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THE MARKET FOR BANK STOCKS AND THE RISE OF DEPOSIT BANKING
IN NEW YORK CITY, 1866-1897

Peter L. Rousseau

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ABSTRACT

The rapid growth of deposits in New York City over the three decades following the Civil War is often attributed to the release of pent-up demand for the services that transactions accounts could provide. I advance a complementary explanation that centers on the existence of an increasingly efficient market for bank shares. The stock market was important because it generated price and dividend quotations that signaled depositors about the soundness of individual banks, thereby directing the expansion. At the same time, innovations within the city's banks created conditions under which stock prices became more informative, reducing asymmetries between banks and depositors to a point where confidence in banks could grow. Using a new database of stock prices, dividends, and balance sheet items for traded New York City banks from 1866 to 1897, a series of dynamic panel data models supports the proposed mechanism.

Peter L. Rousseau
Department of Economics
Vanderbilt University
VU Station B #351819
2301 Vanderbilt Place
Nashville, TN 37235-1819
and NBER
peter.l.rousseau@vanderbilt.edu

I. Introduction

By any standard, the spread of deposit banking in New York City over the three decades following the Civil War was nothing short of remarkable. With \$90 million of capital available in 1866 to support \$200 million in individual deposits, the members of the New York Clearing House Association tripled their deposits by 1897 as capital fell to \$72 million. As Fig. 1 depicts, the fresh deposits fueled a surge in lending activity. The aggregated balance sheet figures for the entire United States are even more striking, and their implications for growth in real per capita incomes, which averaged 1.7 percent over the 1866-1897 period, have been a subject of considerable empirical interest (see Sylla 1969; James 1978; Rousseau and Wachtel 1998).¹ Such inquiries are strengthened by a body of economic theory that identifies channels through which deepening in banking and financial markets may promote long-run growth.² In this paper, rather than focusing on aggregate growth, I examine how the existence and widening of the market for bank equities encouraged and directed the expansion of deposits in the nation's 19th century financial center.

In an earlier treatment, Rousseau (1998) showed that improvements in the screening and

¹ The available banking aggregates for the nation as a whole, including state-chartered and national banks, are from the *Historical Statistics of the United States* (Carter et al., 2006, Vol. 3, series Cj155 and Cj157, pp. 633-4, and series Cj209 and Cj211, p. 641). These data indicate that \$560 million in capital supported \$758 million in deposits nationally in 1866 and that deposits grew more than seven-fold by 1896 to \$5.5 billion with capital more than tripling to \$1.75 billion. Average annual growth rates of real GDP per capita are computed for 1866-97 from *Historical Statistics* (Carter et al., 2006, Vol. 3, series Ca11, pp. 24-5, "Millennial Edition Series"). Alternate estimates from Berry (1988, table 8, p. 24) suggest that annual growth was closer to 2 percent.

² These channels include mobilizing otherwise unproductive resources (e.g., Gurley and Shaw 1955; Bencivenga and Smith 1991) and applying them to high-return projects (e.g., McKinnon 1973; Greenwood and Jovanovic 1990; King and Levine 1993), or improving risk-sharing arrangements among borrowers and lenders (Diamond 1984).

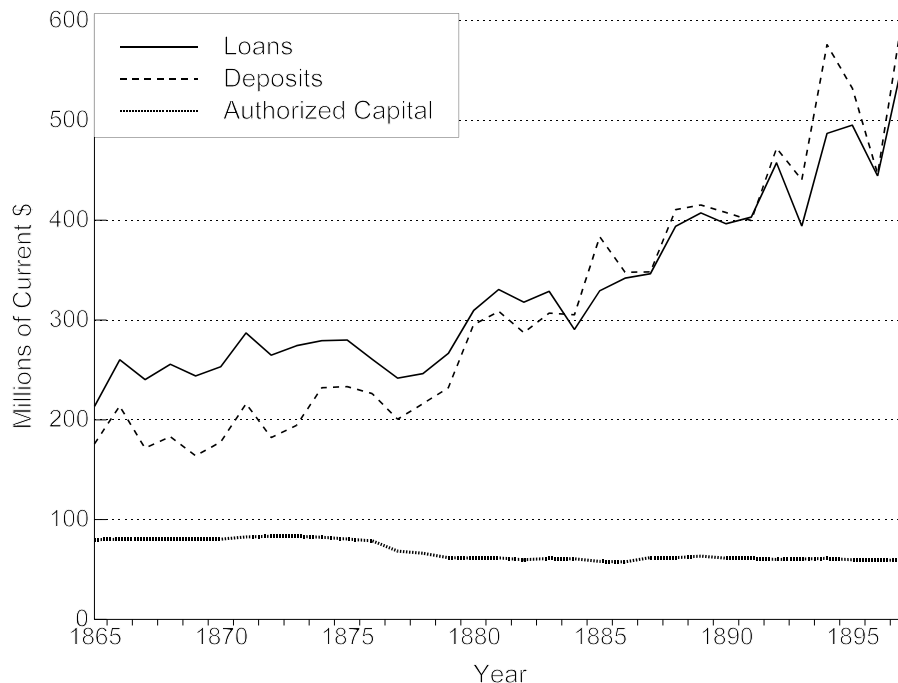


Fig. 1. Loans, individual deposits, and authorized capital of traded New York City banks, 1865-1897. Source: *The Commercial and Financial Chronicle*, various issues.

monitoring of bank loans after 1870 contributed to lower interest rates on loans and higher interest rates on deposit in New York City’s increasingly competitive banking sector, and that this in turn increased throughput by attracting loan applications and fresh deposits. In light of these findings, it is important to our understanding of *how* financial institutions evolve to consider the efficiency with which information reached the public to affect both the size of the deposit base and its distribution across banks in the nation’s largest central reserve city. I propose that an efficient market for banking capital contributed to the unbalanced deposit growth that the data show among New York banks by signaling individual depositors about the condition of particular institutions. In turn, depositors looked to these price signals rather than to more easily manipulated balance sheet quantities when deciding where to place their surpluses.

Since demandable debt emerged in the United States early in the 19th century and in theory possesses the desirable feature of aligning the interests of bankers and less-informed depositors through a threat of liquidation (Calomiris and Kahn 1991), its slow adoption was likely to have resulted from informational frictions that remained quite severe prior to the Civil War. My hypothesis suggests that institutional changes among New York City banks after 1870, including moves toward greater efficiency and transparency, increased public confidence in the safety of demand deposits. At a time when bank stock prices were generally trending upward but varied widely across individual banks, confidence in the informational content of the equity market was instrumental in generating a price elasticity of deposits large enough to direct the path of the expansion.

The proposition implies that the trading of common stocks had become such an integral part of New York's postbellum landscape that individuals who did not invest directly in bank stocks could access price information from the press and thus, both directly and indirectly, from the city's growing community of finance professionals. This was certainly the case in New York, where the practice of stock trading had developed more rapidly since 1800 than in any other nation or epoch in history, with bank stocks leading the way (Rousseau and Sylla 2005).

To facilitate testing of this hypothesis, I have constructed a new bank-level data set containing annual observations of prices, dividends, and balance sheet quantities from the *Commercial and Financial Chronicle*, the *New York Times*, and the *Annual Report of the Comptroller of the Currency*. The data, which cover 1866 through 1897 – the period when deposits grew most rapidly – allow construction of price indexes and dividend yields for New York City's traded banks. More important, they offer an opportunity to trace and compare the dynamic responses of deposits to fluctuations in bank stock prices as well as various accounting

measures of bank performance.

The empirical analysis, which uses the generalized method of moments techniques of Holtz-Eakin et al. (1988) and Arellano and Bond (1991) to estimate dynamic panel models of deposit adjustment, finds that individuals did indeed place their surpluses in banks with strong price performance. At the same time, institutional depositors, who likely had better information about the soundness of potential correspondent banks, relied less upon prices. Neither type of depositor seems to have responded vigorously to signals that were regularly available from published balance sheets, such as a bank's surplus and undivided profits.

