friedman and Schwartz [1963, p. 196] credit Aldrich-Vreeland currency with smothering the crisis that threatened at the outbreak of the Great War: “By the time the Federal Reserve Banks opened for business in the middle of November 1914, the country had recovered from the immediate shock of the declaration of war in Europe, thanks in no small part to the availability of Aldrich-Vreeland emergency currency.” Crises disappear if they fail to get started. Immediate bank access to as much additional high-powered money as they needed nipped the crisis in the bud.¹²

¹¹ See Comptroller of the Currency [1915, p.99]. Friedman and Schwartz [1963, p.801] report a total of \$3.722 billion in high powered money outstanding in October 1914.

¹² The First Annual Report of the Federal Reserve Bank of New York [p. 37, Government Printing Office, Washington D.C. 1916] reported that the New York City national currency association, which issued more than one-third of the total emergency currency, could have issued twice as much emergency currency without hitting the statutory maximum.

II.2 Closing the Stock Market

If Aldrich-Vreeland currency saved the day, why did the New York Stock Exchange have to close? Despite the decline of 8.05 percent on Thursday, July 30th in the New York Stock Exchange's average of 50 stocks, almost no one expected the NYSE to suspend trading on July 31st. On that same morning the front page of the New York Times carried a headline that read: "Bankers Here Confer on War: Closing of Stock Exchange Not Necessary, Meeting at Morgan Offices Decides." The public explanation for the suspension of trading was summarized in the Times the next day (August 1st): "There had been no call for the meeting, and the understanding was that the Exchange would open as usual...but the discovery that the market was loaded down with big selling orders and almost bare of buying orders...alarmed the brokers so much that they hurried upstairs to urge a reconsideration of the decision to remain open."

We know now, thanks to McAdoo's autobiography [1931, p. 290], that at 9:30 on Friday morning, July 31st, J. P. Morgan, Jr. relayed a message to the Governing Board of the New York Stock Exchange from Treasury Secretary McAdoo, suggesting that the NYSE close. According to Henry Noble [1915, pp.11-12], President of the New York Stock Exchange, the Board voted to suspend trading less than fifteen minutes before the scheduled 10am opening bell on that Friday.

Although President Wilson did not legislate the Exchange closing, the Administration obviously did more than just approve it. Moreover, once the Exchange was closed, McAdoo used his influence to keep it shut. As early as

August 2nd, the New York Times wrote: “It would not surprise officials in Washington if Mr. McAdoo used his influence in New York to keep the New York Stock Exchange closed for some time. No direct proposal of this kind may be made but he is expected to show that the Government does not look kindly upon the reopening of the exchange at this time.” Was that because of the ‘clear and present danger of a stock market collapse’ or was it something else?

It must have been something else because the evidence shows:

(1) Stocks probably would not have declined very much had the Exchange remained open on the 31st; (2) Even if the uncertainty justified a ‘circuit breaker’ closure on the 31st, the threat of a market collapse was over by the end of August.

II.2.1 Stock Prices on July 31, 1914

No one has verified the conventional wisdom, published in the August 1st New York Times, and memorialized by Sprague [1915, p. 513], that brokers experienced an overnight build-up of sell orders to be executed on July 31st. The NYSE closed before the opening. However, the Consolidated Stock Exchange¹³, located in New York and trading primarily “odd-lots” of NYSE listed securities opened (as usual) at 9:30 on July 31st, but then closed at 10am when the NYSE voted to close.

Table 1 shows the six stocks that traded during that 30-minute session. Column (1) lists the stock, column (2) lists the July 31 closing price at 10am on

¹³ For the origin of the Consolidated Exchange see Nelson [1907]. Its demise in 1926 is discussed in Sobel [1972].

the Consolidated Exchange and the percentage change from the NYSE close on July 30, and column (3) lists the closing price on the NYSE for July 30 and the percentage change from July 29. All of the stocks showed considerable declines on July 30th. In the abbreviated trading session on the Consolidated Exchange on the 31st, two stocks rose, two remained unchanged and only two declined. Western Union dropped the most – a decline of 4.4 percent.

European investors probably would not have directed their orders to the Consolidated Exchange. Only a few hundred shares of each stock traded during that first half hour. But the information of a substantial overhang of sell orders on the NYSE should have led to lower bids on the Consolidated Exchange while traders waited for the NYSE to open. The transactions prices on the Consolidated Exchange fail to confirm rumors of the overnight build-up of sell orders.

II.2.2 Stock Prices During August and September

Evidence that stock prices were stable accumulated during August and September. I have shown (see Silber [2003]) that prices on New Street, the substitute market that traded NYSE listed stocks in the street, were virtually unchanged during the last few days of August compared with the closing prices on July 30th. During September prices hovered about 2 ½ percent below July 30th. Moreover, I have also shown that even though the popular press blacklisted New Street prices, Henry Noble, President of the NYSE, monitored New Street

quotes. And if Noble knew that stock prices on New Street were stable, so did Secretary McAdoo.

