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The National Banking System: Empirical Observations

by Bruce Champ

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This paper provides a summary of the main features of U.S. financial and banking data during the period of the National Banking System (1863–1914). The purpose of the paper is to provide an overview of the stylized facts associated with the era, with an emphasis on those impinging on national bank behavior. The paper takes a detailed look at key elements of national bank balance sheets over time, over the seasons, and during panic periods. The interesting and puzzling patterns of interest rate movements during the era also are examined. The paper introduces a new set of disaggregated data on the national bank era that has not been examined by prior research. As data are presented in the paper, some of the key puzzles associated with the era are introduced.

This paper represents a preliminary chapter from a forthcoming monograph on the period of the National Banking System. Other chapters of the monograph appear in the Federal Reserve Bank of Cleveland's working paper series as working paper 07-22R and working paper 07-23R.

Key words: bank notes, interest rates, National Banking System, national banks

JEL codes: E42, E43, G21, N21

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Chapter 2

Empirical Observations

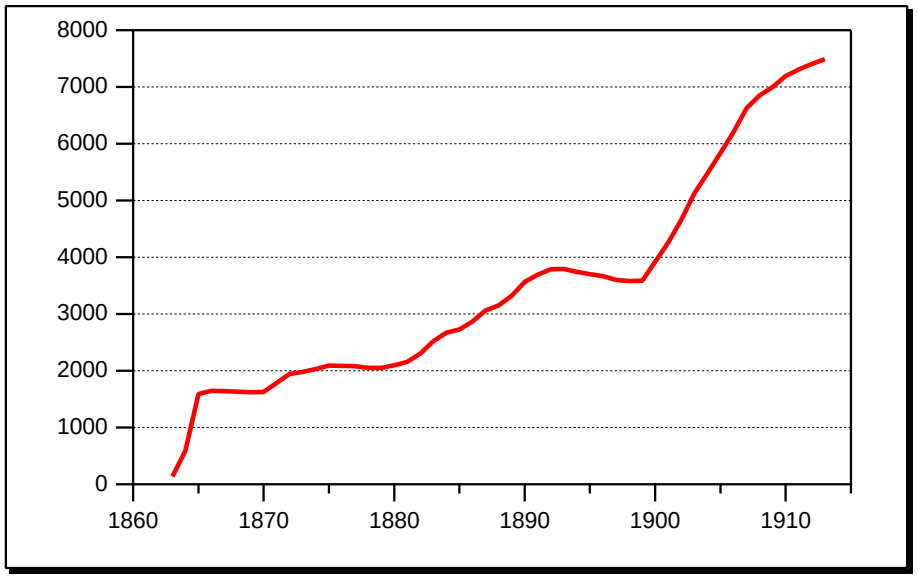
This chapter provides an introduction to the main features observed in the U.S. financial and banking data during the period of the National Banking System (1863–1914).[1] The emphasis of this chapter is to provide an overview of the main stylized facts associated with this era. In the chapter, I point to interesting puzzles associated with the data from this period. The conclusion of the chapter succinctly describes the questions the data bring to focus. Subsequent chapters examine certain features of the data in much greater detail.

2.1 Number of National Banks

The early years of the National Banking System witnessed rapid growth in newly-chartered national banks. Figure 2.1 displays the number of national banks in operation at the end of each year during the National Banking System era. The number of national bank charters during the first few years of the system was remarkable. By the end of 1865, nearly 1,600 national banks had been chartered with total assets of nearly $1.5 billion.

[1] Chapter revised December 19, 2010.

Figure 2.1: Number of National Banks, 1863–1913 (end of year)



Source: *Annual Report* of the Comptroller of the Currency (various years).

2.1.1 Conversion of state bank charters

A primary purpose of the National Banking Acts was to provide a uniform currency. The prior period in U.S. banking history—the state banking era (1836–1863, also known as the free banking era)—was one in which state-chartered banks issued a large number of heterogeneous notes of varying quality and value. These notes often traded at discounts at locations outside the point of issue. It was hoped that the National Banking System would lead to the elimination of this confusing plethora of state bank notes and to the conversion of state banks to national bank charters. In terms of the establishment of a uniform currency, the National Banking Acts were a success, with the help of the passage of a 10% tax on state bank notes in 1865. The National Banking Acts required that all national banks accept the notes of other national banks at par, so the discounting of notes was eliminated during the

national banking era. Beginning in 1874, an efficient means of at-par note redemption facilitated this process.

There were straightforward rules and requirements for obtaining a national bank charter.[2] Initially, there was an expectation that most state banks would seek such charters. But the national banking era never led to the disappearance of state banks. In fact, in the last quarter of the nineteenth century, state banks flourished.

At the outset, it appeared that state banks would choose national bank status. In fact, many of the early national banks were conversions of state banks. Of the 902 state banks that converted to national banks over the entire period, 851 did so by the end of 1865.[3] Many attribute the large number of state bank conversions in 1865 to the 10% tax on state bank notes passed in that year.[4] Although the tax did not actually go into effect until 1866, many state banks may have converted to national bank charters prior to that year in anticipation of the tax. In 1865 alone, over 1,000 national banks were organized, the largest number of newly-chartered banks in any year during the period, and 617 of these were previously state-chartered banks. Table 2.1 details the number of state banks that obtained national bank charters in 1863 through 1866 and later.

After 1865, the conversion of state banks to national bank status slowed markedly. As noted by Friedman and Schwartz (1963, p. 19), "By 1867, the decline in the deposits of state and private banks had ceased. These banks then expanded so rapidly that by 1871 the deposits of non national commercial banks equaled national bank deposits."

[2]The requirements for a national bank charter included meeting minimum capital requirements and minimum holdings of eligible U.S. government securities. See Section 1.3 of Chapter 1 for more details.

[3]I thank Warren E. Weber for information on the dates existing state banks adopted national bank charters.

[4]For a discussion of the 10% percent tax imposed on state bank notes, see Section 1.4 of Chapter 1.

Table 2.1: Number of State Banks Acquiring National Bank Charters by Years

Year	Number of Conversions
1863	18
1864	216
1865	617
1866	18
1867–1913	38

Source: Data gathered by Warren E. Weber.

2.1.2 National bank formation

From Figure 2.1, we can identify five distinguishable periods of national bank formation. The first is the initial period after the establishment of the National Banking System in which there was rapid formation of national banks. Beginning in 1866, national bank formation slowed markedly through 1879. This was followed by a period of moderate expansion during the 1880s and early 1890s. The last part of the 1890s was another period of slow growth. Combined with closings of national banks, the end-of-year number of national banks actually fell from 1894 through 1898. Changes in the laws in 1900 made national bank operations more profitable, and charters expanded rapidly again through the end of the National Banking System period in 1913.

Table 2.2 details the average number of national banks chartered, broken down by these five periods. It is interesting to note that, although contemporary and modern scholars (for example, Cagan 1963, 1965) have discussed the decline in profitability of national bank operations during the 1880s, national banks continued to be chartered at a fair rate.

Table 2.2: National Banks Organized

Year	Average Number Organized per Year
1863–1865	534
1866–1879	60
1880–1893	178
1894–1899	50
1900–1913	373

Source: Annual Report of Comptroller of the Currency (various years).

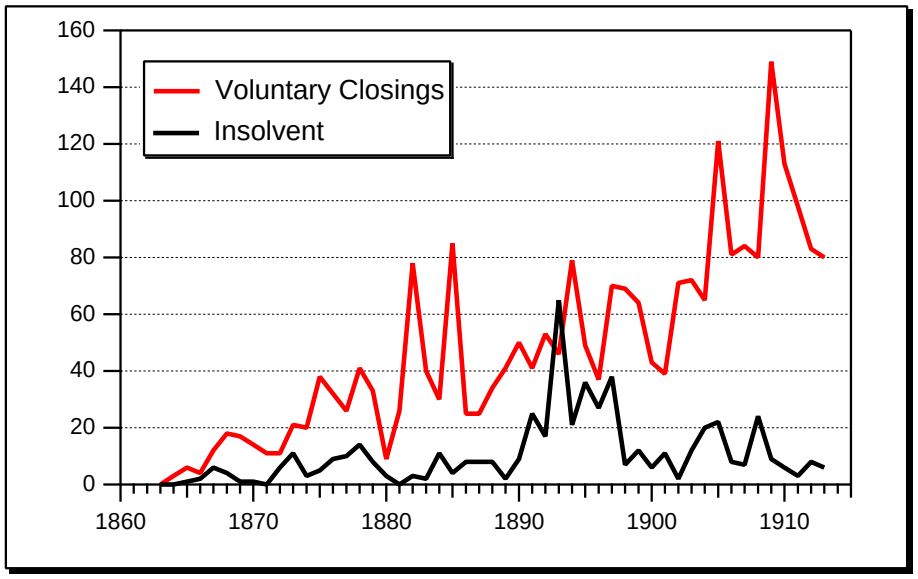
2.1.3 Closings of national banks

The National Banking System was successful by many measures. Although the period witnessed recurrent widespread banking panics, the number of national bank closings during panic periods was not spectacular and losses to depositors and noteholders were minimal.[5] PUT IN A REFERENCE TO SPRAGUE OR KEMMERER???

Figure 2.2 details closings of national banks by year, broken down by whether they were voluntary liquidations or involuntary closings due to insolvency. With the exception of 1893, the major panic years of 1873, 1884, 1893, and 1907 are difficult to pick out by examining the number of bank closings due to insolvency (bank failures). The national bank closing rate over the entire period averaged 1.6% per year (1.3% due to voluntary closings and 0.3% due to insolvency). To put these numbers in perspective, national bank failure rates during the national banking era exceeded those observed for FDIC-insured institutions from 1941 to 1981 (which averaged 0.03%), but are far less than those observed among FDIC-insured institutions from 1982 to 1993 (0.9%). In contrast, the failure rate for savings and loan institutions peaked at

[5]See Williamson (1989a,b).

Figure 2.2: Number of National Bank Closings, 1863–1913



Source: Annual Report of Comptroller of the Currency (various years).

over 10% in 1989.

Table 2.3 compares the closing rates of national banks during panic years to those associated with non-panic years. Only during the panic year of 1893 was the closing

Table 2.3: National Bank Closing Rates During Panics

Year	Voluntary Closings (%)	Insolvent (%)	Total (%)
1873	1.1	0.6	1.6
1884	1.1	0.4	1.5
1893	1.2	1.7	2.9
1907	1.3	0.1	1.4
Non-Panic Years	1.3	0.3	1.6

Source: Annual Report of Comptroller of the Currency (various years).

rate due to insolvency in excess of the average for non-panic years. Of particular interest is 1907, often noted as the most debilitating panic of the entire period of the National Banking System. The insolvency rate during 1907 actually was less than the typical rate during the era. Clearly, panics did not take a major toll in terms of failures of national banks. However, the fact that national banks had failure rates in excess of those observed during modern, normal times, points to some potential flaws in the banking laws of the period.