My emphasis on the equity market in explaining the rise of deposit banking in New York City seems somewhat removed from traditional legislative explanations for the rise of deposits in the nation as a whole. For example, when Congress announced a prohibitive 10 percent tax on the notes of state-chartered banks to take effect on July 1, 1866, state banks were left to choose between exiting the industry altogether, converting to national charters (with which they could continue to issue notes), or relying on deposits as an alternative means of funding earning assets.³ Deposits did not rise immediately, however, because most state banks quickly converted to national charters. But a prohibition on mortgage lending included in the National Banking Acts and decreasing profitability of note issue due to rising prices of collateral bonds led to a resurgence of state banks by 1880. At the same time, deposits expanded as individuals grew more accustomed to check money and to the liquidity and transactions services that deposit accounts could provide (Sylla 1969, p. 663).

But legislative factors were much less at play in New York City where most banks had

³ There were 1,466 state banks in operation when the first National Banking Act was passed in 1863, and this number fell to 1,089 by mid-1864, to 349 by mid-1865, and to only 247 by mid-1868 (Carter et al., 2006, Vol. 3, series Cj149, p. 633).

converted to national charters by 1866 and the return of state banking seen elsewhere after 1880 did not materialize. As the nation's only central reserve city under the National Banking laws until 1887, when St. Louis and Chicago were also designated, New York did of course see large inflows of interbank deposits from elsewhere in the nation (see James and Weiman 2010a, 2010b), but the evidence presented here suggests that these deposits were much less stock-price elastic than those placed by individuals.

The paper is organized as follows. Section 2 describes the evolution of the postbellum market for New York bank stocks. Section 3 reviews the empirical methodology. Section 4 establishes that medium-term price movements provided important information to depositors in choosing among deposit banks and predicted changes in the distribution of deposits more effectively than fundamental balance sheet items. Section 5 concludes.

2. The market for banking equities in New York City

2.1. Overview

The market for U.S. bank stocks made a strong start in 1791 with what in retrospect stands as the nation's most successful initial public offering – that of the First Bank of the United States. As individual states proceeded to grant special charters to more than 800 banks over the next five decades, the transfer of bank shares became familiar transactions in the money centers of New York, Boston, Philadelphia and Baltimore. Rousseau and Sylla (2005) report that the number of New York City banks with price quotations in the local newspapers rose from only three in 1800 to 25 in 1825 and 36 by 1850. Issues of the *Commercial and Financial Chronicle* show that this growth continued unabated through the turn of the twentieth century, with the number of bank listings rising to 46 by 1866 to 50 in 1880 and 79 by 1897.

Banks were among the more frequently quoted stocks in the early years of the NYSE and comprised more than 50 percent of total listings as late as 1856, but the stock market itself remained relatively small. By 1870, however, investment bankers had turned away from bank stocks, a large portion of which were held by institutional investors, in favor of riskier but higher-return railroad securities. Trades of bank stocks on the NYSE continued to appear on the official daily listings throughout the 1866-97 period, but their volume on the exchange had slowed considerably by 1880.

It was not that trading in bank stocks had stopped, however. Rather, banking equities had attracted the interest of a different class of brokers and dealers who traded among themselves and with the public in their offices and at open-air auctions. This over-the-counter market for bank stocks was sufficiently active to yield regular brokers' price quotations, which appeared several times per week in the financial press under the category of "local securities" (along with utilities, insurance companies, and city debt issues). And though it is not possible to estimate the volume of trades in bank stocks that took place in this market by the end of the century, the regular publication of brokers' quotations and actual sales suggests that there was considerable public interest in their price and dividend records.

2.2. Dividends and prices

Fig. 2 presents average annual dividend yields for all New York City banks listed in the *Commercial and Financial Chronicle* between 1866 and 1897. Table A.1 in the Appendix presents these new data series in tabular form along with the others constructed in this section. Table A.2 in the Appendix provides a list of the individual banks and the years for which source data are available for each. The yields combine the averages of brokers' bid and ask prices

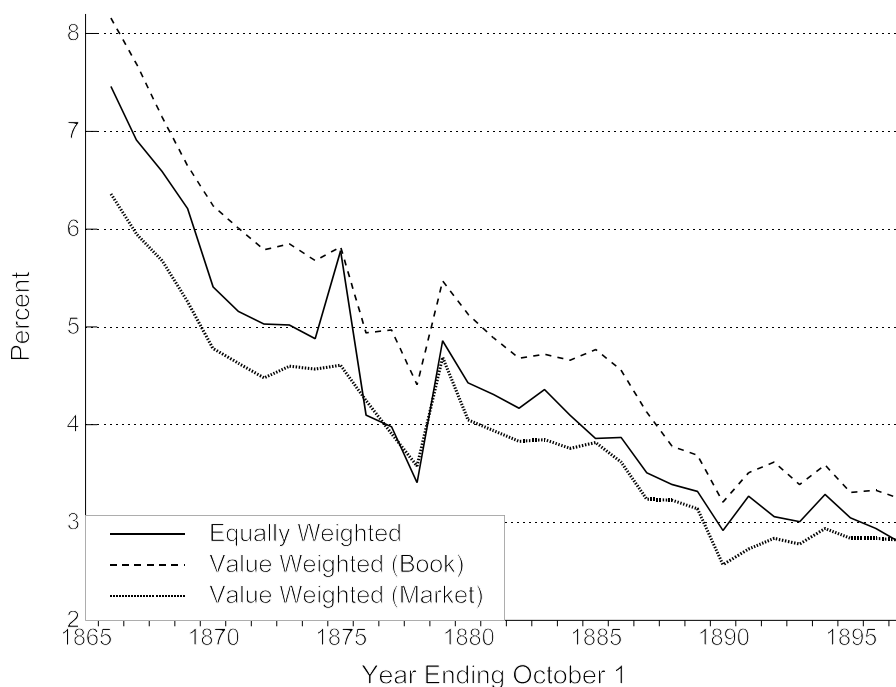


Fig. 2. Dividend yields for traded New York City Banks, 1866-1897. Source: *The Commercial and Financial Chronicle*, various issues.

published closest to October 1 with any dividends paid over the subsequent one-year period.⁴ A bank qualifies for inclusion in the index by having both a dividend and price reported in a given year. Since par and book capital are available for all banks with price observations, the series weighted by book and market values have the same coverage as the equally-weighted yields.⁵

The striking feature of Fig. 2 is the steady decline in dividend yields from more than six

⁴ This timing, which is used throughout the paper, allows information on bank prices and dividends from the newspapers to match the timing of the annual Comptroller's reports of balance sheet items for the national banks in the sample. In nearly all years, the Comptroller requested this information within ten days of October 1. The synchronization is critical for the econometric analysis presented in Section 4.

⁵ The value weight for a bank in a given year is obtained by dividing book capital by par value to obtain the number of outstanding shares, and then multiplying by the share price on October 1. This quantity is then divided by its sum for all banks in the sample in that year.

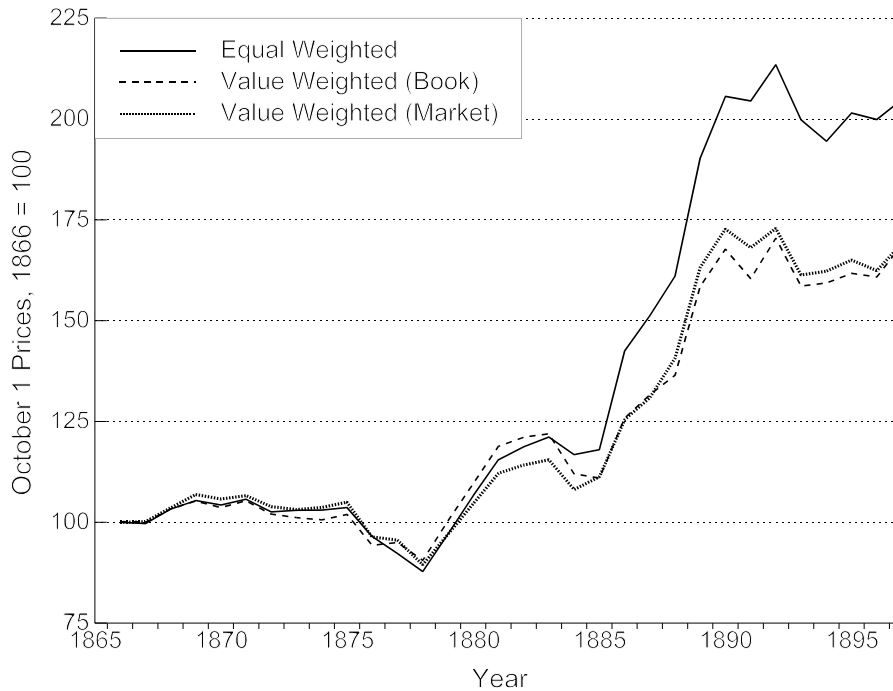


Fig. 3. Price indexes for traded New York City banks, 1866-1897. Source: *The Commercial and Financial Chronicle*, various issues.

