

Extended Liability at Early American Banks

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Abstract: Limited liability is a defining feature of the modern corporation, but it was not always thus. In the nineteenth century, several states imposed extended liability on some firms with corporate status (i.e., perpetual life, freely tradable shares, etc.). In 1850 about half of the states imposed double liability on banks, which meant that shareholders were liable to twice the par value of the banks' shares. This paper shows that double liability was associated with more concentrated bank shareholdings and that the change from limited to double liability altered bank leverage ratios in New York and Pennsylvania. By asking bank shareholders to have more "skin in the game," double liability changed investor and banker behaviors.

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1. Introduction

The *sine qua non* of the modern firm, according to many students of business organizations modern and historical, is limited liability (Jensen and Meckling 1976; Woodward 1985; Carr and Mathewson 1988).¹ Shareholders place their personal wealth at risk up to the amount they invest in the corporation and no more. As a general rule – mostly absent fraud on the part of the firm’s owners and managers – creditors of a corporation have no recourse against the personal wealth of the firm’s individual owners/shareholders (Easterbrook and Fischel 1985), one consequence of which was that shares in the modern corporation were readily transferable and came to be traded in thick, liquid markets. Firms could tap into a larger pool of capital and capture economies of scale unavailable to closely held or family firms, investor/shareholders could better diversify their portfolios, and consumers had access to inexpensive, mass-produced goods (Chandler 1977). And because limited liability appears to have been the default rule for corporations in the United States very nearly from the foundation of the Republic, the United States might be deservedly labeled the original “corporation nation” (Sylla 1985; Lamoreaux 2015; Wright 2011; Wright 2014).² Blandi (1934, 39) finds virtually no mention of shareholder liability in the earliest corporate charters up to the early

¹ Recent scholarship challenges this view on several grounds. Evans and Quigley (1995) show that limited liability did not always dominate unlimited liability in Scottish banking. Guinnane et al (2007) argue that alternative forms were as important as the corporation, especially outside the United States. Hansmann and Kraakman (2000) argue that insulating the assets of the firm from attachment by creditors of bankrupt individual owners was of at least equal importance and could not have been accomplished through contract or trust law. A special branch of organizational law was required to accomplish this. Joint-stock firms, alternatively, could (and did) obtain limited liability through contract.

² Lamoreaux (2015) argues that scholars need to exercise care in comparing US corporations across time and space. The corporation was a product of the state and local political struggles tended to shape the corporation and how it was structured. Bodehorn (2011) discusses this in the context of federal influence over state bank charter terms.

1850s because there was, at that time, no more settled rule of law than that individual shareholders were not liable for the debts of the corporations in which they owned shares.

Early American courts of law upheld limited liability when the charter was silent on the issue, but the acceptance of limited liability at law did not mean the rule was beyond challenge or inviolable (Blandi 1934; Wright 2014).³ By the 1830s the debate came down to two points. One side, made up mostly populist Jacksonians, “looked upon corporations as an evil ... they were exceptions to the common law,” mostly because they shielded their investors from personal responsibility (Hammond 1936, 189), a populist belief that found favor even into the twentieth century (Ballantine 1923, 82). On the other side were those who viewed the limited liability corporation as one of the principal mechanisms underlying modern economic growth. Potential shareholders in search of productive investment, but without the inclination to be directly involved in an enterprise’s management, sought the protections offered by perpetuity and limited liability; and this argument, too, was repeated into the twentieth century.⁴

Nineteenth-century jurists, legislators and regulators resolved this fundamental debate

³ In one of the earliest cases, the Massachusetts court found that the holder of the notes of a failed bank had no recourse against the bank’s shareholders either individually or severally. The court opined that allowing the noteholder recourse against any one shareholder opened the door to claims against all shareholders, including those “wholly innocent and ignorant of the [bank’s] management,” which would create a “palpable injustice.” A decisive factor in the court’s determination was the common law idea that the corporate was an entity completely separate from its individual shareholders. Pennsylvania courts arrived at the same conclusion in 1816 as did the United States Courts of Appeal in 1824. In the latter instance, Justice Story argued a corporation’s capital was pledged in the payment of the firm’s debts, and that the public was aware that this pledge was the only guarantee of repayment. Moreover, that pledge freed the individual shareholders from personal liability. In 1839 the Massachusetts high court opened the door to individual shareholder liability in cases at equity (not law), but only if the creditor could show gross mismanagement of a bank by its directors, acquiesced in by the shareholders. Equity offered the possibility all the firm’s creditors bringing suit simultaneously against all shareholders as a group, a process not allowed at common law. Still, the court established a substantial hurdle; proving the connection between bankruptcy and mismanagement would be a challenge.

⁴ Livermore (1935, 687) contended that the small shareholder “deserves the gift of limited liability,” lest the firm be unable to raise large aggregations of capital.

through a series of compromises. When business firms were granted limited liability they were regulated in other dimensions, ostensibly to limit risk taking and their capacity to inflict losses on creditors or the public. But, more importantly, legislators modified shareholder liability rules either through general statutes applying to all corporations of a particular type, or idiosyncratically by including a statement of the exact nature of shareholder liability directly in the corporation's charter. Massachusetts' manufacturing corporation act of 1809, applicable to all types of manufacturers, imposed full joint and several (unlimited) liability on shareholders. Other Massachusetts corporations enjoyed limited liability. Pennsylvania, too, extended limited liability to banks, turnpikes, bridge and canal companies, but incorporated manufacturing firms typically operated with unlimited liability (Dodd 1948). Among other regulations designed to protect creditors, New York and New Jersey imposed something akin to double liability on manufacturing firms (Dodd 1948). In the event of corporate insolvency, shareholders operating under a double-liability rule were liable up to the par value of the shares they held. If a shareholder owned a single \$100 share in a failed corporation that was unable to make its creditors whole, he faced a call from the bankruptcy court of up to \$100 and no more. Double liability was limited liability, but it limits extended beyond the original purchase price and/or par value of the shares.