2.2 National Bank Holdings of Eligible Securities

National bank notes were fully collateralized by holdings of eligible U.S. government securities. In the event a national bank refused to redeem its notes or if a bank failed, the Treasury was authorized to sell the bonds held as backing and pay off noteholders. Prior to March 14, 1900, national banks could issue notes up to 90% of the par or market value, whichever was lower, of eligible bonds deposited with the U.S. Treasury. After that date, the percentage became 100%. During this period, eligible bonds almost always sold above par so that the par valuation constraint was typically binding.

I refer to the limits on national bank note issue implied by the requirement that notes be backed by eligible government securities as the "collateral constraint." After 1875, the collateral constraint was the most important constraint determining maximum national bank note circulation.[6] An individual bank could only issue notes up to 90% (100% after March 1900) of its amount of paid-in capital, but since this was a choice variable, this regulation did not effectively limit a bank's note issue in the long run.[7] Furthermore, since most banks issued notes up to only a fraction of their

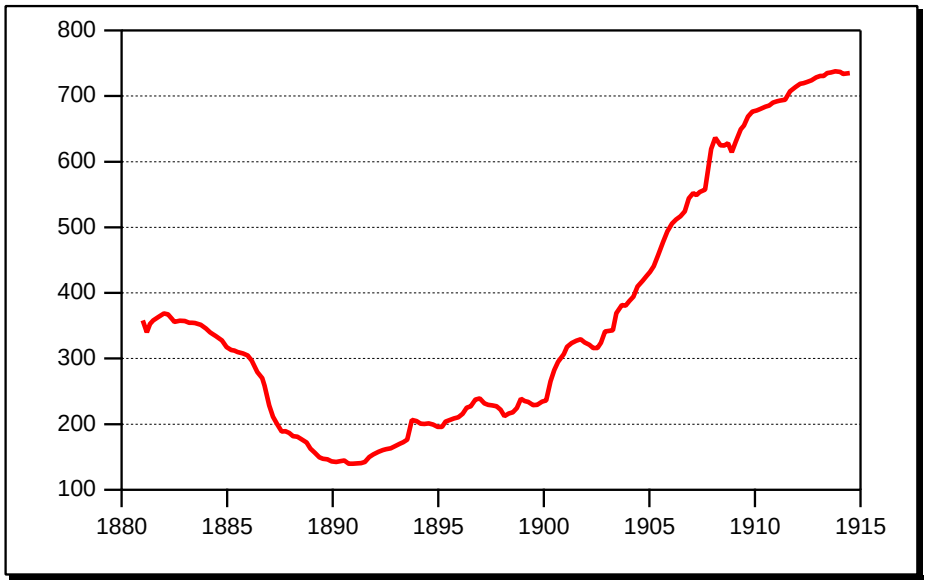
[6]Prior to 1875, national bank note circulation was limited in the aggregate by law. See Section 2.3.1 of this for more detail.

[7]There were also limits on the total number of notes a *single* bank could issue. However, these

paid-in capital, this regulation did not impose a constraint at any point in time. After 1905, aggregate bank capital exceeded total eligible collateral and so did not limit note issue.

In effect, neither did the collateral constraint. Figure 2.3 shows aggregate national bank holdings of eligible bonds as backing for notes.

Figure 2.3: National Bank Holdings of U.S. Government Bonds as Backing for National Bank Notes, 1880–1914 (millions of dollars)



Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

The bond data, as with much of the data of this chapter, come from call reports compiled by the Comptroller of the Currency. Appendix B, at the end of the monograph, describes the data in detail. A couple comments here are in order, however. With support from the Federal Reserve Bank of Minneapolis, Warren E. Weber and I have constructed a large database derived from the Comptroller's call reports.[8] The

limits were only relevant to a few very large banks.

[8]The data are available at `<http://minneapolisfed.org/research/economists/wewproj.`

database consists of balance sheet items aggregated by state and city for the period 1880 to 1910 (through 1914 for aggregate data). For the purposes of this chapter, I primarily make use of the aggregate data. I look at differences between city and country banks in a later chapter. There were five call reports per year. Each came from a particular period of the year, but the exact dates were (more or less) randomly picked by the Comptroller. The irregular spacing of the observations required the development of estimation techniques to extract seasonal information from the data. These techniques are also discussed in Appendix B.

Bank holdings of government securities roughly follow the pattern of national bank note issuance that we examine in Section 2.3. In order to better gauge the willingness of national banks to issue notes, it is more useful to view national bank bondholdings in the context of the total eligible bonds available as backing for circulation. This is done in Figure 2.4. If banks had fully utilized their note issuing privileges, the percentage of eligible bonds held as backing would have approached 100%.[9] However, prior to 1900, national banks only held 20–30% of the eligible bonds as backing for national bank notes. After 1900, when changes in the laws made bank note issuance more profitable, the percentage of eligible bonds held as backing increased fairly significantly. Nonetheless, at the end of the National Banking System era, banks still only held a little over 80% of the eligible bonds. It was only in the 1920s that national banks held nearly all the eligible bonds.[10]

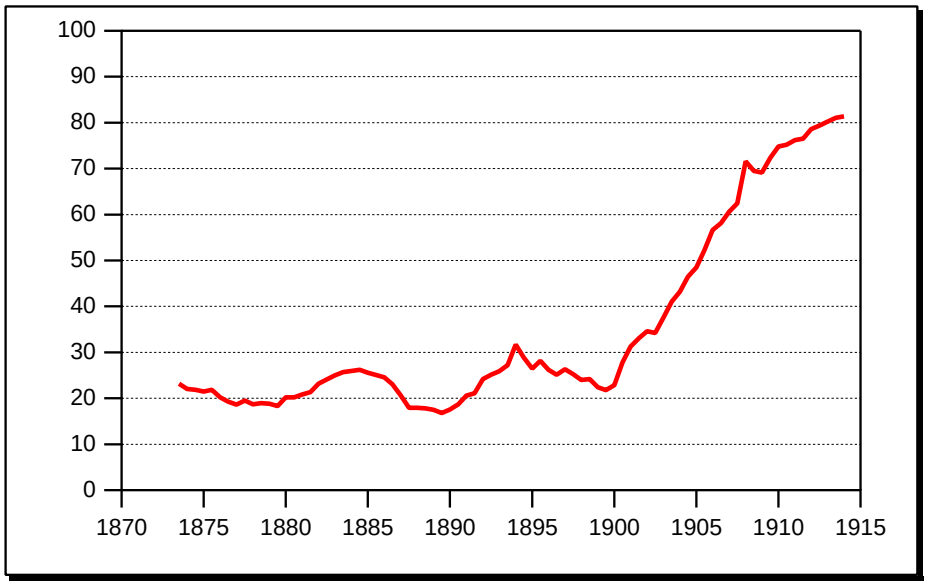
The fact that national banks did not fully intermediate the eligible U.S. govern-

html>.

[9]Some financial intermediaries other than national banks were legally required to hold U.S. government securities. Also, national banks were required to hold U.S. government bonds as collateral for U.S. government deposits. For these reasons, it is unreasonable to believe that national banks would have held *all* the securities eligible for backing. In Chapter 5, in the discussion of the low issuance of national bank notes, I will more appropriately adjust the amount of bonds available for backing.

[10]See (Friedman & Schwartz, 1963, p. 23).

Figure 2.4: Percentage of U.S. Government Bonds Held as Backing for National Bank Notes, 1880–1914



Source: Commercial and Financial Chronicle (various years).

ment securities into national bank notes is one element of what has been termed "the national bank note puzzle." In Chapter 5, I thoroughly examine all the pieces of that puzzle and analyze possible resolutions of the puzzle.

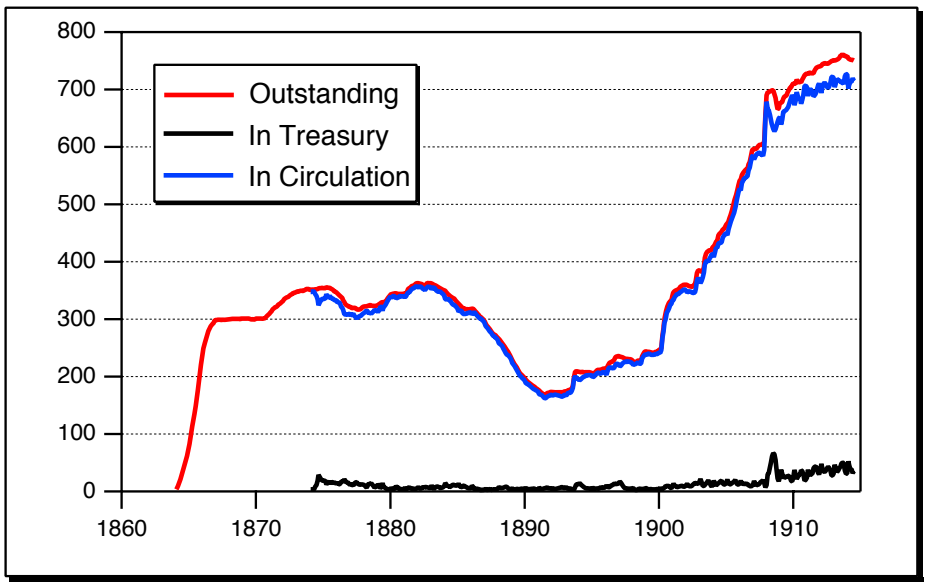
2.3 National Bank Note Circulation

The key feature of the National Banking Act is that it determined the rules by which national banks could issue private bank notes backed by government bonds. In the early part of the national banking era, national bank notes constituted 40–45% of currency in circulation. However, this percentage trended downward throughout the national banking era. By the end of the era, national bank notes were only 10–15% of hand-to-hand currency.[11] The U.S. Treasury issued all other forms of currency in circulation. Treasury currency consisted of legal tender notes (greenbacks), gold and silver coin, gold and silver certificates, and paper fractional currency. National bank notes and Treasury-issued currency could be used for many of the same purposes. However, there were two important distinctions. First, national bank notes did not qualify as reserves for national banks. Second, national bank notes could not be used to pay customs duties, which were a large fraction of federal revenue during the period.

In this section, we examine the time-series and seasonal properties of national bank note circulation. Figure 2.5 shows aggregate national bank notes outstanding, in the U.S. Treasury, and in circulation. There are several things to note about the data in this graph. Bank notes denoted as "in Treasury" are notes going through the formal redemption process. This amount represents the difference between notes

[11] A small amount of private currency issued by farmers, merchants, railroads, and mills was, for the most part, tolerated during the period. These forms of private money were typically of small denomination and only circulated in a region near the point of issue. See Timberlake (1974) for more on private money. SHOW PIE GRAPH???

Figure 2.5: National Bank Notes Outstanding, in the Treasury, and in Circulation, 1864–1913 (millions of dollars)



Sources: Andrew (1910) for data up through 1909. *Annual Report* of the Comptroller of the Currency for 1910–1914.

outstanding and in circulation. Idle notes in the vault of the issuing bank do not appear in this graph, did not count as circulation, and were not subject to taxation. Since the formal redemption process through the U.S. Treasury began in 1874, the breakdown only begins in that year. There is no distinction between notes outstanding and notes in circulation prior to 1874.