Although European investors would have found it difficult to transact in New Street because of the absence of clearing facilities, transactions prices on New Street would have reflected war related information, including the threat of European liquidation.¹⁴ Thus, the stability of stock prices on New Street suggests that if the NYSE had reopened at the end of August the expected deluge of selling would not have materialized.¹⁵

If stock prices were relatively stable, why did McAdoo use his influence to keep the Exchange shut?¹⁶ Part of the answer is that the Exchange could remain closed without creating investor resentment because an effective substitute source of liquidity had emerged. The public could trade on New Street, which offered liquidity to those who needed it (see Noble [1915, pp. 38]). The clamor to re-open the Exchange came from the brokers,¹⁷ who had lost their livelihood. But to McAdoo that was less important than insuring the successful launch of the safety net of the future – the Federal Reserve. We will see that keeping the Exchange closed helped protect the birth of the new monetary system.

¹⁴ In late October New Street prices declined by about 9 percent compared with July 30 closing prices because of adverse developments in Europe (see Noble [1915, p.43]).

¹⁵ By way of contrast, Michie [1999, p.148] reports that unofficial trading in London confirmed that prices on the London Stock Exchange would have fallen dramatically had London re-opened. London remained closed until January 4, 1915.

¹⁶ On August 27th the Wall Street Journal said: "...intimations have been received from Washington to the effect that the opening of the Exchange would be considered undesirable by the Government officials who realize that...every effort should be made to relieve the strain on the country's monetary system." Recall the New York Times' observation on August 2nd that Mr. McAdoo would use his influence to keep the Exchange closed for some time.

¹⁷ Various stock exchanges, representing their brokerage house constituents, regularly called for a resumption of trading during the period of suspension. Noble[1915, p.34] reports that as early as August 5th, the Baltimore Stock Exchange urged that trading be resumed. The Wall Street Journal [August 17, 1914] reported that the Consolidated Stock Exchange called a Board meeting to consider steps to trade.

II.3 A Split Opening for the Federal Reserve

Treasury Secretary McAdoo knew how important the Federal Reserve System could be in dealing with the crisis. On August 1st, the New York Times reported: “After a conference with the President, [Treasury] Secretary McAdoo expressed the belief that there should be no further serious delay in getting the new reserve bank system fully organized... The international character of the Federal Reserve banks under the new law is broad and flexible in the matter of dealing with gold coin and bullion...”

But McAdoo also knew how much the bankers opposed the new system. He observed [McAdoo, 1931, p.213]: “Bankers fought the Federal Reserve legislation – and every provision of the Federal Reserve Act – with the tireless energy of men fighting a forest fire.”¹⁸ The bankers invoked the crisis of World War I as a delaying tactic. On August 5th the New York Times reported that the general sentiment among bankers was: “...the present is not an auspicious time for the installation of the new banking system.”

To get the System going but to avoid unnecessary pitfalls, McAdoo engineered a split opening. The Board was confirmed on August 7th, only days after President Wilson rushed the last two nominees -- Paul M. Warburg and Frederick A. Delano -- before the Senate for approval. After the swearing-in ceremony on August 10th McAdoo said [New York Times, August 11, 1914]: “We are going to be able to make this System a bulwark against financial

¹⁸ Chandler [pp.32-6] confirms banker opposition to the Federal Reserve Act. This does not imply that bankers were against the establishment of a central bank in the United States. Rather, they were unhappy with this particular version of the legislation.

disaster...These banks could have been organized by the 1st of August, but due to causes over which we had no control the organization was not perfected by that date. The fact that the Board itself has been organized means that the Banks can certainly be organized by the 1st of October, or sooner.”

The Federal Reserve Act conferred the right to set the date for opening the regional Banks on the Secretary of the Treasury (see Meltzer [2003, p.74fn]). McAdoo clearly wanted the banks to open sooner, rather than later. Nevertheless, the twelve Federal Reserve Banks did not open until November 16th. What caused the delay?

III. The Gold Problem

On Sunday night, August 2nd, McAdoo traveled to New York to meet with leading bankers to hear their views about gold.¹⁹ In 1914, gold and foreign exchange were intertwined by the gold standard.

Under the rules of the gold standard, the exchange rate between U.S. dollars and British pounds (Sterling) fluctuated in a narrow range around \$4.8665 per British pound, the mint parity exchange rate determined by the gold content of the dollar and the pound (see Yeager [1966]). The demand for British pounds versus dollars should never, under normal circumstances, force the exchange rate above the mint parity by more than the cost of shipping gold to London. Under those conditions, it would pay to ship gold to satisfy obligations abroad rather than to buy Sterling above the ‘gold export point’.

¹⁹ The New York Times [August 3, 1914] reports McAdoo saying: “I came to New York for a conference with leading bankers about the issuance of national bank currency...and for a discussion of measures for the protection of the gold supply of the country.