percent in the years immediately following the Civil War to about three percent by the 1890s. At first glance, this simply seems to reflect the general decline in dividends for stocks traded on the NYSE at this time. Unlike other NYSE stocks, however, the sharp decline in bank dividend yields between 1877 and 1890 was due to a sustained rise in bank stock prices rather than any dramatic change in dividend policy.⁶ This rise is evident in Fig. 3, which shows equal and value-weighted price indexes for traded New York City banks.⁷ Following a decade with no

⁶ For example, Cowles et al. (1939, table Y-1, p. 270) reports that average dividend yields of all NYSE stocks fell from 5.81 percent annually in the 1870s to 4.75 percent in the 1880s and to 4.0 percent in the 1890s. The tendency toward lower dividend yields prevailed in other markets as well. For example, Rousseau (2009) shows that dividend yields of listed manufacturing firms fell by over 50 percent in the Boston market between 1865 and 1897.

⁷ In any given year, the price indexes include firms with observations on or around October 1 of both the current year and the previous one. The weighted sum of the percentage changes in price

significant advance at the start of the sample, bank stock prices rose more than 65 percent between 1877 and 1890 on both an equal and book-weighted basis, and nearly doubled when weighted by market capitalization. Since this was a time of gradual price deflation in the United States, the rise in bank values is even more dramatic in real terms. This stands in contrast to movements in the general level of NYSE stock prices, for which the index in Cowles et al. (1939, chart 7, p. 59) shows no signs of advance between 1880 and 1900.

Fig. 4 presents dividends as percentages of par values, and indicates that the New York banks had begun to smooth dividends as early as 1875. The figure excludes banks with market prices that exceed six times par to remove the influence of those that did not adjust their par values to reflect rising prices of their shares.⁸ Restricting the sample in this way does not render the coverage in Fig. 4 significantly different from that of Fig. 2 until after 1887, when eliminations, which had averaged only three banks per year between 1866 and 1886, rose sharply to an average of 14 banks per year between 1887 and 1897.

The reluctance of most banks to raise dividends to reflect increases in their stock prices suggests either uncertainty among bankers about the sustainability of higher dividends or a shift in the New York market for bank equities that rendered dividends less important for distributing earnings and signaling future firm prospects. The latter explanation is more likely if prices were informative and investors came to expect a deepening equity market to facilitate the liquidation

for the included firms then serves as a multiplier to update the preceding index number. The indexes use 100 as the base value in 1866. This “chaining” technique resembles that described in Cowles et al (1939, pp. 17-25).

⁸ The most extreme observations are associated with the Chemical, Fifth Avenue and First National banks, all of which had par values of \$100 and yet were quoted on October 1, 1897 at prices of \$4250, \$3300, and \$2700 respectively! The Chemical Bank sold at ten times par from the time of its first appearance in the price indices in 1872, while the prices of the Fifth Avenue and First National Banks did not reach this level until the late 1880s. Par dividends of 100 percent or more were common for these particular banks.

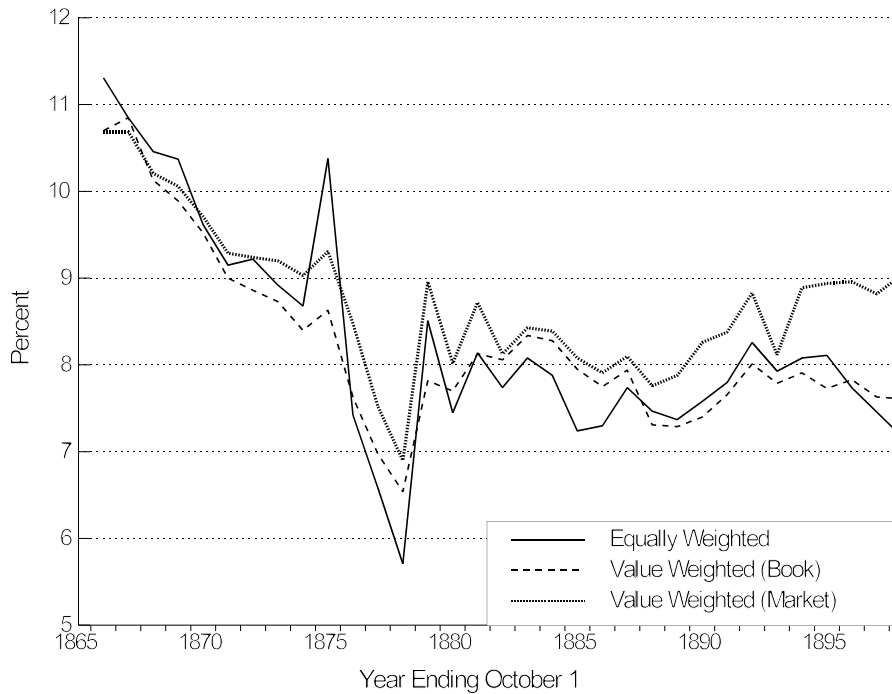


Fig. 4. Dividends as percent of par value for traded New York City banks, 1866-1897. Source: *The Commercial and Financial Chronicle*, various issues.

of assets at prices that reflected their intrinsic valuations. In this case shareholders might prefer choosing when to take larger-than-usual profits or losses rather than insisting that banks signal their condition through more variable dividend distributions. Moreover, given that bank stocks had become quite profitable investments by the 1880s, with returns outperforming NYSE stocks by an average of more than 2.8 percent per year in that decade, owners would not wish to alarm depositors, who had become the main source of the higher earnings, by reducing par dividends.

2.3 Innovation and sources of depositor confidence

Despite sometimes being characterized as a time of inefficiency and excessive regulation (e.g., Grant 1992), the New York banking sector adopted many new and innovative practices in the late 19th century that encouraged deposit growth. By 1866, for example, the clearing house,

which had been established in 1853, was actively arranging for interbank clearances between member banks and their correspondents. The expanded use of clearing facilities reduced balances in the process of collection and allowed banks to make more productive use of their funds. New York's banks had also accumulated a large share of the nation's interbank balances. This made membership in the clearing house all the more important, and nearly all of the city's banks had joined by 1870. Membership may have also sent a positive signal of operational soundness to potential depositors and those who traded banking equities because member banks were regularly listed on the stock exchange and in over-the-counter markets. Since the financial press published weekly balance sheet statements for clearing house members, there was also a good deal of other public information about their condition that was not as readily obtained for nonmembers and banks outside of the city.

The rise of a market for call loans after 1880 presented opportunities for the growing deposit base to fund screened, monitored and easily liquidated loans that in turn facilitated the transfer of balances from the short-term to the long-term capital market (Sylla 1969). Call loans made by New York banks grew from \$56 million in 1875 to more than \$200 million by 1897, with their share in total loans rising from one-third to more than one-half over the same period (Myers 1931, p. 272, and Annual Comptroller's Reports).

New York banks also turned to the market for commercial paper with increasing frequency to make investments for themselves as well as their correspondents (Davis 1965; James 1978, pp. 174-98). The market was encouraged by a shift away from insisting upon two-name paper in favor of accepting single-name paper, which grew in popularity as screening improved and the more professional nature of the industry made banks less hesitant to liquidate the paper upon maturity. Though the market for commercial paper was still developing in 1880,

by 1895 it was already responsible for marked increases in the diversification of bank portfolios that had reduced the vulnerability of assets to distress liquidations (Myers 1931, p. 326).

Along with commercial paper came the creation of credit departments within New York banks to advise correspondents and individual clients about direct investments in commercial enterprises. The Importers' and Traders' Bank was the first to establish such a department in 1880 and other banks quickly followed. The credit departments established more objective means for evaluating the condition of loan recipients to promote more efficient deployment of their available funds. By 1894, borrowers were in most cases required to provide a statement of condition with their loan applications. Since commercial loans were often renewed, monitoring and the establishment of long-term customer relationships became particularly important for anticipating financial difficulties and improving recovery rates through planned liquidations and restructuring.