From Figure 2.5, we see that national banks quickly ramped up note issuance in the years following passage of the National Bank Act. The pattern mimics the rapid formation of national banks we observed in Figure 2.1.

2.3.1 Limits on aggregate circulation

The original act restricted the aggregate amount of outstanding bank notes to $300 million. National banks approached this limit in late 1866. After much debate in Congress, this limit was increased to $354 million in 1870. By late 1873, banks rapidly were approaching this new limit on note issue. In 1875, the limit on aggregate notes outstanding was repealed. After that time, circulation was only effectively limited by the amount of eligible collateral.

Despite the repeal of limits on aggregate notes outstanding, national bank note circulation only briefly exceeded $354 million in late 1874 and early 1875. During the late 1870s, national bank note circulation rose at moderate rates. However, beginning in 1882, aggregate circulation began to fall. Year over year, national bank note circulation fell at a 6.5% annual rate from 1882 to 1892. Overall, national bank note circulation fell by over 50% during this period. This is one component of the "national bank note puzzle" I address in Section 5.X of Chapter 5.

After 1900, national bank note circulation surged. In fact, as noted previously, by the end of the National Banking System era, national banks held over 80% of the eligible collateral and, correspondingly, were approaching the maximum amount of

circulation allowed under the National Banking Act.[12]

2.3.2 Seasonal pattern of national bank note circulation

After examining the time-series properties of national bank note circulation, I now turn to a discussion of its seasonal behavior.

From Figure 2.5, it is clear that, even though we have monthly data, it displays very little, if any, seasonal variability. The lack of seasonal fluctuations in national bank note circulation was a common contemporary criticism of the system.

Figure 2.6 illustrates the seasonal pattern in national bank note circulation.[13] There was a tendency for national bank note circulation to increase during the spring planting season and the fall harvesting season, when liquidity and credit demand were high in the agricultural sector. However, note circulation varied less than two percentage points over the months.

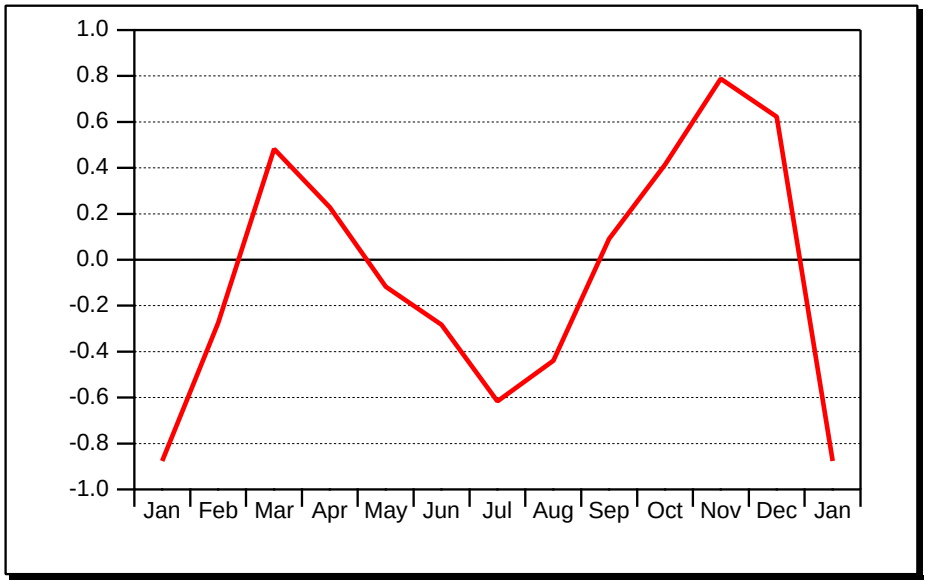
Furthermore, none of the monthly dummies are significant at any reasonable level of statistical significance. National bank note circulation has been frequently criticized, contemporaneously and more currently, for its observed inelasticity—its inability to rise and fall in volume with the "needs of trade." These criticisms appear

[12]This statement is not quite accurate due to the passage of the Aldrich-Vreeland Act in 1908. This act allowed the issuance of "emergency circulation" backed by a broader range of securities than merely U.S. government securities. This implies that when issuance of the emergency circulation was allowed, the maximum amount of national bank note circulation could exceed that allowed by U.S. government securities alone. See Section 1.7.3 of Chapter 1 for a discussion of the Aldrich-Vreeland Act.

[13]Appendix B describes in detail the procedures used to extract seasonal information for the variables examined in this chapter. But, I will briefly discuss the procedure here. Basically, for monthly data like national bank note circulation, the data are first detrended using a Hodrick-Prescott filter. A regression using standard ordinary least squares with twelve monthly dummies is then calculated to obtain the monthly coefficients.

For call report data which has irregularly spaced data, each series is logged and generalized least squares is applied. The dependent variables are trend, trend-squared, and sine and cosine variables at various seasonal frequencies. Monthly coefficients are then generated from the sine and cosine regression coefficients. I thank John Geweke and Warren E. Weber for extensive discussions on this estimation procedure. The code for the estimation procedure is available from me upon request in either the C programming language or RATS format.

Figure 2.6: National Bank Note Circulation Pattern 1874–1914 (percentage deviation from trend)



Sources: Andrew (1910) for data up through 1909. *Annual Report* of the Comptroller of the Currency for 1910–1914.

to be well founded.I examine the inelasticity of national bank note circulation more thoroughly in Chapter 7.

There is one other interesting feature of the national bank note circulation data presented in Figure 2.5. A casual look at the data demonstrates that beginning in 1908, the data appear to display a greater degree of seasonal variability than prior to that year. More formally, an F-test of the null hypothesis that all the monthly coefficients for national bank note circulation are equal to zero cannot be rejected prior to 1908. However, the corresponding F-test for the data from 1908 to 1913, even with the small number of observations, is significant at the 1% percent level. This indicates that indeed circulation does have a greater seasonal movement after 1908. To my knowledge, this has not been pointed out by previous studies of the period.

2.4 Banking Variables

This section takes a look at some of the important elements of national bank balance sheets. A national bank of this period performed many of the same operations of a modern bank, with one important distinction. National banks could issue private bank notes. After acquiring eligible U.S. government securities, a national bank would deposit those securities with the U.S. Treasury and receive bank notes in return. These notes could be used to make loans and purchase securities. As with modern banks, national banks of this era acquired funds through deposits and injections of bank capital. Borrowing provided only a very minor source of bank funds during this period.

Table 2.4 details the most important components of a typical national bank balance sheet, along with the each components percentage share of total assets. The

Table 2.4: Prototypical National Bank Balance Sheet

Assets		**Liabilities**	
Reserves	9%	Bank notes in circulation	7%
Loans	55%	Individual deposits	51%
U.S. government securities	8%	U.S. deposits	1%
Other securities	9%		
Due from other banks		Due to other banks	
and reserve agents	13%	and reserve agents	19%
Other assets	6%	Capital	22%

percentage values represent the average for aggregate balance sheets over the entire era. These percentages, of course, varied over time and particularly varied between country and city banks.

Most of the items in the prototypical balance sheet are self-explanatory. However, some of the items deserve more discussion. On the asset side, other securities include bank holdings of call loans and other forms of bonds, such as municipal bonds. The "due from" and "due to" elements on the asset and liability sides of the balance sheet, respectively, represent what are often call "banker's balances." Bankers' balances are partially the result of the structure of reserve holdings, which are explained in the following section. They also illustrate the importance of correspondent bank relationships that were formed during the period. These relationships became an important component of the payments system during the national banking era and are discussed in detail in Chapter 4.

2.4.1 Reserves

Initially national banks were legally required to hold reserves against both their circulation (bank notes) and deposits. The reserve requirement was the same for both

time and demand deposits. Reserves consisted of bank holdings of specie (gold and silver coin), gold and silver certificates, legal tender notes (greenbacks), fractional currency, and, beginning in 1874, lawful money in the five-percent fund held by the Treasury for the redemption of bank notes. Reserve requirements against circulation were dropped with the establishment of the five-percent redemption fund. On average, bank reserves constituted nine percent of bank assets.

As discussed in Section 1.3.3 of Chapter 1, the system of reserve requirements under the National Banking System was rather complex. Here I briefly discuss the reserve requirement regime in effect after reserve requirements on circulation were eliminated.

Reserve requirements under the National Banking System

There were three tiers of banks relevant to the holding of reserves. Table 2.5 details reserve requirements for these three tiers of banks.

Table 2.5: Reserve Requirements under the National Banking System (after 1874)

Bank Location	Reserve Requirement on Deposits	Where Held
Central Reserve City	25%	All in bank
Reserve City	25%	1/2 in bank, 1/2 in higher tier bank
Country	15%	2/5 in bank, 3/5 in higher tier bank

Source: Annual Report of Comptroller of the Currency (various years).

Banks in the top tier were called "central reserve city banks." Initially, the only central reserve city banks were those located in New York City. Chicago and St. Louis became central reserve cities in 1887. Central reserve city banks had to hold 25% in-

bank reserves against deposits.

Banks in the middle tier were called "reserve city banks." Eighteen reserve cities were established by the original act. (See Section 1.3.3 of Chapter 1 for a list of reserve cities.) As cities increased in population, they became eligible to become reserve cities. By the end of the era, there were a total of 47 reserve cities. Banks in reserve cities also had to hold 25% reserves against deposits. However, one-half of those reserves could be held in a correspondent bank in a central reserve city. The remainder had to be held in the bank own vaults.

Banks in the lowest tier were called "country banks." These banks were those in all remaining locations. Country banks were required to hold 15% reserves against deposits. Three-fifths of these reserves could be held with a correspondent bank in either a reserve city or a central reserve city.

This system of reserve requirements came under criticism during the period and led to what was commonly called a "pyramiding of reserves."[14] Lower tier banks held a portion of their reserves in a correspondent bank in a higher tier. Such correspondent balances typically earned interest. Of course, a bank holding reserves in its own vault earned no interest, so banks had the incentive to hold reserves with correspondent banks. Besides paying interest, these "bankers' balances" could be used to facilitate transactions in large cities for the bank's customers. The reserve structure meant that a significant fraction of reserves ended up in New York City, where they were frequently invested in call loans.