Estimates of the gold export point varied with shipping costs and insurance. The Wall Street Journal noted [July 31, 1914]: "...the most experienced operator would never have dreamed that any combination of circumstances could have arisen to drive demand sterling to 4.98, or about ten cents above the ordinary gold export point." Thus the Journal calculated the gold export point at \$4.88 on July 31st, and reports that Sterling sold at \$4.98. On August 5th the Journal quoted Sterling between "6.25 @ 6.75 ... with practically no business done."²⁰

As long as Sterling stayed above the gold export point, the pressure to send gold abroad would continue. The Wall Street Journal noted on July 29th "...the engagement of gold on a large scale for shipment to Paris and London." Only the jump in the real cost of shipping gold, because of war related risks, deterred gold exports.²¹ When the Bank of England established a gold depository in Ottawa, Canada, however, everyone knew the shipping barrier disappeared. The New York Times [August 12th] reported: "Owing to the severe straits into which the war had plunged foreign exchange, the news [about Ottawa] aroused instant opposition among New York financiers."

The disarray in the foreign exchange market hurt business, but what mattered most to bankers was that U.S. obligations were payable either in dollars

²⁰ Sterling had been above the gold export point beginning with July 27th. The Wall Street Journal [July 31, 1914] explains the premium on Sterling as follows: "There was a large short interest in the market when Austria surprised the world by sending her ultimatum to Servia [Serbia], representing those who had sold for future delivery...While there was no immediate necessity for evening up their commitments, the shorts were faced with the possibility that even higher rates would obtain when their obligations fell due." On August 5th the Wall Street Journal continued: "The banks have already sold the exchange against the gold, and unless the metal goes forward...they will be that much 'short' of exchange."

²¹ The Wall Street Journal noted on July 31st that the "increase in the cost of insuring gold shipments had raised the gold export point."

or in gold. Failure to pay gold, if it were demanded, would cause irreparable damage to the credit worthiness of U.S. corporate and municipal securities. Bankers always worried about credit worthiness, but especially in 1914. Back then bankers had placed many of these securities with their European counterparts. The Europeans would surely demand gold rather than dollars under wartime conditions.

Bankers supported the suspension of trading on the New York Stock Exchange and the issuance of Aldrich-Vreeland currency because they both served to conserve gold.²² The New York Times said on August 1st: "...the closing of the Exchange put an additional barrier in the way of gold export, and perhaps it was the only means to that end which was at hand." Closing the Exchange would help prevent gold exports even if every potential European seller were met by a domestic U. S. purchaser to produce stable stock prices. European sellers were likely to present checks for payment to domestic U.S. banks and demand gold, the only universally acceptable medium of exchange.²³ Domestic investors did not represent the same threat to the U.S. gold supply, especially with bank access to Aldrich-Vreeland currency for meeting cash withdrawals.²⁴ The New York Times article emphasizes the connection by

²² Bankers also supported the suspension of trading because they worried about the impairment of the stock exchange collateral backing their brokers' loans. They were safe as long as prices remained officially frozen at the July 30 closing quotes. Stable New Street prices minimized this problem.

²³ Sprague [1915, p. 510] says: "...the disturbing effect of these [stock exchange] sales was almost wholly due to the fact that they were sales by foreign holders rather than [because of] the quantities offered for sale."

²⁴ The availability of Aldrich-Vreeland currency also made up for the illiquidity of brokers' loans (the stock exchange collateral could not be sold). Sprague [1915, p.513] says:" The effects upon banks of locking up part of their assets...proved less serious than was at first anticipated." He

noting: "...an additional measure of protection for our gold supplies [is the] circulation provided under the Aldrich-Vreeland Act...which will supply any local demand for cash without putting it out in a form that could be immediately taken for export."

Note the specificity of the Aldrich-Vreeland Act. It resolved the problem of a domestic shortage of gold because it provided legal tender within the U. S. but it did not satisfy international requirements. How did the bankers prepare to meet foreign obligations? They formed a gold pool.

III.1 The Gold Pool

On August 28th the Federal Reserve Board called a conference at the Treasury Department for the following week to discuss "a solution to the foreign exchange problem." Representatives of Bank Clearing House Associations were invited to attend [New York Times, August 28, 1914] and to bring: "...such data as it is possible to furnish regarding the present United States cash indebtedness to Europe [including] maturing obligations, and vice versa."

Some of the most prominent bankers in the country responded to the invitation. On September 4th, the day of the conference, the New York Times reported: "Messrs. A.H. Wiggin [President of the Chase National bank] and Benjamin Strong, Jr. [President of Bankers Trust Co.]²⁵, who will represent the New York Clearing House, carried with them to Washington data supplied by

goes on to say [p.519]: "Thanks again to the emergency notes ...the banks were able to meet requirements for additional loans occasioned by the crisis."

²⁵ The New York Times says Vice President of Bankers Trust, but Chandler [1958, p.31] notes that "Strong became President of Bankers Trust in January, 1914."

most of the international banking houses showing the amount of money owed in Europe and the amounts of credit available... It was understood in the financial district that [Wiggin and Strong] will propose the formation of a gold pool to provide at least \$200 million in gold for shipment abroad.”