In 1880 only about half of the national banks in New York City paid interest on deposits, but this percentage rose rapidly over the next five years so that by 1886 all clearinghouse banks did. This provided direct motivation for more individuals to place their excess funds with banks.

The innovations described above became important features of New York's banking terrain. But the extent to which individual banks adopted them and put them to proficient use was difficult for individual depositors to discern. Prices, on the other hand, could potentially convey information about these more subtle sources of profitability that might elude the casual reader of a bank's balance sheet. This is especially true if equity holders were better informed than the general public about the underlying condition of individual banks and traded on this information. This would allow individual depositors in effect to treat the stock price as a sufficient statistic for bank soundness. The next section two sections explores this proposition

using bank-level data.

3. Dynamics of informational transfer and deposit growth

3.1. Model selection

The preceding discussion points to a process of dynamic adjustment through which individual depositors gained confidence in banks by observing medium-term stock price fluctuations and then made deposits based upon these signals. Evidence that changes in the prices of individual bank stocks from one year to the next influenced the time path of deposits for individual banks would offer support for this proposition. Items on bank balance sheets that reflected sound management and a record of profitability, such as large surpluses and undivided profits, might send similar signals to potential depositors. If depositors did not have ready access to balance sheets, however, or were unable to interpret fluctuations therein from week to week, or if balance sheets failed to reflect innovative activities pursued by individual banks, the sheets themselves would be less important than price signals in attracting deposits. This is even more likely if depositors recognized that the balance sheets were susceptible to the manipulation or “window dressing” that was common in 19th century banking practice. Finally, though deposit growth in a bank could certainly affect its stock price due to scale economies in lending or some other reason, an inability to identify feedback of this type in the data would bolster support for prices as a driving force behind the deposit expansion.

To model this process, I begin by examining dynamic interactions in multivariate systems that include total deposits (i.e., both individual and interbank), the sum of surplus and undivided profits, and stock price. Because surplus and undivided profits are available at the bank level from the annual *Comptroller's Reports* only for nationally-chartered banks and only at the call

date closest to October 1, the annual observations for prices and deposits are sampled at approximately the same time.

A finding that price fluctuations directed the expansion of total deposits, however, by itself would not shed light on whether individuals or institutions were the primary users of these signals. Such a distinction would be particularly important to draw given that balances “due to other banks” grew from \$84 million in 1872 to \$140 million in 1885 to an astounding \$288 million by 1897 for the national banks in New York City. These three figures represent 32 percent, 41 percent, and 44 percent of total deposits (*Comptroller’s Reports*, various years). Further, institutional investors would have had better access to both inside information and other less readily-obtained public information about the soundness of a bank than the typical depositor, and would be in a better position to monitor the performance of a bank’s assets, particularly under a banking system where excess balances were often placed as call loans on the stock market. This suggests that individual deposits should be more sensitive to stock price changes than interbank deposits. For this reason, I expand the first set of dynamic systems to alternately include individual deposits and balances “due to” other banks.

Fig. 4 showed that New York’s clearinghouse banks had been smoothing dividends by the 1870s, which suggests that much of their informational content had already been muted, rendering dividends less important than market prices in building confidence among depositors. Given the common belief that the stability of dividend streams and fixed par values led 19th century equities to function essentially like bonds (Baskin 1988, pp. 231-232), I next consider the possibility that dividends still contained information about a bank’s condition beyond that conveyed by price in a second set of dynamic systems that use dividend yields in place of surplus and undivided profits.

The investigation employs a series of vector autoregressive models using panel data. I estimate these systems using an adaptation of the generalized method of moments (GMM) technique developed by Arellano and Bond (1991) and Holtz-Eakin et al. (1988). The approach begins with a dynamic specification in levels and then differences it to eliminate bank-specific effects such as differences in management styles that by virtue of their likely correlation with the included system variables would otherwise contribute to omitted variable bias. Of course, to the extent that prices and balance sheet items are related, collinearity among regressors may reduce the apparent impact of stock prices from what might be expected in simpler models. The findings thus offer conservative estimates of the importance of price discovery in deposit growth. After reporting the directions of timing relationships in the VARs with F-tests for block exogeneity, I evaluate the relative size of these effects over time by computing the impulse responses.

3.2. Estimation

In a panel of N banks over T years, the dynamic systems of interest have the form:

$$\begin{aligned}
 d_{i,t} &= \sum_{j=1}^k \alpha_{1,j} d_{i,t-j} + \sum_{j=1}^k \beta_{1,j} s_{i,t-j} + \sum_{j=1}^k \gamma_{1,j} p_{i,t-j} + \eta_{1,i} + \Phi_{1,t} + \varepsilon_{1,i,t} \\
 s_{i,t} &= \sum_{j=1}^k \alpha_{2,j} d_{i,t-j} + \sum_{j=1}^k \beta_{2,j} s_{i,t-j} + \sum_{j=1}^k \gamma_{2,j} p_{i,t-j} + \eta_{2,i} + \Phi_{2,t} + \varepsilon_{2,i,t} \\
 p_{i,t} &= \sum_{j=1}^k \alpha_{3,j} d_{i,t-j} + \sum_{j=1}^k \beta_{3,j} s_{i,t-j} + \sum_{j=1}^k \gamma_{3,j} p_{i,t-j} + \eta_{3,i} + \Phi_{3,t} + \varepsilon_{3,i,t}
 \end{aligned}
 \tag{1a,b,c}$$

where, in the first system discussed below, $d_{i,t}$ is deposits of bank i at time t , $s_{i,t}$ is the sum of surplus and undivided profits, $p_{i,t}$ is the average of the bid and ask prices for the bank's stock, η_i is a bank-specific fixed effect, Φ_t is a global time effect, and $\varepsilon_{i,t}$ is a random disturbance whose

distribution approximates the normal. The specification of (1) as a set of projection equations implies that the error terms $\varepsilon_{i,t}$ are orthogonal to the fixed and time effects as well as lagged values of the endogenous variables. The model also includes the standard assumptions that the errors have a positive variance and are uncorrelated across cross-sectional units and time. A fixed effects specification is preferable to a random effects alternative because the η_i are likely to represent omitted bank-specific characteristics that are correlated with the other explanatory variables, since the generalized least squares estimator for the random effects model under these conditions will be biased. The time effects allow for trending behavior in the system variables.

Since the least squares dummy variable (LSDV) estimator is known to produce biased coefficient estimates when applied to equations with lagged values of the dependent variable and fixed effects in a data set with a small time dimension, the fixed effects are first removed by differencing.⁹ The first equation of the VAR (1a) then becomes

$$\begin{aligned} (d_{i,t} - d_{i,t-1}) = & \sum_{j=1}^k \alpha_{1,j} (d_{i,t-j} - d_{i,t-j-1}) + \sum_{j=1}^k \beta_{1,j} (s_{i,t-j} - s_{i,t-j-1}) \\ & + \sum_{j=1}^k \gamma_{1,j} (p_{i,t-j} - p_{i,t-j-1}) + (\Phi_{1,t} - \Phi_{1,t-1}) + (\varepsilon_{1,i,t} - \varepsilon_{1,i,t-1}) \quad (2) \end{aligned}$$

with the other equations of the system defined similarly. The form of equation (2) makes clear the bias that may result from least squares estimation due to the possible correlation between the lags of the endogenous variables and the errors. Arellano and Bond (1991) propose a linear instrumental variables technique that uses the predetermined lags of the system variables as instruments to exploit a potentially large set of overidentifying restrictions and deliver consistent

⁹ Nickell (1981) derives the bias of the OLS estimator of the coefficient on the lagged dependent variable under these conditions. Judson and Owen (1999) show that this bias can be as much as 20% even as T approaches 30.