Each summer and winter, reserves would flow toward the large city banks. During spring planting season and fall harvesting season, when liquidity demand was high in the agricultural regions, reserves would flow back to the interior as country banks

[14]O.M.W Sprague was one of the more vocal contemporary critics of the reserve system imposed by the National Banking Acts. He strongly argued for revisions in the system in Sprague (1910).

withdrew deposits from city banks. If there was some disruption to this process, such as the failure of a large bank or trust company, these flows could be interrupted, resulting in a possible panic situation. Although Sprague (1910) originally presented this view, it is clearly stated by Goodhart:

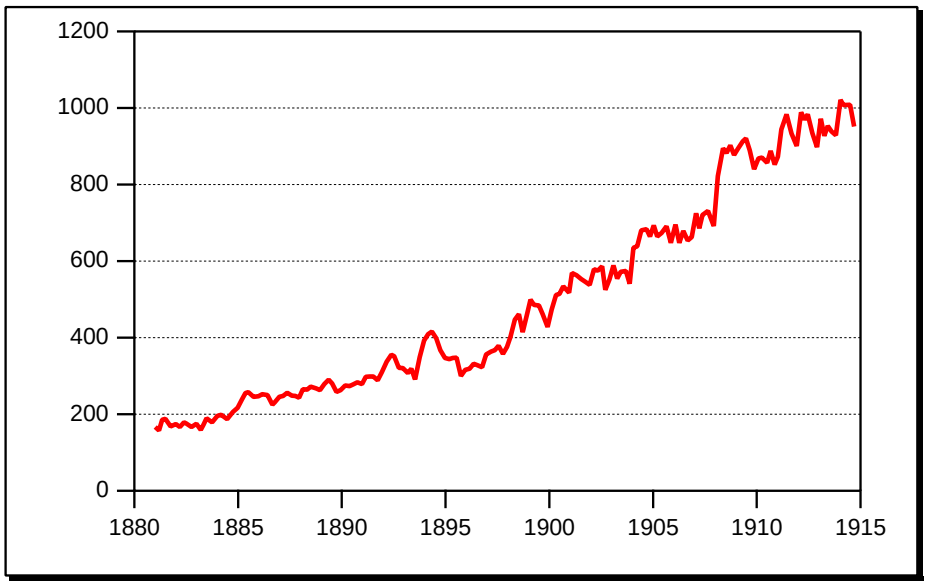
> ... financial crises and season variations were not considered to be separate phenomena. Financial crises were attributed, with a great deal of truth, not so much to cyclical factors as to the natural results of the recurring autumnal pressures upon the money market; these seasonal pressures were so extreme that it took only a little extra strain—in the form of overheated boom conditions or the bursting bubbles of Wall Street speculators—to turn tightness into distress. (Goodhart, 1969, p. 3)

Champ *et al.* (1996) refer to this view as the "seasonal plus shock" explanation of banking crises during the period. During periods when the system was typically under stress (spring and, especially, the fall crop-moving season), an additional shock to the system could send it into panic. This view has received some criticism over the years, and I discuss the issues related to it in more detail in Chapter 6, Bank Panics.

Figure 2.7 shows total reserves held by national banks at call dates determined by the Comptroller of the Currency, and Figure 2.8 illustrates movements in the reserve-to-deposit ratio.

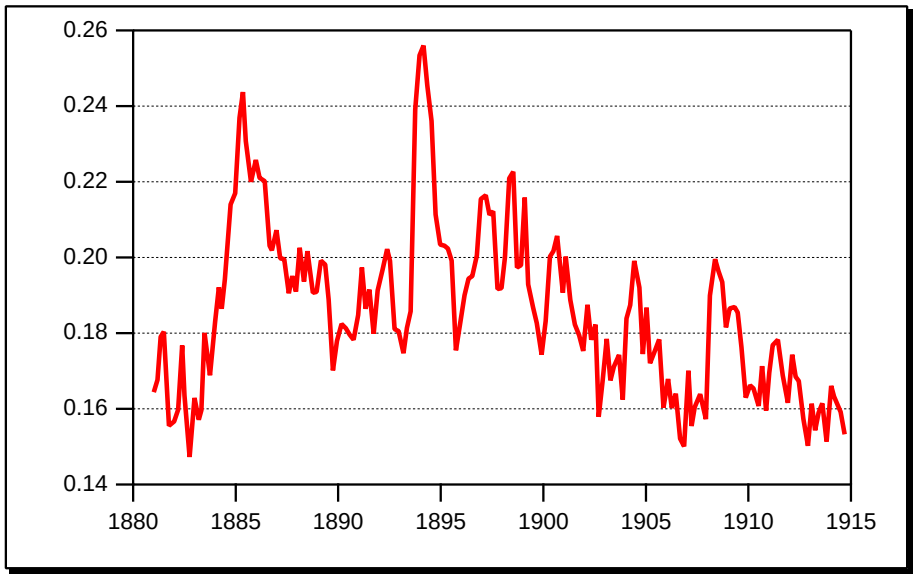
Unfortunately, it is difficult to determine the pattern of reserves *during* panic periods from call report data. There were only five call reports required of national banks each year. Furthermore, the Comptroller appears to have picked call dates that avoided periods when the system was most under stress. However, we do observe a significant run-up in reserves and in the reserve-deposit ratio after the panics of 1884, 1893, and 1907. Friedman & Schwartz (1963) note that increases in the reserve-to-deposit ratio came significantly (up to a year) after the panic periods and occurred during contractionary periods of the business cycle. These strong upward movements in the reserve-to-deposit ratio undoubtedly represented deliberate actions of banks to increase liquidity in response to the preceding panics and also reflected public distrust

Figure 2.7: National Bank Total Reserves, 1880–1914 (millions of doillars)



Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

Figure 2.8: National Bank Reserve-to-Deposit Ratio, 1880–1914



Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

in the banking system. But details of reserve behavior *during* the panic periods are impossible to ascertain from the call report data.

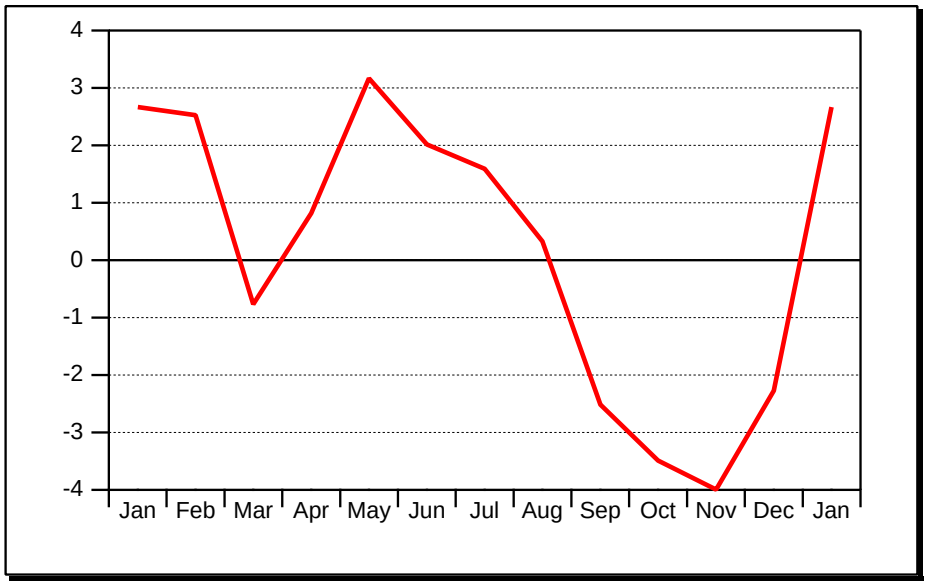
However, we can analyze behavior for a select group of banks by looking at clearinghouse bank data, which were reported monthly.[15] As detailed in Champ *et al.* (1996), monthly data from clearinghouse banks in New York City show a marked decline in reserves during panic periods. As we noted, "reserves are from 25% to 55% below trend during the three panics [of 1884, 1893, and 1907]." (Champ *et al.*, 1996, p. 849). Naturally, due to the structure of holdings of reserves, we would expect the most extreme movements in reserves to appear in the clearinghouse banks of New York.

[15]Clearinghouse bank data can be found in Andrew (1910).

Seasonal pattern of reserves

The seasonal pattern of reserve holdings is of particular interest and is illustrated in Figure 2.9. National banks tended to ramp up reserves at the conclusion of the

Figure 2.9: National Bank Reserves Seasonal Pattern 1880–1914 (percentage deviation from trend)



Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

spring planting season and during the idle early months of the year. During those periods, bank reserves were two to three percent above trend. Bank reserve holdings fell markedly below trend during the fall harvest season. On average, reserve holdings were three to four percent below trend during October and November. An F-test of the null hypothesis that all the seasonal coefficients are equal to zero is strongly rejected, indicative of the significant seasonal movement in this variable.

For clearinghouse banks in New York, the movements in reserves was even stronger. New York clearinghouse reserves typically fell by more than six percent during the

autumn harvesting season.

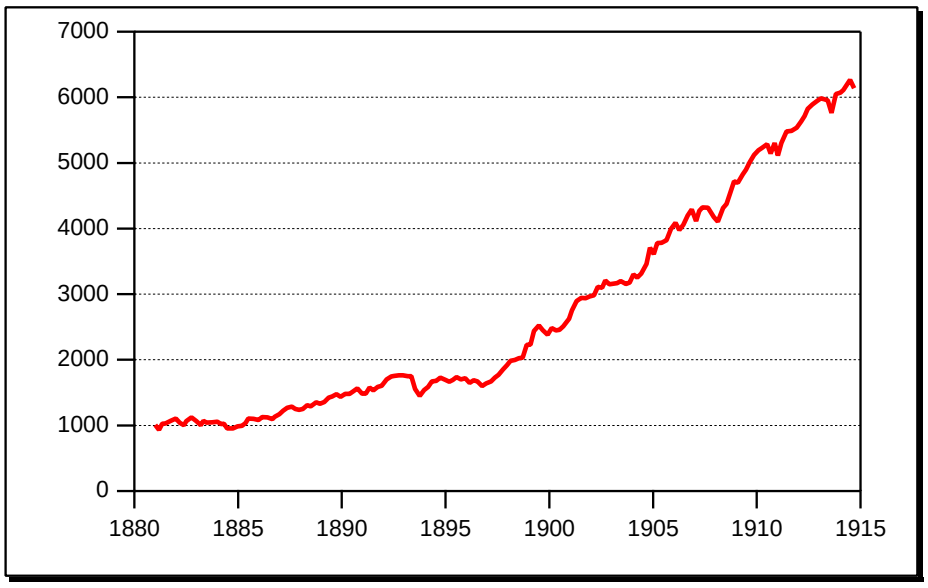
2.4.2 Deposits

As detailed in Table 2.4, individual deposits constituted a little over half of bank liabilities and capital. The Comptroller's call reports unfortunately do not break individual deposits into greater detail. To a great extent this is due to the fact that there was little difference in the regulations imposed on time versus demand deposits—the reserve requirement was the same for both types of deposits. Furthermore, both types of deposits typically paid interest. We do know that in the early part of the period, time deposits represented practically all of individual deposits. However, beginning in the 1870s, checking accounts played an increasing role. Their role was primarily limited to city banks, and demand deposits had very limited use outside the city of issue due to the poor communications network of the era. Large interregional payments typically were made in the form of a certified check drawn on New York banks. (See James and Weiman 2006.)