The New York bankers did not disappoint. Wiggin and Strong proposed the gold pool and suggested that “the Reserve Board should name committees at the reserve centers to apportion the balance needed among the Clearing House Banks.” The proposal had an immediate effect on foreign exchange. On September 5th the Wall Street Journal reported: “There is a good deal easier tone to the foreign exchange market...attributed in large measure to the meeting taking place in Washington. Sterling was quoted at \$5.01½, a decline of 2 cents since Thursday and 5 cents since the high this week.”

The Federal Reserve Board appointed a Committee headed by James B. Forgan, president of the First National Bank of Chicago, to implement the gold pool plan. The “Forgan Committee” consisted of Benjamin Strong of New York, L.L. Rue of Philadelphia, S. Wexler of New Orleans, and T. P. Beal of Boston. Despite the wide geographic representation, Benjamin Strong dominated subsequent events. According to the New York Times, on September 10th, Strong, J.P. Morgan, Jr., and Jacob Schiff met with Treasury Secretary McAdoo for 2 ½ hours to discuss the Plan. Later that day the three New York bankers met with the Federal Reserve Board.

As these discussions proceeded, a series of fortuitous developments obviated the pressing need for the gold pool. The Wall Street Journal reported on

September 15th that: “Consummation of the plans to meet the \$100 million of New York City’s maturing securities, \$80 million of which are held in England and France, was the most constructive development that has taken place since the war started...There has been evidence that England, the largest foreign holder of our securities, is not as anxious to liquidate as might be supposed. About 75% of the holders of... Lake Shore one-year notes elected to take new notes...in exchange for maturing securities. One of the bankers in charge of that financing said: ‘When they know they can get their money, they are not so eager to have it.’”

The success at rolling over maturing obligations held abroad should have put the gold pool to rest. It also should have advanced the timetable for a resumption of trading on the NYSE. It did neither.²⁶ Foreign exchange remained above the gold export point and that posed a danger, especially to Benjamin Strong, Jr, who was about to become a central banker.

IV. Benjamin Strong, Central Banker

On October 5th, Benjamin Strong, Jr., President of Bankers Trust, was elected Governor of the Federal Reserve Bank of New York. Strong had refused the offer to become Governor of the New York Fed as recently as August 27th (see Chandler [1958, p.38]). He reversed his decision after Henry Davison (J. P. Morgan & Co.) and Paul M. Warburg, who had become a member of the Federal

²⁶ The Wall Street Journal reported on September 14th that the success of the New York City note sale led the ‘Forgan Committee’ to reduce the size of the proposed gold pool to \$100 million.

Reserve Board, spent a weekend convincing him of his public duty to accept [Chandler p.39].

None of the Federal Reserve Banks were open for business when Strong became the chief executive officer of the New York Bank. McAdoo, who had committed to opening the individual Banks before October 1st, had been preoccupied with a series of internal squabbles within the Board, ranging in substance from a philosophical dispute about the relationship between the Board and the Treasury to questions concerning appropriate quarters for Board members [McAdoo 1931, pp. 285-6]. Once Strong assumed his position in New York, McAdoo faced the most formidable obstacle to opening the banks.

As a private banker, Strong had taken an active roll in the formation of the gold pool because he believed that only gold could insure U.S. credit worthiness in Europe [Chandler, p.58]. As a central banker, Strong believed that the Federal Reserve Banks should hold far more gold than required by law. Chandler [p.83] quotes Strong as saying: “We need an immense safety factor beyond the legal minimum and it is for this reason that I have been so urgent about accumulating gold.”²⁷ Strong also wanted to make the dollar “an international currency by [creating] confidence in the redeemability of dollars in gold at all times [Chandler, p.84].”

²⁷ The Federal Reserve Act required that the System hold gold reserves of 40 percent against its liabilities of Federal Reserve Notes. According to Friedman and Schwartz [1963, pp194-5]: “Since the Federal Reserve was required to keep a gold reserve of 35 percent of its deposits [reserves of member banks], it could use any excess over that amount [the 35 percent]... to meet the 40 percent requirement for notes.” Strong recognized that to provide for an ‘elastic currency’ to meet the needs of commerce and to avoid panics, the System needed excess gold reserves.

As long as Sterling remained above the gold export point, Strong worried that the stock of gold in the U.S. would ebb towards Europe. On October 10th he wrote to Paul Warburg: “If the Federal Reserve Banks refuse to pay gold they will be discredited at the outset, and gold will certainly be demanded of them if they expand their note issues when gold will be at a premium...the premium as reflected in the price of sterling [Chandler, p.61].” Figure 1 plots Sterling exchange rates collected from the Wall Street Journal between July 15, 1914 and December 31, 1914.²⁸ On October 1st, Sterling sold at \$4.965 and on October 15th it stood at \$4.975, both well above the gold export point, which was now \$4.90.²⁹ The Wall Street Journal reported almost daily shipments of gold to Canada during October.³⁰

McAdoo had the legislative authority to open the banks, but Strong’s misgivings surely restrained him. The two had met numerous times after McAdoo’s August 2nd trip to New York,³¹ and Strong was not shy about articulating his views.³² McAdoo had also received a communication at the end of

²⁸ Figure 1 plots the exchange rate for ‘demand Sterling’ (rather than for cable transfers). According to Sprague [1915, p. 500]: “Demand sterling [was] the most significant single exchange rate.” Ask prices for demand Sterling are used in the figure since there were fewest gaps in the data on ask quotes during this time period. The exchange rate for each date in the table comes from the Wall Street Journal of the following day.