coefficient estimates. The technique also permits processing of an unbalanced panel. The VAR models take the form

$$\begin{aligned}
\bar{d}_{i,t} &= \sum_{j=1}^k \alpha_{1,j} \bar{d}_{i,t-j} + \sum_{j=1}^k \beta_{1,j} \bar{s}_{i,t-j} + \sum_{j=1}^k \gamma_{1,j} \bar{p}_{i,t-j} + \bar{\Phi}_{1,t} + \bar{\varepsilon}_{1,i,t} \\
\bar{s}_{i,t} &= \sum_{j=1}^k \alpha_{2,j} \bar{d}_{i,t-j} + \sum_{j=1}^k \beta_{2,j} \bar{s}_{i,t-j} + \sum_{j=1}^k \gamma_{2,j} \bar{p}_{i,t-j} + \bar{\Phi}_{2,t} + \bar{\varepsilon}_{2,i,t} \\
\bar{p}_{i,t} &= \sum_{j=1}^k \alpha_{3,j} \bar{d}_{i,t-j} + \sum_{j=1}^k \beta_{3,j} \bar{s}_{i,t-j} + \sum_{j=1}^k \gamma_{3,j} \bar{p}_{i,t-j} + \bar{\Phi}_{3,t} + \bar{\varepsilon}_{3,i,t}
\end{aligned} \tag{3a,b,c}$$

where \bar{d} , \bar{s} , \bar{p} , Φ , and $\bar{\varepsilon}$ are first differences, and the errors of the transformed equations satisfy the orthogonality conditions

$$E[d_{i,r} \bar{\varepsilon}_{i,t}] = E[s_{i,r} \bar{\varepsilon}_{i,t}] = E[p_{i,r} \bar{\varepsilon}_{i,t}] = 0 \quad r < (t-1). \tag{4}$$

These conditions imply that under the assumption of serially uncorrelated errors, the vector of instrumental variables available to identify the parameters of equation (3a) has the form

$$z_{i,t} = [d_{i,t-2}, \dots, d_{i,1}, s_{i,t-2}, \dots, s_{i,1}, p_{i,t-2}, \dots, p_{i,1}]. \tag{5}$$

Define Z_i^* as a block diagonal matrix whose r th block is given by (5) for $r=1, \dots, T-2$. Then the matrix of instrumental variables for each equation of the VAR is $Z = (Z_1^*, \dots, Z_N^*)'$. Define X as the $N(T-k-1) \times q$ design matrix stacked by cross-sectional unit with typical row

$$\bar{x}_{i,t} = [\bar{d}_{i,t-1}, \dots, \bar{d}_{i,t-k}, \bar{s}_{i,t-1}, \dots, \bar{s}_{i,t-k}, \bar{p}_{i,t-1}, \dots, \bar{p}_{i,t-k}, \Phi_t]. \tag{6}$$

The GMM estimator for the coefficient vector $[\alpha_1, \dots, \alpha_k, \beta_1, \dots, \beta_k, \gamma_1, \dots, \gamma_k, \phi_1, \dots, \phi_T]$ is then

$$\hat{\delta} = (X' Z A_N Z' X)^{-1} X' Z A_N Z' Y \tag{7}$$

where Y is a $(T\text{-lag-}1)N \times 1$ vector of the stacked \bar{y}_i dependent variables. A_N is given by

$$A_N = \left(\frac{1}{N} \sum_{i=1}^N Z_i^*{}' H Z_i^* \right)^{-1} \quad (8)$$

where H is a $T-2$ square matrix with twos in the main diagonals, minus ones in the first subdiagonals, and zeros otherwise.¹⁰

Granger-causal patterns that may arise among the system variables are of particular interest. To facilitate this analysis, I construct F -tests for block exclusion based on the difference in criterion functions of the restricted and unrestricted models of the form

$$F(r, obs - q) = \frac{\left[\left(e_R Z A_N Z' e_R \right) - \left(e_U Z A_N Z' e_U \right) \right] / r}{e_R' e_R / (obs - q)} . \quad (10)$$

where e_R and e_U are the residuals from the restricted and unrestricted models respectively, r is the number of restrictions, and obs is the number of observations in the panel.

4. Results and discussion

Table 1 presents estimates from the first set of panel VARs, which include bank stock prices and the sum of surplus and undivided profits (hereafter referred to as simply “surplus”) in the baseline specification. Total deposits and their components – individual deposits and balances due to other banks – alternate as the third variable for the systems in the left, center, and right panels, respectively. Significance levels of F -tests for the exclusion of each variable block appear in the lower part of the table. The likelihood ratio tests described in Holtz-Eakin et al. (1988) select models with a lag order of two.

¹⁰ This produces the one-step (GMM1) estimator. A two-step (GMM2) estimator can also be computed that uses the GMM1 residuals to refine H . Monte Carlo evidence, however, suggests that GMM1 in most cases produces less-biased and more efficient estimates than the GMM2 alternative (e.g., Arellano and Bond 1991; Judson and Owen 1999).

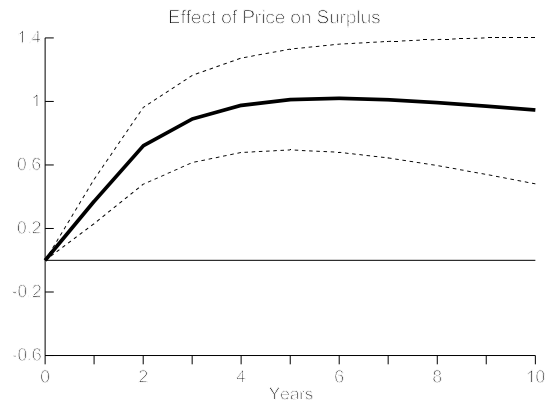
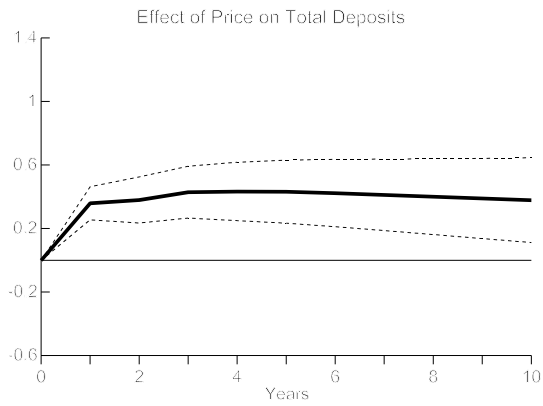
Table 1

Panel GMM estimates of VAR systems with deposits, surplus and prices of banks traded in the New York stock market, 1866-1897

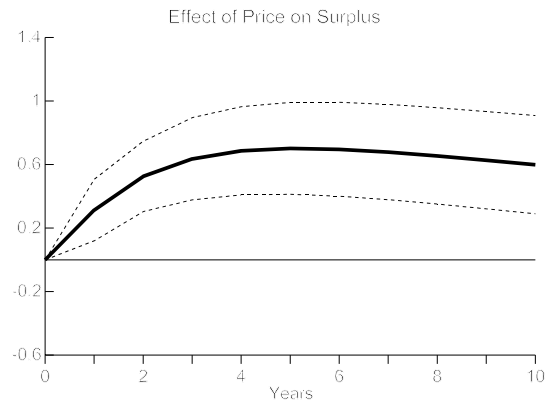
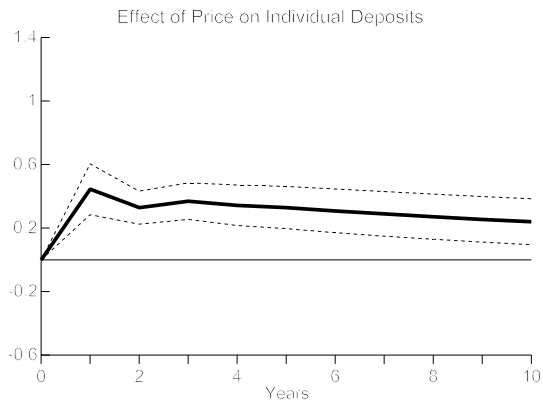
	Deposits	Surplus	Price	Ind. Dep.	Surplus	Price	Due to	Surplus	Price
Deposits ₁	0.3717** (.0979)	-0.0350 (.0568)	0.0485* (.0324)	0.4270** (.0470)	0.0745* (.0499)	0.0378* (.0251)	0.5371** (.0326)	0.0158 (.0180)	-0.0115** (.0059)
Deposits ₂	0.1052** (.0537)	0.0344 (.0720)	-0.0101 (.0257)	0.1350** (.0290)	0.0160 (.0590)	-0.0117 (.0196)	0.0657** (.0371)	-0.0187 (.0226)	0.0079 (.0076)
Surplus ₁	0.0130 (.0346)	0.6578** (.1319)	0.0682** (.0297)	-0.0180 (.0416)	0.6417** (.1054)	0.0603** (.0273)	0.1197 (.1134)	0.7487** (.0750)	0.0595** (.0331)
Surplus ₂	-0.0210 (.0352)	-0.0333 (.0685)	-0.0516** (.0278)	-0.0150 (.0425)	-0.0032 (.0578)	-0.0362 (.0287)	-0.0334 (.1278)	-0.0397 (.0761)	-0.0156 (.0284)
Price ₁	0.3567** (.1053)	0.3700** (.1389)	0.7719** (.0824)	0.4469** (.1618)	0.3108* (.1938)	0.7657** (.0730)	0.2045 (.4818)	0.3925** (.1926)	0.7499** (.0810)
Price ₂	-0.0308 (.0972)	0.2126* (.1618)	0.1186** (.0620)	-0.1958 (.1735)	0.0659 (.1555)	0.1155** (.0530)	-0.2611 (.3279)	-0.0435 (.1666)	0.0720* (.0522)
No. banks (observations)	53 (1112)	53 (1106)	53 (1103)	53 (1107)	53 (1107)	53 (1103)	53 (1051)	53 (1053)	53 (1052)
<i>Significance Levels</i>									
F-Deposits	NA	.853	.393	NA	.295	.336	NA	.780	.702
F-Surplus	.909	NA	.050	.849	NA	.107	.570	NA	.125
F-Price	.001	.000	NA	.010	.001	NA	.690	.009	NA
Sargan Test	.999	.981	.999	.999	.826	.999	.999	.999	.999