Certain banks were designated as U.S. government depositories. Banks holding government deposits had to also hold U.S. government bonds as collateral for those deposits. In the aggregate, these deposits only accounted for one percent of bank liabilities and capital. However, for those banks designated as depositories, government deposits were an important source of funds. Furthermore, these government deposits were used in the early implementation of monetary policy by the U.S. Treasury during the late 1800s. More detail on these actions by the Treasury is presented in Chapter 6.

Figure 2.10 displays the call report data on individual deposits. The data indicate fairly steady growth in individual deposits in national banks throughout the entire

Figure 2.10: National Bank Individual Deposits, 1880–1914 (millions of dollars)

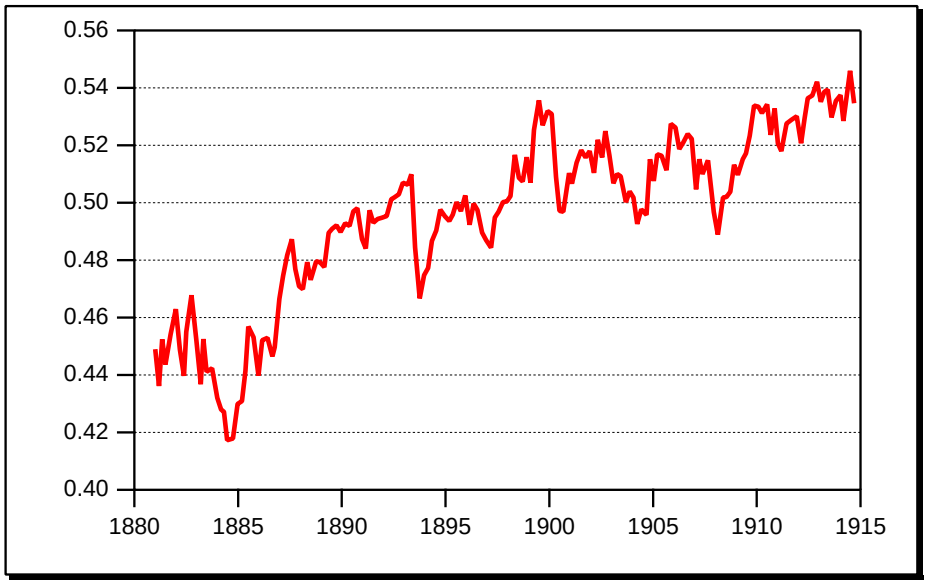


Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

period. However, the panics of 1893 and 1907 can be clearly seen in the data. These panic periods resulted in significant declines in the level of deposits in national banks as public distrust of banks caused deposit withdrawals.

In order to scale the magnitude of individual deposits in national banks, Figure 2.11 presents data on the ratio of individual deposits to total assets. As with

Figure 2.11: National Bank Individual Deposits to Total Assets Ratio, 1880–1914



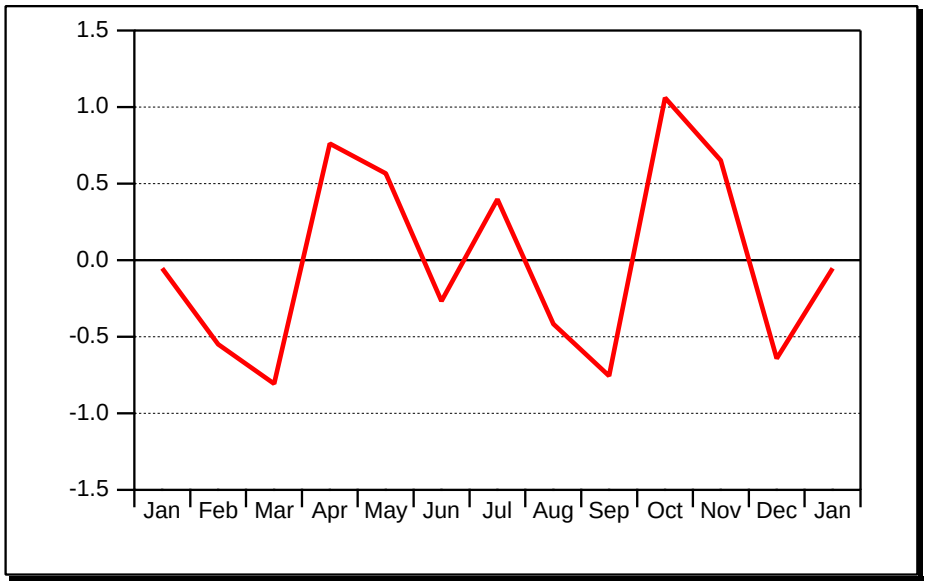
Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

the time-series data on the level of deposits, we can clearly see the panic periods in these data. We also note a significant upward trend in the importance of individual deposits in national bank balance sheets. From 1885 to 1914, the percentage of bank total liabilities and net worth in the form of individual deposits rose by over ten percentage points.

Seasonal pattern of deposits

The seasonal pattern of individual deposits in national banks is portrayed in Figure 2.12. The seasonal movement in deposits is not strong, varying only one percent

Figure 2.12: National Bank Individual Deposits Seasonal Pattern, 1880–1914 (percentage deviation from trend)



Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

or less from trend. We see that deposits tended to be relatively high in the spring and late fall. Despite their small magnitude, these seasonal coefficients are significant at the 5% level.

Data for clearinghouse banks in New York display much greater seasonal variation than for the aggregate data. The basic pattern is also somewhat different for the clearinghouse banks. In those banks, deposits rise two percent above trend in the summer and fall four percent below trend in the fall.

2.4.3 Bankers' balances

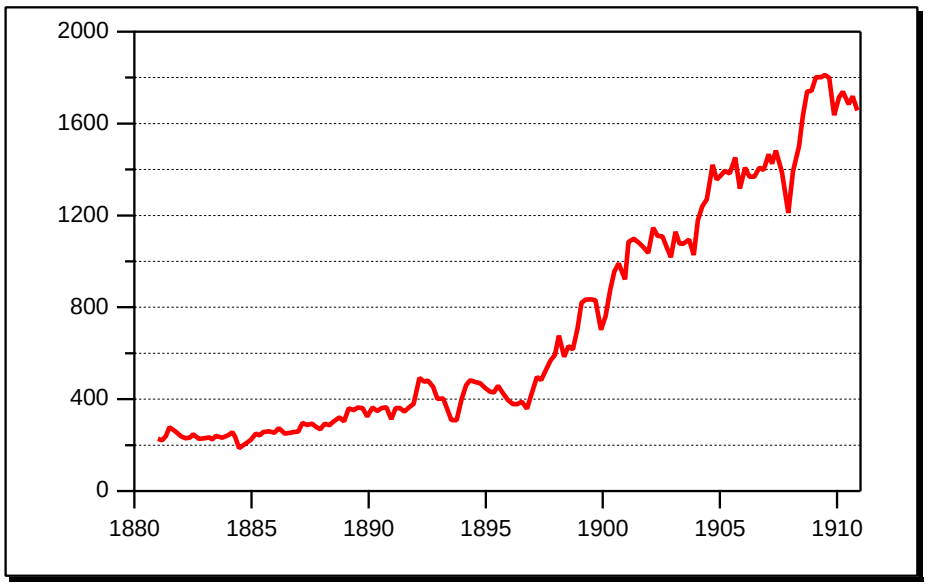
Bankers' balances refer to deposits of financial institutions in correspondent banks. For national banks, these consisted of balances due to other national banks, state banks, mutual savings banks, and trust companies. Recall that the system of reserve requirements allowed the holdings of a fraction of country and reserve city national bank reserves in correspondent banks. Furthermore, most state banking laws allowed state banks to hold a fraction of their reserves in national banks. These reserve holdings represented one source of bankers' balances. The other source was due to the payments system. Bankers' balances were often held to facilitate interregional payments. The importance that bankers' balances played in the payments system is discussed in detail in Chapter 4, National Banks and the Payments System.

For these reasons, the majority of bankers' balances were in city banks, with New York City banks holding a large portion of these balances. Figure 2.13 displays call report data on bankers' balances.[16] The displayed data consist only of bankers' balances held at city banks. The data show a strong upward trend beginning around 1897. Many of the series (including deposits and loans) examined in this chapter show marked increases in trend beginning in 1897. Although it is difficult to pinpoint the timing of this break on any change in national banking laws, it is interesting to note that this corresponds to when the long-standing debate over gold versus silver was resolved by the defeat of William Jennings Bryan in the election of 1896.

To illustrate the increasing importance of bankers' balances to the entire banking system, Figure 2.14 plots bankers' balances as a fraction of total national bank assets. We see that bankers' balances as a fraction of total assets rises from around 20% at the end of 1800 to over 35% in the early 1900s. We can also easily see in Figure 2.14

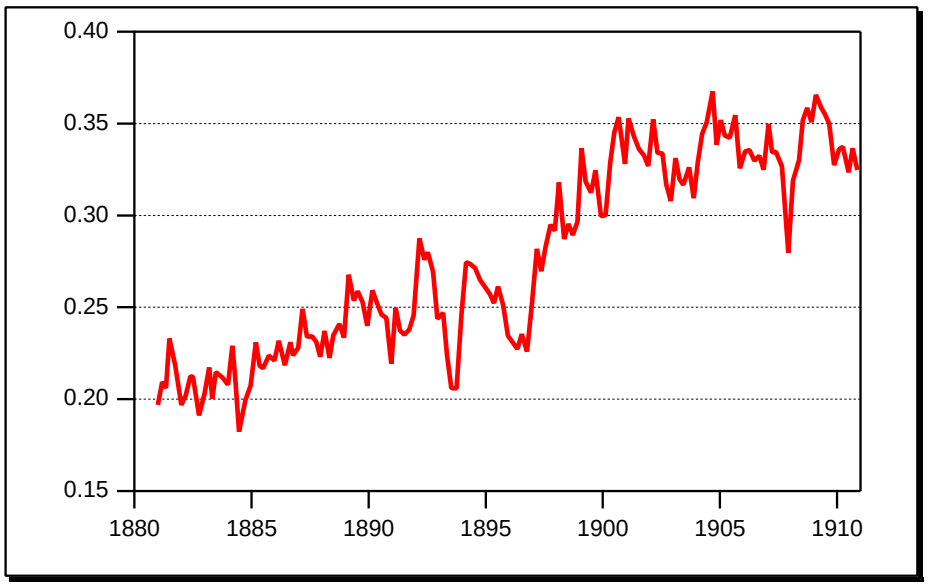
[16]In terms of the Comptroller of the Currency's call report data, I define bankers' balances to be funds due to national banks, state banks, trust companies, and reserve agents.