²⁹ On October 27th the Wall Street Journal wrote: “[a] decline in exchange below \$4.90...shuts off gold exports. This was the gold export point since the bank of England established the gold depository in Ottawa.”

³⁰ The Wall Street Journal recorded the following gold shipments to Canada during October. On the 7th: \$523,000; 8th: \$450,000; 14th: \$645,000; 15th: \$845,000; 17th: \$1,510,000; 20th: \$489,000; 27th: \$855,000; 29th: \$760,000; 30th: \$340,000.

³¹ In addition to the August 2nd meeting mentioned earlier, the New York Times lists Strong at the following meetings with McAdoo: The August 13th conference to promote U.S wheat exports, the September 4th conference on establishing the gold pool, the 2 ½ hour meeting on September 10th, along with J.P. Morgan, Jr., and Jacob Schiff, to implement the gold pool, and a September 18th meeting, along with Forgan, Wiggin and Rule, to modify the size of the gold pool.

³² Chandler [p.3] summarizes the reasons for Strong’s influence: “The strength of his personality and the force of his persuasion extended far beyond the Federal Reserve Bank of New York

August from Paul Warburg making a similar point:³³ “[W]e could not think of opening now unless the [Federal Reserve Act] were radically changed in some respects. If the bank opened under the present law it would have capital of about \$19,000,000 and deposits of about \$250,000,000. Under present circumstances a very large portion of these deposits would be paid in the form of rediscounts, so that one might expect that the actual gold held in the aggregate by the new banks would amount to about \$150,000,000...Past and present experience shows conclusively that a gold reserve of \$250,000,000 is not sufficient to safeguard the immense financial structure of currency and bank credits of the United States.”

Warburg’s observation made considerable sense. Commercial banks would not want to pay their obligations to the Federal Reserve Banks in gold if the exchange rate between the dollar and the Pound were above the gold export point. Gold would be more profitably used to make foreign exchange payments rather than to satisfy a bank’s obligations to the Federal Reserve System.³⁴

Unlike central bankers Warburg and Strong, many commercial bankers, especially in the West and South, wanted the Federal Reserve Banks to open quickly to facilitate crop movements. During the last half of September, the Federal Reserve Board received a petition from banks in Richmond, Virginia, a telegram from the National Currency Association of Georgia, a telegram from the

through the other eleven Reserve Banks, the Federal Reserve Board, [and] the United States Treasury...”

³³ Letter from Warburg to McAdoo, August 27, 1914, Papers of William G. McAdoo, Library of Congress. Also see Meltzer [2003, p.74, fn 20]

³⁴ Banks could pay their reserves to the Federal Reserve in lawful money, which included Greenbacks and silver certificates, as well as gold. In addition, half of their reserves could be paid in rediscounted commercial paper See Willis [1915, p.158]

Governor of Florida and a telegram from the Texas Legislature all urging a quick opening date for the Federal Reserve banks.³⁵ The resolution passed by the Texas Legislature sums up the argument best: “Whereas...Texas will produce four million bales of cotton...Whereas approximately 95 percent of the Texas crop is annually shipped and used beyond the limits of the state, and there is now no appreciable export demand...Whereas the effect of these conditions is to seriously threaten the cotton growers...Resolved...the Legislature of the State of Texas...urge[s] you to expedite as much as may be possible the establishment of the Regional Reserve Banks to be organized under the provisions of the Federal Reserve Act.”

McAdoo confirms that the main pressure to delay the opening came from within the Federal Reserve System. He says [1931, p.288]: “I talked in October with the governors and chairman of most of the Federal Reserve Banks and nearly all of them thought that the necessary preparations [for opening the banks] would take considerable time.” Most of the Reserve Banks wanted time to arrange for offices, vault space and staff for running a bank. After all, the Federal Reserve Banks were real banks.³⁶

Despite these objections, McAdoo felt that “the delay could not be justified.” On October 25th he announced that all Reserve Banks would open on

³⁵ A total of 22 letters were received by the Board in favor of a quick opening of the Reserve Banks. These communications are stored in: Board of Governors, Central Subject File, 1913-1954, Box 659, National Archives, College Park, Maryland. Also see Meltzer [2003, p.74, fn. 20].

³⁶ In a conference of Federal Reserve Bank Directors held at the Treasury on October 20 1914, the participants voted 37 to 35 to open on November 30, rather than November 16, to provide extra preparation time. Representatives of the Federal Reserve Banks of New York, San Francisco, and Minneapolis suggested opening after January 1, 1915 (see the transcript of the conference in Box 293, Board of Governors, Central Subject File, 1913-1954, National Archives, College Park, Maryland).

November 16th. McAdoo quotes President Wilson [New York Times, October 27th] as giving the best reason for avoiding further delay: "...an effort to protect the [Federal Reserve] System against the strains of the emergency which it is designed to relieve is to cast doubt on the system itself."