The table reports GMM estimates from VARs corresponding to equations (3a)-(3c) in the text that use two lags of the system variables with robust standard errors in parentheses. Year effects are included in the equations but not reported. * and ** denote statistical at the 10 and 5 percent levels respectively. The system in the left panel includes the total deposits, surplus and undivided profits, and stock price, while the center and right panels replace total deposits with individual and interbank deposits, respectively. The significance levels of F-statistics for block exclusion and Sargan tests of the overidentifying restrictions are reported in the lower part of the table.

Panel A: System including total deposits, surplus and prices



Panel B: System including individual deposits, surplus and prices



Panel C: System including balances “due to” other banks, surplus and prices

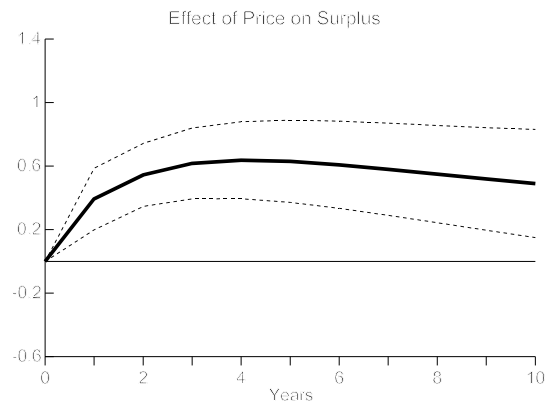
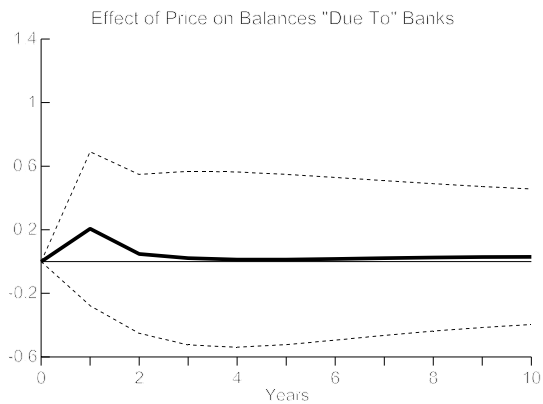


Fig. 5. Selected impulse response functions.

In the system reported in the left panel of Table 1, the coefficients on bank stock prices have a positive sum in the equations that include total deposits and surplus as the independent variables, with F-tests that are significant at the 1 percent level. Total deposits, on the other hand, have no significant effect on surplus or prices. The Sargan tests do not reject the validity of the instrument set for any of the equations. The findings are consistent with a link from rising stock prices to growth in the deposit base. Since stock prices do not respond to fluctuations in deposits, it is unlikely that the strong response of deposits to price signals is a result of omitted variables.

The center panel in Table 1 shows that bank prices have a similar effect on the individual component of deposits. The system reported in the right panel, however, shows that balances “due to” other banks are unaffected by fluctuations in bank prices. This suggests that the effects of prices on total deposit growth enter through the individual component, and supports the view that smaller depositors looked to stock prices as important signals of a bank’s soundness.

Fig. 5 presents the cumulative responses of deposits and surplus over a ten-year period to one-time price shocks in all three systems.¹¹ As suggested by the *F*-tests, total deposits and individual deposits have lasting responses to price signals that are economically important. For example, panel A relates an increase in stock price of 1 percent, or about \$1 per share for a typical bank stock with a par value of \$100, to an increase of about 0.4 percent in total deposits and 1 percent in surplus after five years. For the average bank in the sample, which had \$5.4

¹¹ The plots in Fig. 5 trace the responses of bank deposits and surpluses to one percent changes in stock prices. Using Monte Carlo integration, the thick solid lines plot the mean impulse responses that result from 5,000 random draws from the estimated distribution of the coefficients in each system. The dashed lines are one standard error bands. The multiplier responses can be interpreted as permanent changes in the log level of deposits or surplus over a ten-year horizon.

million in total deposits and \$0.6 million in surplus and undivided profits, a \$10 change in the stock price would thus imply an increase of \$0.22 million in total deposits and \$60,000 in surplus after five years. The responses for the system with individual deposits (Panel B) are qualitatively similar those in Panel A, though the initial response of individual deposits to a price shock is sharper. Panel C, on the other hand, shows no effect of prices on balances “due to” banks.

In Table 2, annual dividends replace the sum of surplus and undivided profits in each system. The findings are similar to those obtained in Table 1, with bank stock prices Granger-causing total deposits (left panel) at the 5.5 percent level and dividends at the 1 percent level. The capital market also appears to be more responsive to dividend declarations than the amount of surplus and undivided profits reported on the balance sheet, with dividends Granger-causing prices at the 5 percent level. Prices Granger-cause individual deposits and dividends at the 1 percent level (center panel). Balances “due to” other banks are only marginally responsive to price changes (right panel). Further, it is interesting that these interbank balances appear to have a negative impact on both future dividends and prices. This suggests that inflows of the 19th-century equivalent of modern “hot money” were not necessarily viewed by investors as conducive to strong bank performance, nor were they associated with increases in dividends.

The impulse responses depicted in Fig. 6 confirm the main results, with the response of individual deposits to price shocks again much sharper, persistent, and precisely estimated than the response of interbank balances. The size of the effects on individual deposits (Panel B) are roughly the same as those obtained for the system with surplus (Fig. 5), while the effects on total deposits, though still positive and persistent, are somewhat smaller.