Figure 2.13: City Banks Due to Other Financial Institutions, 1880–1910 (millions of dollars)



Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

Figure 2.14: City Banks Due to Other Financial Institutions as a Fraction of Total Assets, 1880–1910 (millions of dollars)



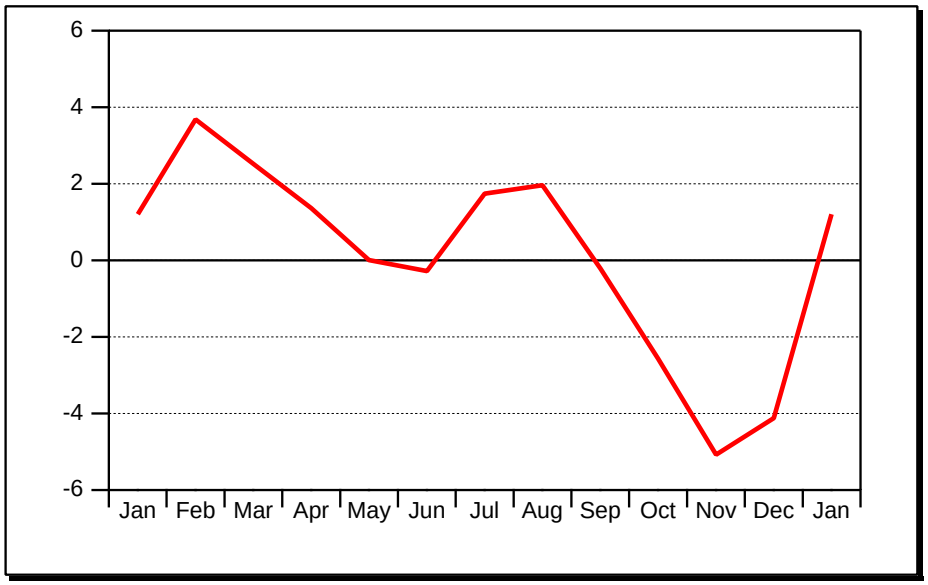
Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

the tendency of country banks to withdraw balances from city banks at dates around panic periods.

Seasonal pattern of bankers' balances

The seasonal pattern of bankers' balance is indicative of the strong interregional flow of funds during the national banking era. Figure 2.15 illustrates the seasonal pattern of bankers' balances for city banks. As discussed previously, bankers' balances tended

Figure 2.15: City Banks Due to Other Banks Seasonal Pattern, 1880–1910 (percentage deviation from trend)



Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

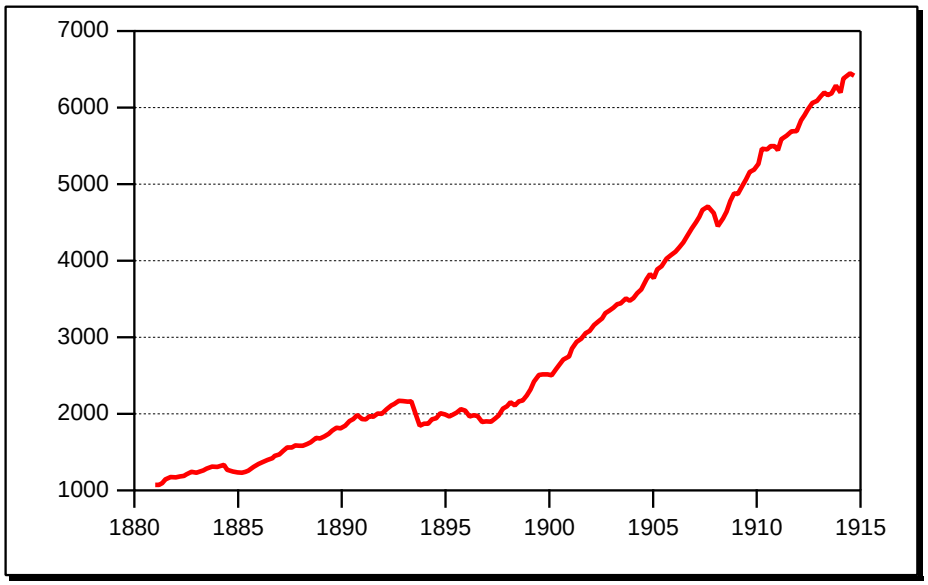
to rise in the idle months at the beginning of the year and during the summer months. During the fall harvest season, country banks made significant withdrawals of cash from city banks, resulting in bankers' balances falling 5% below trend. The seasonal coefficients are highly significant.

2.4.4 Loans

As with modern banks, loans represented the most important source of revenue for national banks. On average over the period, 55% of the total assets of national banks consisted of loans. Unfortunately, the call report data does not break down the types of loans held by national banks. Legal restrictions on branching greatly limited the ability of banks, especially country banks, to diversify their loan portfolio. A drought in an agricultural region could lead to severe financial problems for country banks in the region.

Figure 2.16 presents aggregate bank loans and overdrafts at call report dates. As

Figure 2.16: National Bank Loans and Overdrafts Outstanding, 1880–1914 (millions of dollars)

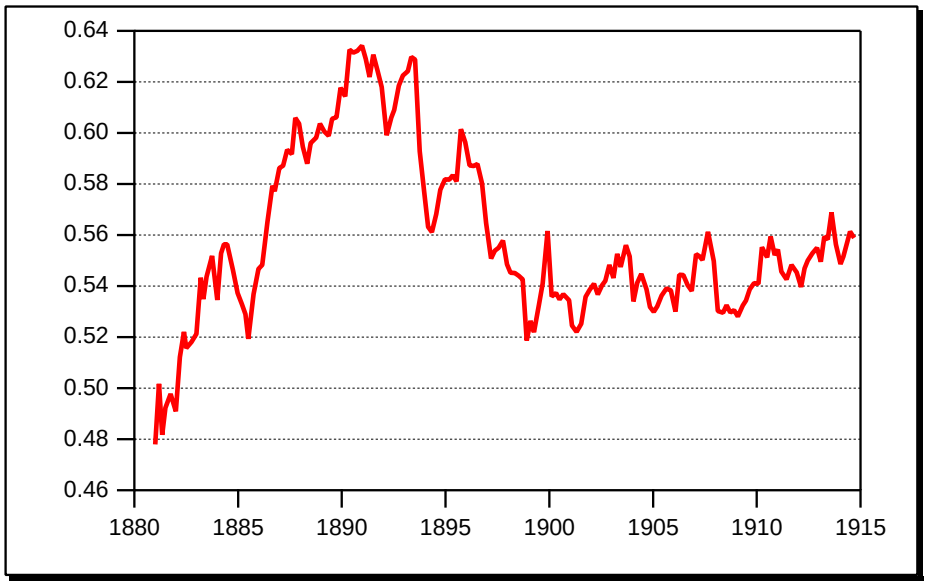


Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

with many components of national bank balance sheets, loans contracted sharply at call report dates following the panic periods of 1884, 1893, and 1907.

Expressing loans as a fraction of total bank assets reveals some interesting patterns that are not obvious in the loan data in levels. This is shown in Figure 2.17. Except

Figure 2.17: National Bank Loan to Asset Ratio, 1880–1914



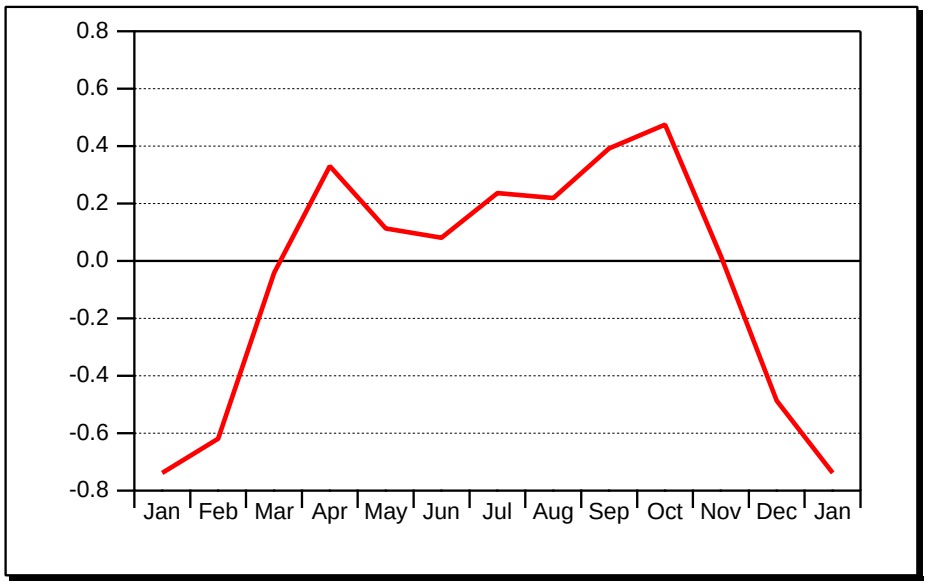
Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

for the call dates following panics, the loan-asset ratio rises sharply from 1880 to the beginning of 1891. This is followed by an equally sharp downward trend until 1898. The period from 1891 to 1897 is marked by two sharp contractions, so the decline in loans is not surprising. From 1898 on, there is little trend in the loan-asset ratio.

Seasonal pattern of loans

Total national bank loans shows little seasonal variation, varying less than one percent from trend over the year. The seasonal pattern in bank loans is illustrated in Figure 2.18. Furthermore, an F-test of the seasonal coefficients show that they are

Figure 2.18: National Bank Loans Seasonal Pattern 1880–1914 (percentage deviation from trend)



Source: Call reports from the *Annual Report* of Comptroller of the Currency (various years).

only significant at the 6% significance level.

As with many of the series, the movements in loans for New York City clearinghouse banks is stronger than for the aggregate data. Loans in the clearinghouse banks fall over two percent below trend during the fall.

2.5 Interest Rates

One of the most striking features of the period of the National Banking System is the behavior of interest rates. Interest rate behavior during this period is both dramatic and puzzling. On the surface, given the bank note-issuing regime of the period, it appears that arbitrage conditions are broken.

Champ *et al.* (1994) present a model of bank note issuance that attempts to mimic that of the national banking system. Under the assumption that national bank notes and other forms of money were perfect substitutes for the public, the model generates the result that safe short-term rates and the yield on eligible securities should have been pegged at the tax rate on national bank notes (one percent before 1900 and, effectively, one-half percent thereafter).

The argument goes something like this. National banks could essentially borrow from the federal government at the tax rate on note issue. With their notes, they should have been able to profit by purchasing securities (like government bonds) that possessed yields in excess of that tax rate. Purchases of these securities should have continued until yields on them approximated the tax rate on issue.

However, this prediction is strongly rejected by the data. Short-term interest rates are considerably above the tax rate on note issue and the long-term yields on eligible collateral are a percentage point or more above the tax rate. Of course, the observed call loan rate is not a safe short-term rate in that call loans possess default risk. However, it is difficult to believe that the extreme variability in the call loan rate can be completely explained by changes in default risk. In addition, the tax rate on note issue effectively declines from 1% to 1/2% in 1900. We would expect a similar decline in the average level of call loan rates and government bond yields, but this is not borne out in the data.

We will examine the puzzle related to interest rate behavior during the national banking era in great detail in Chapter 5 "The National Bank Note Puzzle." For now, I simply discuss the observed patterns in the data.