McAdoo [p.289] singles out the "representative of the Federal Reserve Bank of New York (FRBNY)," in an almost comical interchange, as trying to overturn the decision:

FRBNY: "...the bank has no vault or safe place for keeping...gold"

McAdoo: "There is a sub-Treasury in New York...[use] its vault."

FRBNY: "Our bookkeeping system is not...ready for the printing of forms."

McAdoo: "Surely you can have enough printing done by November 16..."

FRBNY: "We can't get our office furniture by that time."

McAdoo: "Buy a few chairs and pine-top tables."

The November 16th date set by McAdoo held firm despite the delaying tactics of the Federal Reserve Bank of New York and its chief executive officer, Benjamin Strong, Jr. Chandler [p.61] emphasizes that Strong did not want to derail the system, as some of his fellow bankers tried to do. Strong sought the delay because "the System might be jeopardized if the Reserve banks were subjected to heavy demands when they were...weak in resources." The communication from Warburg to McAdoo mentioned above legitimizes Strong's concern about the System's shortage of gold. Chandler [p.65] also supports at least one additional resource shortage in New York: "the newly formed bank did, in fact, use the vaults of the New York sub-treasury."

V. McAdoo's Insurance Policy

Why didn't McAdoo set a date for opening the NYSE, just as he had done for the Reserve Banks? The simplest answer is that he had stuck his neck out on August 11th by promising to open the Federal Reserve Banks on or before October 1st. He had never said anything publicly about the Exchange, except to approve its closure on August 1st. Also, contrary to the Federal Reserve Banks, he did not have the legislative responsibility to open the NYSE. On the other hand, McAdoo surely could have used the same influence to open the Exchange as he had used to close it,³⁷ unless he really wanted the NYSE to remain shut.

McAdoo kept the NYSE closed as his insurance policy. He worried about the fundamental risks of shifting to a new monetary regime. In his autobiography, McAdoo says [p.278]: "The entire scheme was novel and untried. We were dealing with experimental formulas, with principles that had existed only in theory and which were to be put to the most practical of tests." Chandler [p.15] emphasizes the risks by noting: "So severe were the financial strains that many questioned the wisdom of opening the Reserve Banks in November." McAdoo's concern as a prudent policymaker, combined with the arguments by Strong and Warburg about gold, prevented him from doing too much too soon. He opened the Reserve Banks because he (and Wilson) felt they would help solve the crisis that began on August 1st. He kept the Exchange closed because he thought the

³⁷ Numerous references to Washington's influence appeared in the press, beginning with the New York Times quote of Wilson's approval of the closing on August 1st to a Wall Street Journal article on November 16th saying: "Despite Washington's belief in the desirability of keeping the exchanges closed, bankers ... have now entered seriously upon the consideration of ways and means to [open the Exchange]."

financial strains were not completely gone. On November 7th the Wall Street Journal quotes McAdoo as saying: “The chief thing that is needed [to re-open the Exchange] is a restoration of international confidence. This is, in my opinion, *almost* [my italics] an accomplished fact.” ‘Almost’ was just not good enough while the Federal Reserve System was being launched.

McAdoo announced the November 16th opening for the individual Reserve Banks on Sunday, October 25th. Figure 1 shows Sterling trading above the \$4.90 gold export point throughout the month, except for a temporary decline to \$4.890 on the day after McAdoo’s announcement.³⁸ The Wall Street Journal continued to report gold exports to Canada (see footnote 30). Stock prices on New Street had fallen about 9 percent below July 30 closing prices as a result of war related developments (see Noble [1915, p.43]). Under those circumstances, the NYSE might easily have served as a teller’s window (see Noble [p. 65]) for European access to our gold. Keeping the Exchange closed helped mollify Strong and sheltered the birth of the Federal Reserve System.

³⁸ Did the announcement of the opening of the Federal Reserve Banks cause the drop in Sterling? The return on the dollar-pound exchange rate on October 26 is significantly different from zero at the five percent level, based on daily exchange rate data from August through December 1914. Although the announcement by McAdoo could have been responsible for the significant movement that day, market commentators pointed to another news release on the 26th when explaining the significant drop in Sterling. The front page of the New York Times [October 27, 1914] reported an article with the following headline: “England Opens Seas to Cotton: Exchange Rate drops on Heavy Discounting of Bills. The article explains that the British Ambassador to the United States delivered a note to the State Department on the 26th saying that American cotton would not be treated as contraband and would have freedom of the seas as far as Britain was concerned. Cotton had been piling up in America since the war began because of the difficulty of arranging for shipping. The Times article explains in greater detail: “Bills drawn against exports of cotton appeared in the foreign exchange market yesterday and were of first importance, according to exchange brokers in bringing about another abrupt fall of rates.” No mention of McAdoo’s announcement opening the Reserve Banks appeared in the New York Times or the Wall Street Journal in connection with foreign exchange. The emphasis on exports of American goods in explaining improvements in foreign exchange is consistent with Willis [1915, p.153] who cites: “The gradual restoration of exports and the growth of a balance [of trade] in favor of the United States” as the main reason for the drop in the exchange rate of the Pound versus the dollar during this period.