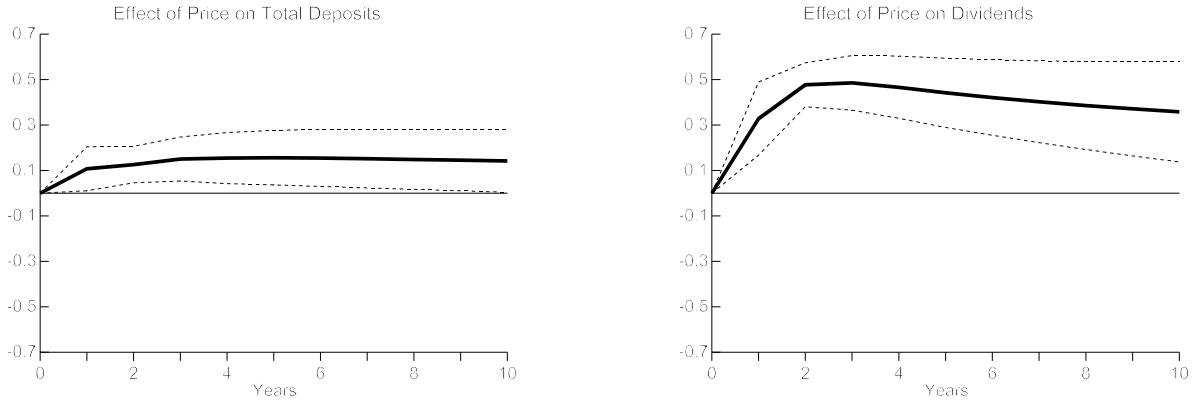
Table 2

Panel GMM estimates of VAR systems with deposits, dividends and prices of banks traded in the New York stock market, 1866-1897

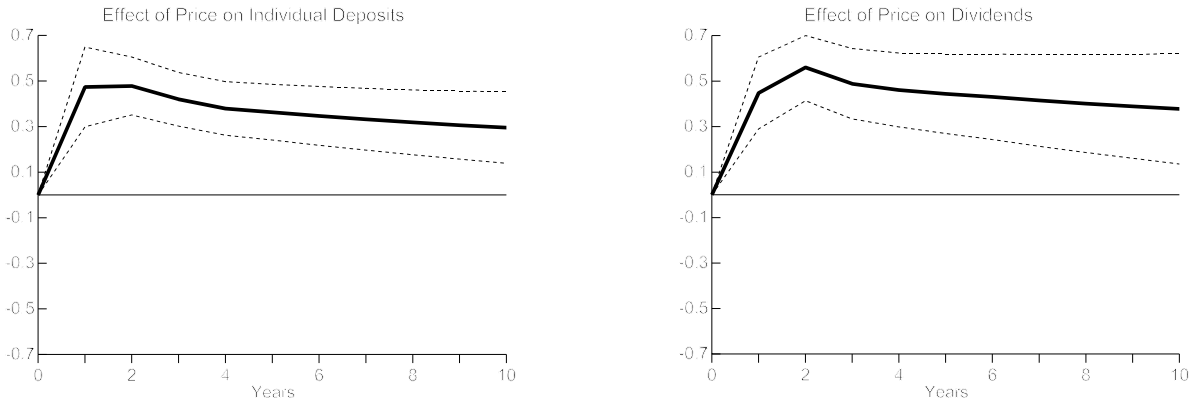
	Deposits	Dividend	Price	Ind. Dep.	Dividend	Price	Due to	Dividend	Price
Deposits ₁	0.3816** (.0796)	-0.0584 (.0575)	0.0090 (.0349)	0.3858** (.1001)	-0.0969** (.0485)	0.0163 (.0242)	0.6087** (.0654)	-0.0637 (.0265)	-0.0209** (.0107)
Deposits ₂	0.1876** (.0597)	-0.0247 (.0427)	-0.0023 (.0249)	0.1612** (.0606)	0.0414 (.0590)	0.0089 (.0225)	0.0921** (.0534)	0.0450** (.0173)	0.0385** (.0197)
Dividends ₁	-0.0057 (.0475)	0.1116* (.0723)	0.0753** (.0275)	-0.0096 (.0594)	0.0252 (.0872)	0.0269 (.0357)	0.1883* (.1183)	0.0287 (.0684)	0.0039 (.0438)
Dividends ₂	-0.0124 (.0692)	-0.0567 (.1079)	-0.0185** (.0407)	-0.0761 (.0974)	-0.0096 (.0749)	0.0222 (.0429)	0.1300 (.1549)	0.0094 (.0547)	-0.0173 (.0288)
Price ₁	0.2237** (.1248)	0.5161** (.2486)	0.7593** (.0947)	0.5198** (.2144)	0.6355** (.3200)	0.8093** (.0917)	0.5377* (.3445)	0.9899** (.2619)	0.8067** (.1098)
Price ₂	-0.0602 (.1229)	0.0866 (.2050)	0.0029 (.0987)	-0.1388 (.2271)	0.0883 (.2571)	0.0726 (.0053)	-0.6588 (.2857)	-0.1335 (.2233)	-0.0213 (.0900)
No. banks (observations)	69 (1365)	69 (1333)	69 (1353)	51 (1014)	51 (994)	51 (1009)	51 (962)	51 (945)	51 (962)
<i>Significance Levels</i>									
F-Deposits	NA	.360	.956	NA	.025	.668	NA	.007	.006
F-Dividends	.966	NA	.020	.505	NA	.500	.323	NA	.873
F-Price	.055	.000	NA	.000	.000	NA	.102	.000	NA
Sargan Test	.999	.096	.342	.999	.987	.460	.999	.978	.975

See note to Table 1.

Panel A: System including total deposits, dividends and prices



Panel B: System including individual deposits, dividends and prices



Panel C: System including balances "due to" other banks, dividends and prices

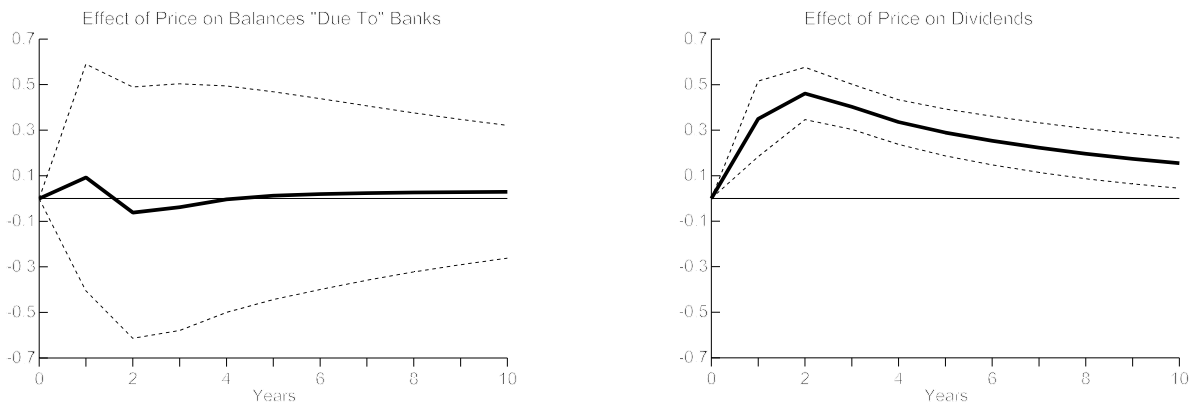


Fig. 6. Selected impulse response functions.

5. Conclusion

The rise of deposit banking in the late 19th century United States is often characterized as a response to legislative actions and the release of pent-up demand for transactions services. At the same time, risky portfolio decisions, fraud, and outright defalcation by bank officers during the “wildcat” and free banking eras of the antebellum period can explain why banks needed to rely largely on equity capital to support their asset portfolios in the early part of the century. I propose that an important shift in banking practices occurred under the National Banking System that increased public confidence in deposits and encouraged individuals to place their surplus balances with banks.

The banks of New York City were the leaders in this new and more professional form of banking, and ushered it in with a series of innovations that promised more efficient use of resources and a safer haven for accumulated wealth. With this professionalism came a leap in the informativeness of the market for bank stocks. Although not traded as actively on the New York Stock Exchange as they had been in the past, the over-the-counter market for these securities was efficient and the local newspapers quoted bank stock prices on a regular basis. The prices revealed in this market became reliable sources of information about the soundness of these institutions. Most important, ordinary depositors – mostly those not actually investing in bank stocks – used this information to choose among the options for placing their savings. It is in this way that the market for bank stocks in New York contributed to increased public confidence in the banking system and the observed rise in deposits.

The emergence of a significant price elasticity of bank deposits suggests that the New York equity market had finally come of age by the 1880s. One need not look very far back in recent history to see that this elasticity is still at work even in the presence of government-

backed deposit insurance. An active market for industrial equities was soon to follow by the end of the 19th century with strong effects on growth in the manufacturing sector. To the extent that the deposit base fueled commercial loans and investments in this newer class of industrial securities, the New York market for bank stocks can be viewed even more broadly as a key component of the vigorous growth experienced by the nation as the 19th century drew to a close.