2.5.1 Short-term rates

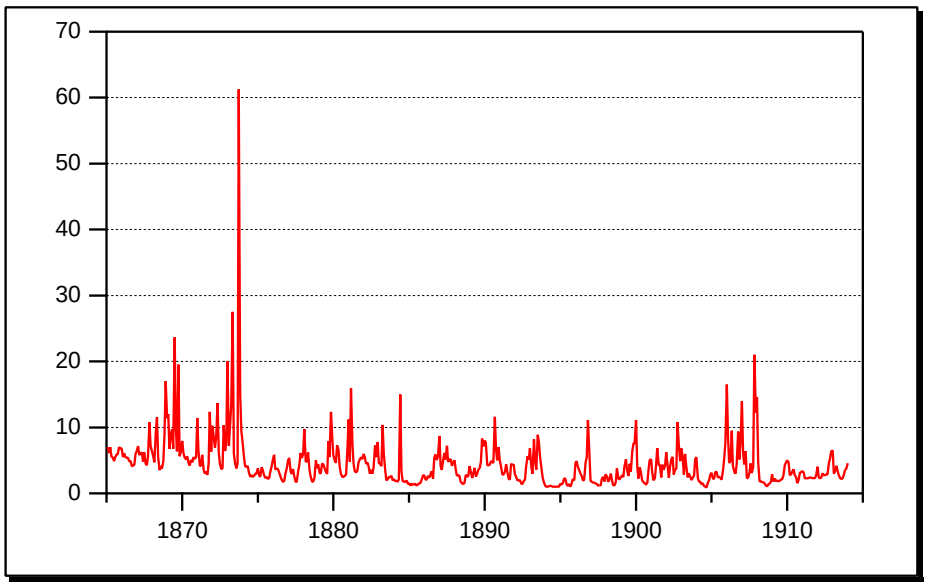
We have two sets of reliable data on short-term interest rates—data on call loan rates and commercial paper rates. Unfortunately, data on other important interest rates, like bank deposit rates, is scarce.

Call loan rates

Much emphasis has been placed in the literature regarding the behavior of call loan rates during the national banking era. Monthly data on call loan rates in New York City are shown in Figure 2.19. It is easy to see why the data have received so much attention. The call loan rate varies markedly over the year and, occasionally, peaks at extremely high rates. Over the period 1865–1913, the average call loan rate was 4.5%. But call loan rates in excess of 10% per annum were not unusual. During the panic of 1873, the call loan rate peaked at over 61%. It is important to note that the data on call loan rates presented here are monthly averages. Daily data would indicate spikes in excess of those shown in Figure 2.19. In general, panic periods witnessed particularly strong upward movements in call loan rates.

Call loans are of particular importance to a study of the national banking era. Recall that due to the structure of reserves, idle funds tended to accumulate as reserves in correspondent banks in New York. Often, these funds found their way into the call loan market. Hence, call loans were particularly important to many of the largest banks in New York.

Figure 2.19: New York City Call Loan Rate, 1865–1913 (percent per annum)

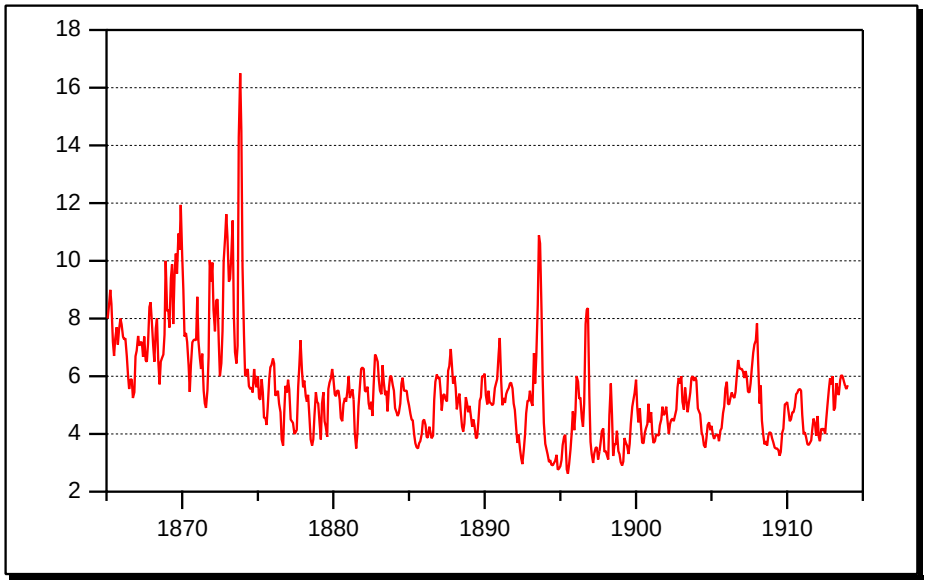


Source: Macaulay (1938).

Commercial paper rates

Figure 2.20 presents interest rates for prime 60–90-day double-name commercial paper. We observe similar, although less dramatic, movements in commercial paper

Figure 2.20: Commercial Paper Rate, 1865–1913 (percent per annum)



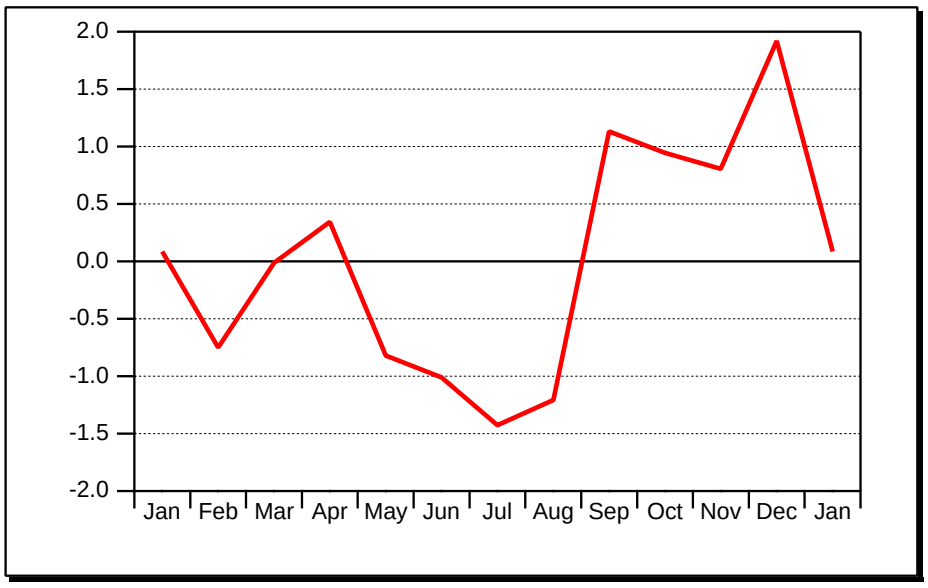
Source: Macaulay (1938).

rates relative to those observed for call loans. Commercial paper rates rose to 16.5% in October 1873, during the panic of that year. During the 1893 panic, commercial paper rates approach 11%.

Seasonal pattern of short-term rates

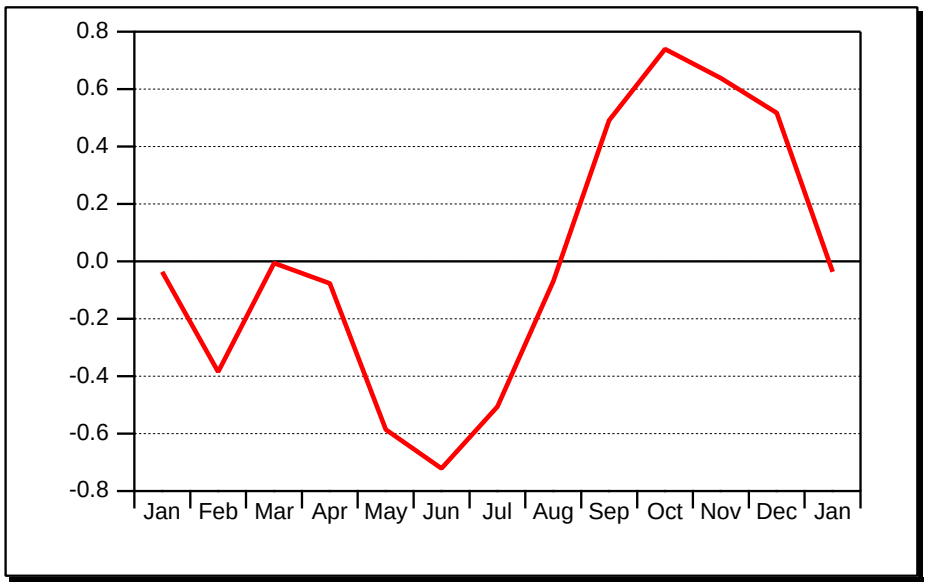
Besides reaching high levels during panic periods, short-term interest rates display significant seasonal movements. Figures 2.21 and 2.22 show the monthly coefficients for call loan rates and commercial rates, respectively. The call loan rate has greater

Figure 2.21: New York City Call Loan Rate Seasonal Pattern, 1865–1913 (deviation from trend)



Source: Macaulay (1938).

Figure 2.22: Commercial Paper Rate Seasonal Pattern, 1865–1913 (deviation from trend)



Source: Macaulay (1938).

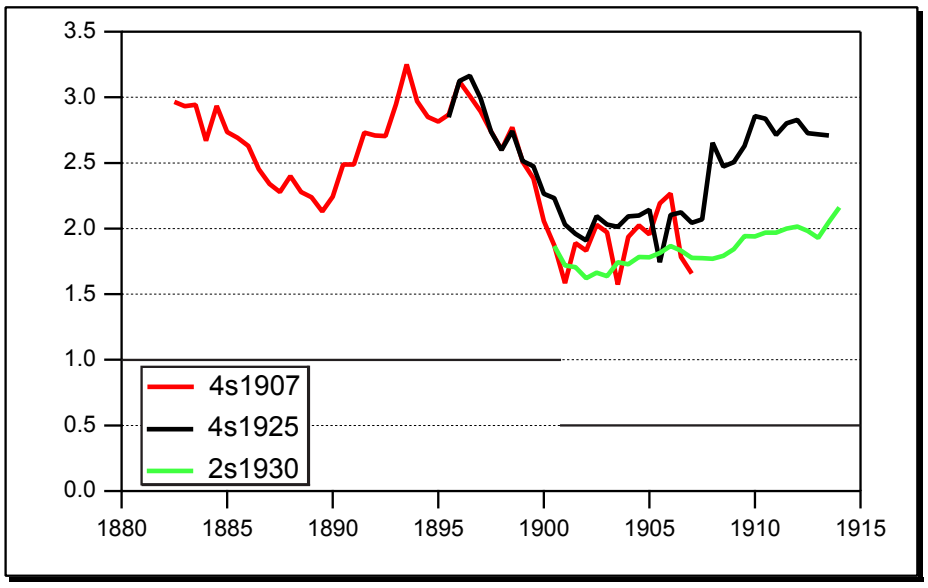
seasonal variability, rising roughly one to two percentage points above trend during the last four months of the year. From May to August, it is roughly one to one and a half percentage points below trend. The commercial paper rate shows a similar seasonal pattern although it varies less than a percentage point over the seasons.