V.1 The Risks Abate

The middle of November brought a much kinder environment for a resumption of NYSE trading. The New York Times [November 13th] heralded a bullish stock market by publishing, for the first time, a list of prices for 27 stocks trading on New Street. The most encouraging development, however, came from foreign exchange. The Wall Street Journal [November 13th] reported: “The foreign exchange market broke sensationally at one time to...\$4.87½ for cable transfers, well within the present gold export basis, which is usually considered to be \$4.90 The present level of exchange is the lowest point the market has touched since before the declaration of war, and marks the restoration of normal conditions.” Figure 1 shows Sterling declining below the gold export point on November 11th and remaining below it through the end of the year.

Henry Noble [1915, p. 74], President of the NYSE, describes a series of favorable meetings during mid-November with George Paish and Basil Blackett, representatives of the U.K. government discussing foreign exchange with Washington. They encouraged the re-opening of the Exchange at that time.

The improved conditions cast doubt on a press report of November 16th saying that the government preferred to continue the suspension of trading on the NYSE. It turns out that the reported objection was erroneous. Noble [p.79] says that his Committee set Monday, November 23rd, as the date for restoring limited bond trading to the Exchange floor. He then notes: “On Thursday (the 18th) a well meaning but misguided go-between reported that he had communicated with Washington...and [they] expressed a desire to see some

member of the [stock Exchange] Committee before any further steps were taken [to open the Exchange].” Noble reports [p. 80] that he contacted the ‘Government official’ and received a telegram explaining “that the suggestion of an interview had in no way emanated from him.”

Bond trading on the NYSE floor resumed on Saturday November 28th. Noble [p.82] says that the success with bonds encouraged the Exchange Committee to formulate a plan for “carrying the reopening a step further.’ On December 12th, stocks that were “not international in character” (see Noble [p.83]) were brought to the Exchange floor and on December 15th, all stocks were admitted for trading.

VI. Was the Federal Reserve Opening Successful?

Did the Federal Reserve Banks get the gold they needed when they finally opened on November 16? According to Paul Warburg the Federal Reserve needed all the gold it could get. He had written:³⁹ “The United States is rich in gold. The entire gold holding of the United States, taking the holdings of all banks, the free Treasury balance and gold in circulation is estimated to amount to upwards of \$1,500,000,000. It is apparent how insufficient is a system which assembles only \$250,000,000 of this gold and leaves about \$1,250,000,000 free as an absolutely useless wasted asset of the nation.”

Benjamin Strong worried about whether the Banks would get what they expected. On November 2, he wrote in a memo to Paish and Blackett, on behalf

³⁹ Letter from Warburg to McAdoo, August 27, 1914, Papers of William G. McAdoo, Library of Congress..

of a committee of New York bankers:⁴⁰ “It must be born in mind that there is no certainty as to the amount of gold which will be paid into the Federal Reserve Bank [of New York] at the commencement of its operation.” Earlier, Warburg had asked the Treasury for help. He had written to McAdoo:⁴¹ “It would be very helpful to know how much gold from the Treasury the Federal Reserve can count on.” There is no record of any answer by McAdoo.

The consolidated balance sheet of the Federal Reserve Banks on November 20, 1914 shows that more than 80 percent of the \$245 million of paid-in-capital and reserves consisted of gold and gold certificates [see Willis, 1915, p.159]. This is an impressive percentage considering that banks could have paid half of their reserves by rediscounting commercial paper and could have tendered an unlimited amount of other forms of lawful money (e.g. Greenbacks). Willis [1915, p. 158] says that the Federal Reserve’s success came from a plea by the Reserve Banks for member banks to make their reserve payments in gold. As a special inducement, the Reserve Banks agreed to pay the express charges for shipments of gold.

The Federal Reserve’s incentive plan worked but that does not mean that Warburg and Strong were wrong to worry about a shortage of gold in the System. Had the Banks opened earlier, when Sterling (and gold) was at a premium,

⁴⁰ The committee consisted of Benjamin Strong, Albert Wiggin of the Chase National Bank and James Brown of Brown Brothers. Bankers who had met with Paish and Blackett at a Treasury conference on October 23 designated these three to present an analysis of the current financial situation (see the memo dated November 2, 1914, Board of Governors, Central Subject File, 1913-1954, Box 1470, National Archives, College Park, Maryland).

⁴¹ The letter, written on October 13, 1914 by Warburg and W.P.G. Harding (another member of the Federal Reserve Board) to McAdoo, is in Box 659, Central Subject File, Board of Governors, 1913-1954, National Archives, College Park Maryland. There is no record of any answer in Box 659 or in McAdoo’s Papers, Library of Congress.

member banks would have had the economic incentive to ignore the Federal Reserve's preference for gold.⁴² Figure 1 shows the Pound dipping below the gold export point on November 11 and plunging even further the following day. By November 16, when the member banks had to make their reserve payments to the Federal Reserve Banks, the incentive to hoard gold had dissipated. The decline of the Pound below the export point allowed banks to comply with the Federal Reserve's plea for gold and to receive compensation in the form of zero express charges.