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Data Appendix

Table A.1
Price indexes and dividends for bank stocks traded in New York City, 1865-1897

Year	Stock prices weighted by			Dividend yields weighted by			Dividends (% of par) weighted by		
	Equal	Book capital	Market value	Equal	Book capital	Market value	Equal	Book capital	Market value
1866	100.0	100.0	100.0	7.46	8.16	6.36	11.31	10.70	10.69
1867	99.7	100.0	100.1	6.91	7.69	5.95	10.85	10.85	10.69
1868	103.2	103.3	103.6	6.59	7.15	5.68	10.46	10.13	10.21
1869	105.4	105.3	106.9	6.21	6.65	5.26	10.37	9.89	10.06
1870	104.3	103.6	105.8	5.41	6.24	4.78	9.62	9.52	9.71
1871	105.7	105.4	106.6	5.16	6.01	4.63	9.15	9.00	9.29
1872	102.6	102.0	103.9	5.03	5.79	4.48	9.22	8.86	9.24
1873	103.0	101.1	103.2	5.02	5.85	4.60	8.92	8.73	9.20
1874	103.0	100.6	103.7	4.88	5.68	4.57	8.68	8.40	9.03
1875	103.6	101.9	105.0	5.78	5.82	4.61	10.38	8.63	9.31
1876	96.5	94.3	96.4	4.10	4.94	4.25	7.43	7.63	8.48
1877	92.3	95.0	95.6	3.98	4.97	3.91	6.59	6.98	7.53
1878	87.8	90.5	89.5	3.41	4.41	3.58	5.71	6.54	6.90
1879	97.1	100.4	97.0	4.86	5.47	4.69	8.51	7.82	8.96
1880	106.6	109.6	104.6	4.43	5.13	4.05	7.45	7.70	8.02
1881	115.5	118.9	112.1	4.31	4.89	3.94	8.14	8.13	8.72
1882	118.7	121.1	114.2	4.17	4.68	3.83	7.74	8.06	8.13
1883	121.1	122.0	115.5	4.36	4.72	3.85	8.08	8.34	8.43
1884	116.8	112.0	108.1	4.10	4.66	3.76	7.88	8.28	8.39
1885	118.0	110.9	111.3	3.86	4.77	3.82	7.24	7.95	8.08
1886	142.5	125.9	125.4	3.87	4.56	3.62	7.30	7.75	7.91
1887	151.2	131.6	130.9	3.51	4.13	3.24	7.74	7.94	8.10
1888	161.1	136.5	140.7	3.39	3.78	3.23	7.47	7.31	7.76
1889	190.4	158.5	163.2	3.32	3.69	3.14	7.37	7.29	7.88
1890	205.6	167.7	172.7	2.92	3.21	2.57	7.58	7.40	8.26
1891	204.5	160.4	168.1	3.27	3.51	2.73	7.80	7.66	8.38
1892	213.5	170.5	172.9	3.06	3.62	2.84	8.26	8.01	8.83
1893	199.8	158.6	161.4	3.01	3.39	2.78	7.93	7.79	8.12
1894	194.5	159.4	162.3	3.29	3.59	2.94	8.08	7.91	8.89
1895	201.5	161.7	165.1	3.05	3.31	2.84	8.11	7.73	8.94
1896	199.9	160.8	162.4	2.94	3.33	2.84	7.74	7.83	8.96
1897	204.9	168.9	169.3	2.79	3.24	2.82	7.46	7.63	8.82

Note: The table presents the data series that underlie Fig. 2, Fig. 3 and Fig. 4 in the text.

Table A.2
Sample coverage for New York City banks

Bank name	Stock price	Dividends	CFC balance sheet	Comptroller reports
American	1866-97	1866-97	1866-97	none
American Exchange	1866-97	1866-97	1866-97	1866-97
Bowery	1872-3,88-97	1866-97	1867-97	1866-88
Broadway	1866-97	1866-97	1866-97	1866-97
Butchers' & Drovers'	1866-97	1866-97	1866-97	1866-97
Central	1866-97	1866-97	1866-97	1866-97
Chase	1879-97	1879-97	1879-97	1878-97
Chatham	1866-97	1866-97	1866-97	1866-97
Chemical	1872-97	1866-97	1866-97	1866-97
Citizens	1866-97	1866-97	1866-97	1866-97
City	1866-97	1866-97	1866-97	1866-97
Columbia	1888-97	1886-97	none	none
Commerce	1866-97	1866-97	1866-97	1866-97
Continental	1866-97	1866-97	1866-97	1866-97
Corn Exchange	1866-97	1866-97	1866-97	none
East River	1866-97	1866-97	1866-97	1866-97
Fifth	1872-3,88-97	1865-91,94-7	1883-97	1866-97
Fifth Avenue	1876-97	1877-97	1880-97	none
First	1866-97	1866-97	1866-97	1866-97
Fourth	1866-97	1866-97	1866-97	1866-97
Fulton	1866-87	1866-87	1866-87	1866-87
Gallatin	1866-97	1866-97	1866-97	1866-97
Garfield	1883-97	1880-90,95-7	1883-97	1882-97
German American	1871-97	1871-97	1870-97	none
German Exchange	1888-97	1874-97	1881-97	none
Germania	1872-76,83-97	1870-97	1869-71,81-97	none
Greenwich	71-73,76-9,84-97	1866-97	1866-97	none
Grocers'	1868-79	1866-79	1866-79	1866-68
Hanover	1866-97	1866-97	1866-97	1866-97
Importers' & Traders'	1866-97	1866-97	1866-97	1866-97
Irving	1866-97	1866-97	1866-97	1866-97
Leather	1867-97	1866-97	1866-97	1866-97
Manufactures'				
Lincoln	1888-97	1883-97	1882-97	1882-97
Manhattan	1866-97	1866-97	1866-97	none
Manuf. & Merchants'	1866-79	1866-79	1866-79	1866-67
Marine	1866-79,81-3	1866-83	1866-83	1866-83
Market	1866-87	1866-87	1866-87	1866-87
Market & Fulton	1888-97	1888-97	1888-97	1888-97

Table A.2
Sample coverage for New York City banks

Bank name	Stock price	Dividends	CFC balance sheet	Comptroller reports
Mechanics	1866-97	1866-97	1866-97	1866-97
Mech. Bkg. Assoc.	1866-82	1866-79	1866-81	1866-81
Mechanics' & Traders'	1869-97	1866-97	1866-97	1866-83
Mercantile	1866-7,70-97	1866-97	1866-97	1866-97
Merchants	1866-97	1866-97	1866-97	1866-97
Merchants' Exchange	1866-97	1866-97	1866-97	1866-97
Metropolis	1888-97	1874-90,94-7	1885-97	none
Metropolitan	1866-94	1866-83	1866-84	1866-83
Nassau	1866-97	1866-97	1866-97	none
New York	1866-97	1866-97	1866-97	none
New York County	66-8,71-6,79-97	1866-97	1870-97	1866-97
New York Exchange	1868-77,81-97	1866-97	1866-97	1866-97
Ninth	1866-97	1865-91,94-7	1866-97	1866-97
North America	1866-97	1866-97	1866-97	1866-8,91-7
North River	1866-90	1866-90	1866-90	none
Oriental	1866-97	1866-97	1866-97	none
Pacific	1869-97	1866-97	1866-97	1866-68
Park	1866-97	1866-97	1866-97	1866-97
People's	1866-94,96-7	1866-97	1866-97	none
Phoenix	1866-97	1866-97	1866-97	1866-97
Produce Exchange	1887-97	1885-97	1896-97	none
Republic	1866-97	1866-97	1866-97	1866-97
Seaboard	1888-97	1885-97	1885-97	1888-97
Second	1871-2,82-97	1866-97	1866-97	1866-97
Seventh Ward	1866-76,82-97	1866-97	1866-97	1866-97
Shoe & Leather	1866-97	1866-97	1866-97	1866-97
St. Nicholas	1866-94	1866-93	1866-93	1866-82
State of New York	1866-97	1866-97	1866-97	1866-82
Tenth	1866-77	1866-76	1866-77	1866-77
Third	1889-97	1866-90	1866-96	1866-96
Tradesmens'	1866-97	1866-97	1866-97	1866-97
Union	1866-85,96-7	1866-84,97	1866-85,94-7	1866-84,93-7
U.S. National	1881-97	1880-96	1881-97	1881-97
Western	1887-97	1887-97	1887-97	1887-97
West Side	1888-97	1871-97	1885-97	none

Note: Coverage for individual banks is based upon information contained in various issues of the *Commercial and Financial Chronicle* and *Annual Reports of the Comptroller of the Currency*.