Long-term rates on eligible securities

There were a number of classes of U.S. government securities eligible as backing for national bank notes. In general, the eligible securities were long-term bonds with call provisions. For example, the 4s of 1907 were a bond held as backing for national bank notes. Bonds of this era were typically denoted by their annual coupon rate and a date they became "redeemable" or callable. So, the 4s of 1907 were four percent annual coupon rate bonds that became redeemable in 1907. They were originally issued in 1877 and, thus, were 30-year bonds. Often the bonds were called on the announced call date, so that the call date was also the maturity date. This was the case with the 4s of 1907. However, some bond classes were not called at their "redeemable" date and became callable "at the pleasure of the government"—in other words, callable at any time.

Figure 2.23 illustrates the yields on three bond classes held by national banks as backing for bank notes. The solid black horizontal lines in the figure represent the tax rate. It clearly shows that the the yields of government bond were far in excess of the tax rate. These bonds are the 4s of 1907, the 4s of 1907. The 2s of 1930, along with the 2s Panamas (issued to finance the building of the Panama Canal), became popular bonds for national banks to hold as backing due to their preferential tax treatment. After March 1900, notes secured by 2% coupon rate bonds were subject to an annual tax of one-half percent. Notes secured by bonds with higher coupon

Figure 2.23: Yields on Selected Eligible U.S. Government Securities, 1882–1913 (percent per annum)



Source: *Annual Report* of the Comptroller of the Currency (various years).

rates were taxed at the old rate of one percent. By the end of 1913, these two bond classes made up over 92% of bank holdings as backing for notes, and banks held over 90% of the total amount of these bonds outstanding. For that reason, one could argue that the collateral constraint was nearly binding at the end of the national banking era.

Recall that by the arguments put forth in Champ *et al.* (1994), the yield on eligible bonds should have been pegged at the tax rate on note issue (one percent before 1900 and, effectively, one-half percent thereafter. Yields on government bonds were from 100 to 200 basis points above the tax rate, suggesting the possibility of arbitrage profits. This is another component of the national bank puzzle addressed in Chapter 5.

2.6 The Price Level and Inflation

Contrary to the financial data, which are fairly reliable, the data on macro variables such as the price level and output are merely estimates, although we have fairly reliable data on prices/quantities of individual goods and services. Figure 2.24 shows the Warren-Pearson Wholesale Price Index. The shaded bars represent recessions as defined by The National Bureau of Economic Research (NBER). Figure 2.25 displays the inflation rate according to the Warren-Pearson price index.

The latter half of the 1800s was one of strong economic growth. This confirms the view of Friedman & Schwartz that it is possible to have strong economic growth coinciding with deflation. QUOTE????

Figure 2.24: The Warren-Pearson Wholesale Price Index, 1863–1890 (1880 = 100)

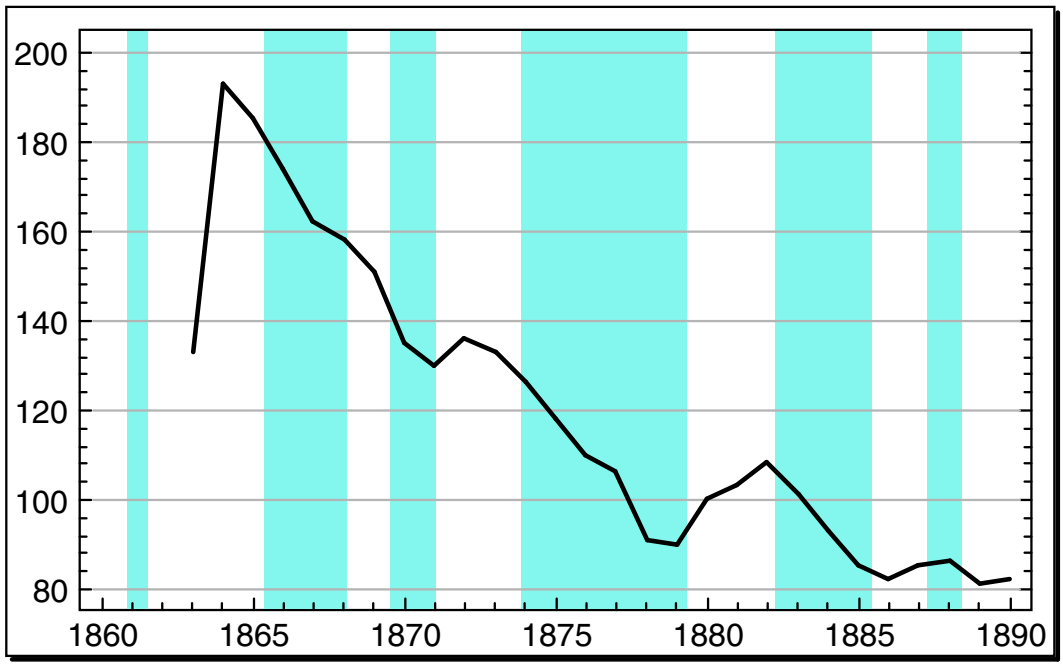
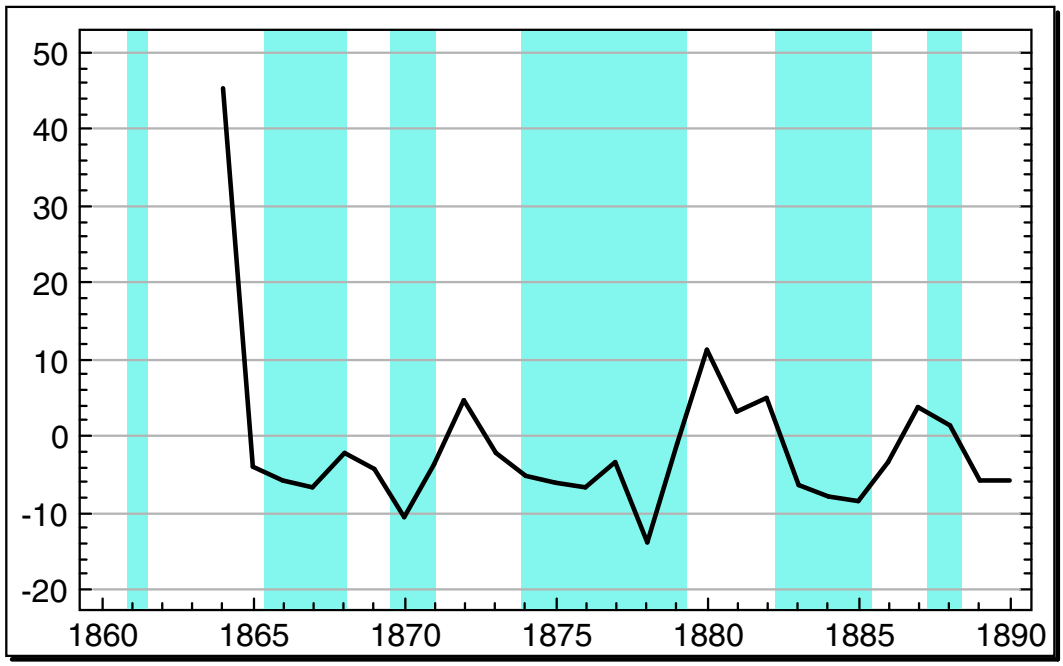


Figure 2.25: The Inflation Rate According to the Warren-Pearson Wholesale Price Index, 1864–1890 (percent per annum)



Conclusion

In this chapter, we have taken an introductory look at some of the important data related to the national banking era. A major emphasis has been to examine the behavior of certain key variables, over time, during panic periods, and over the seasons. Some of the important observations we have made and questions we have asked are the following.

With regard to the establishment of national bank charters, the early years of the era saw rapid growth. Many of these early charters were state banks that converted to national banks. However, the initial conversion of state banks to national bank status practically stopped by 1867. After that, most newly-chartered national banks had not been in operation previously.

We have seen that national banks never fully intermediated the eligible government securities in the form of national bank notes. For the period before 1900, national banks held only 20–30% of the eligible bonds as backing for notes. After 1900, the fraction held steadily increased. Only at the very end of the national banking era were banks coming close to fully intermediating the stock of government bonds.

National bank note circulation, especially when viewed in the light of interest rate behavior during the period, is particularly puzzling. There are three interesting puzzles related to national bank note circulation. First, with interest rates far in excess of the tax rate on circulation, why didn't banks choose to issue more bank notes? It appears that an arbitrage condition is being broken. The generally low issuance of national bank notes over the period is certainly a puzzle. Second, what caused the large dip in circulation from 1882 to 1892? Third, we also noted that national bank note circulation has very little, if any, seasonal variation, especially before 1908. What caused the observed inelasticity over much of the period, and

what caused the apparent increase in elasticity toward the end of the era? All these questions and puzzles are addressed in later chapters.

This chapter also introduced the potential complications created by the system of reserve requirement during the period. The system encouraged the holding of bank reserves outside a bank's own vault but did not provide an efficient means to reallocate those reserves in time of financial crisis. This, of course, was one of the main criticisms of the period and a major reason for the establishment of the Federal Reserve System. However, it is important to note that there were some beneficial results emanating from the reserve system structure. It encouraged the formation of an intricate network of correspondent relationships. These relationships greatly contributed to the formation of a national payments system. We discuss this aspect in detail in Chapter 4.

Also of interest is the significant increase in trend in deposits, bankers' balances, and loans beginning around 1897. The break in this trend is not easily traceable to any changes in the statutes governing national bank operations. Could the end of the debate regarding gold versus silver have reduced uncertainty for the players in the financial system sufficiently enough to encourage the system to more rapidly expand?

For most of the variables in this chapter, we discovered their key seasonal patterns. Table 2.6 provides a useful summary of these seasonal patterns. With the exception of national bank note circulation, these seasonal patterns are statistically significant.

Table 2.6: Summary of Seasonal Patterns in the Data

Variable	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Circulation	–	–	+	+	–	–	–	–	+	+	+	+
Reserves	+	+	–	+	+	+	+	+	–	–	–	–
Deposits	–	–	–	+	+	–	+	–	–	+	+	–
Due tos	+	+	+	+	+	–	+	+	–	–	–	–
Loans	–	–	–	+	+	+	+	+	+	+	+	–
Call rate	+	–	–	+	–	–	–	–	+	+	+	+
CP rate	–	–	–	–	–	–	–	–	+	+	+	+

In the table, a plus indicates above trend and a minus indicates below trend. "CP rate" denotes the commercial paper rate, and "Due tos" denotes bankers' balances held by city banks. The monthly coefficients for circulation were not significantly different from zero.

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