VII. Conclusion

The outbreak of World War I threatened to repeat the conditions that led to the Panic of 1907. Most of the credit for averting the crisis belongs to the Wilson Administration's immediate declaration of an emergency under the Aldrich-Vreeland Act. This allowed banks to issue emergency currency as needed to meet demands for cash.

According to Benjamin Strong, private banker and central banker, the export of gold to Europe jeopardized the birth of the Federal Reserve System. Treasury Secretary McAdoo responded to the danger by encouraging the suspension of trading on the NYSE for more than four months to minimize the outflow of gold and to smooth the way for the new monetary system. On August 28, 1914, the Wall Street Journal got it almost right when it said: "To put it

⁴² Recall Warburg's letter of August 27 cited above: "If the bank opened under the present law it would have capital of about \$19,000,000 and deposits of about \$250,000,000. Under present circumstances a very large portion of these deposits would be paid in the form of rediscounts, so that one might expect that the actual gold held in the aggregate by the new banks would amount to about \$150,000,000. "

frankly, the bankers closed the Stock Exchange and the bankers will reopen it, after wise counsel with the Federal Reserve Board.”

Was the delay in opening the Reserve Banks really necessary to protect the System? The following contemporaneous comment from Sprague sums it up best [1914, p. 185]: “It is probably fortunate, however, that the new banks did not begin business as originally expected, in June or July. While they might have been helpful, it is unlikely they would have been able to maintain the normal course of banking operations. Partial failure might have lessened the confidence in the new system, and such confidence, it hardly need be said, is absolutely indispensable if it is to perform the functions for which it has been designed.”

References

- Bagehot, Walter, 1873, *Lombard Street: A Description of the Money Market*, reprinted with a forward by Peter Bernstein, John Wiley & Sons, New York, 1999.
- Chandler, Lester V., 1958, *Benjamin Strong, Central Banker*, Washington, D.C., The Brookings Institution
- Comptroller of the Currency, 1915, *Annual Report*, U.S. Department of the Treasury, Washington, D.C.
- Friedman, Milton, and Anna Jacobson Schwartz, 1963, *A Monetary History of the United States*, Princeton, Princeton University Press.
- Keynes, John Maynard, 1915, "War and the Financial System, August 1914," *Economic Journal*, Volume 24, No. 95, pp. 460-486.
- McAdoo, William Gibbs, 1931, *Crowded Years*, Boston, New York, Houghton Mifflin company.
- Michie, Ranald C., 1999, *The London Stock Exchange: A History*, Oxford, Oxford University Press.
- Meltzer, Allan H., 2003, *A History of the Federal Reserve, Volume I, 1913-1951*, Chicago, University of Chicago Press
- Nelson, Samuel Armstrong, 1907, *The Consolidated Stock Exchange of New York*, New York, The A. B. Benesch Co.
- New York Times, 1914, 1915, Various Issues.
- Noble, Henry George Stebbins, 1915, *The New York Stock Exchange in the Crisis of 1914*, Garden City, N. Y., The Country Life Press.
- Silber, William L. 2003, "What Happened to Liquidity When World War I Shut the NYSE?" NYU Salomon Center Working Paper No. S-03-13.
- Sobel, Robert, 1968, *Panic on Wall Street; a History of America's Financial Disasters*, New York, Macmillan.
- _____, 1972, *Amex: A History of the American Stock Exchange, 1921-1971*, New York, Weybright and Talley.

Sprague, Oliver Mitchell Wentworth, 1910, *History of Crises Under the National Banking System*, Washington, D.C., Government Printing Office.

_____, 1914, "The War and the Financial Situation in the United States," *Quarterly Journal of Economics*, Volume 29, No. 1, pp.181-186.

_____, 1915, "The Crisis of 1914 in the United States," *American Economic Review*, Volume 5, No. 3, pp. 499-513.

Wall Street Journal, 1914, 1915, Various Issues.

Willis, H. Parker, 1915, "American Finance and the European War," *Journal of Political Economy*, Volume 23, No. 2.

Yeager, Leland B. 1966, *International Monetary Relations: Theory History, and Policy*, Harper & Row, New York.

Table 1: Selected Closing Prices for Stocks on July 31, 1914 and July 30, 1914

(1) Stock	July 31 Close	(2) Percent Change	July 30 Close	(3) Percent Change
American Smelting	52 1/2	-	52 1/2	-13.0%
Chicago, Milwaukee & St. Paul	87	+2.1%	85 1/4	-7.8%
Reading Railroad	141	+ .7%	140	-9.2%
Union Pacific	113 1/2	-	113 1/2	-5.4%
U.S. Steel	51 1/8	-1.4%	51 7/8	-8.6%
Western Union	51	-4.4%	53 3/8	-6.2%

Source: New York Times, August 1, 1914

Figure 1: Sterling Closing Ask Prices (1914)



Source: Wall Street Journal, July 15, 1914 through December 31, 1914