Beginning in the 1810s, several states imposed double liability on chartered commercial banks. Pennsylvania adopted double liability in 1808, but returned to strictly limited liability in 1810. Massachusetts imposed double liability in 1811, followed by Rhode Island [1818, modified 1833], New York [1827, rescinded 1829, reinstated 1850], Maine [1831], New Hampshire and Ohio [1842], Maryland and Indiana [1851], and Wisconsin [1852]; in 1850 Pennsylvania and Massachusetts modified their rules such that shareholders were doubly liable only for a bank's note issues, but not

its other debts (Wisconsin 1852; Blandi 1934; Livermore 1935; Kinner 1927; Marquis 1937; Leonard 1940). Dodd (1948, 1377) could find no readily discernible pattern in the patchwork of states that adopted unlimited liability in manufacturing. It is no less difficult to describe the nineteenth-century pattern of double liability in banking. Grossman (2007) finds that, in the early twentieth century, more commercially developed states and those in which the costs of bank failures were expected to be relatively large were more likely to impose double liability, but it is not immediately obvious that his explanation holds for the nineteenth century.⁵ It is obvious, however, that the rule was in flux in the first half of the nineteenth century. Political and regulatory concerns led to alternative rules across states and changes to the rule within states over time.

This paper does not investigate the political economy of the adoption (and modification) of double liability rules in the nineteenth-century, but rather its economic implications. Macey and Miller (1992), Esty (1998) and Grossman (2001) posit that banks operating under double liability should be less leveraged and, presumably, less risky than banks operating under traditional limited liability rules. Relying on cross-sectional data Macey and Miller (1992) and Grossman (2001) find that double liability actually increased measured bank leverage, an apparently counterintuitive result they attribute to double liability serving to reassure creditors that they would be made whole in the event of bank failure. To the extent that double liability served as an implicit, off-balance-sheet increase in the bank's capital account, the increase in measured leverage overstates creditor risk and explains the counterintuitive result. Using New York and Pennsylvania as case studies, this article

⁵ Explaining the adoption of double liability is beyond the scope of this paper, though it constitutes an element of the larger project of which this is a part. Although Grossman (2007) argues that double liability is one of many endogenous policy responses to perceived changes in bank risk taking, this study takes it as given and investigates its economic ramifications.

employs a difference-in-differences approach taking the adoption of double liability as a treatment effect. The difference-in-differences approach yields a similar result, and points toward double liability as an implicit increase in the banks' capital accounts. The implicit, contingent guarantee of double liability left creditors less exposed and bank shareholders more exposed to bankruptcy risk, which is reflected in other on-balance-sheet ratios.

We might also expect that a change in the shareholder liability regime to alter the mix of shareholders. Some individuals who might own shares under limited liability will choose not to if doing so exposes them to extended liability. Acheson and Turner (2006) and Hickson, Turner and McCann (2005), in fact, find that changes in liability rules changed the number and the mix of shareholders in nineteenth-century Irish banking. Using a unique data set of detailed bank shareholdings, which spans liability regimes in the early nineteenth-century United States, I also find that double liability had profound effects on the number, but not on the composition of bank shareholders. Double liability is associated with fewer shareholders and more concentrated shareholdings, all else constant, but it is not strongly associated with share ownership of women or block holdings by families. Double liability altered the investment calculus for some people and change the nature of corporate ownership in predictable ways.

2. The law and economics of limited and double liability

One obvious question surrounding the corporation is why liability is limited. Manne (1967), echoing arguments advanced in the nineteenth century, contends that limited liability offers several advantages over unlimited liability. First, limited liability encourages small investments from a broad class of investors, middling sorts as well as the wealthy. Unlimited liability, also known as joint and

several liability, means that the totality of each owner's personal estate can be assessed to make creditor's whole in the event of the firm's insolvency. In such cases wealthy investors will not want to join with relatively impecunious investors because the costs of insolvency are, relative to profits, disproportionately borne by wealthy investors. Thus, wealthy investors will want to invest with similarly wealthy people and will demand a say in the sale and purchase of any and all shares. Under unlimited liability *who one invests with* becomes a matter of as much importance as *what one invests in*.

Limited liability generates economies in monitoring among owners in that it eliminates the costs of owners continually monitoring and updating the net worths of all other owners (Winton 1993).⁶ Limited liability also reduces the monitoring costs of creditors because under limited liability the firm's net shareholder equity (i.e., capital plus retained earnings) rather than the shareholders' aggregate net worth provide what nineteenth-century jurists labeled a "trust fund" for the indemnification of creditors in the event of default (Blandi 1934, 40). Like limited liability, double liability eliminates joint monitoring among shareholders because double liability places a cap on each owner's exposure independent of the shareholdings and wealth of other investors. Double liability reduces but does not eliminate the need for creditor monitoring. Creditors need not understand the details of each shareholder's net worth, just whether it is sufficient to meet the extended liability if the firm defaults.

With the elimination of the need for shareholders to continually monitor each other's wealth,

⁶ Winton (1993, 490) notes that the optimal liability rule depends on the relative magnitude of verification and liquidation costs (discussed below), as well as the number of shareholders and their individual wealth. In the absence of statutory mandates, the firms' liability structures would be endogenous to its balance sheet choices; but firms were constrained in their choices and had to choose an ownership structure (partnership or corporation) consistent with their preferred risk taking and operating ratios.

limited liability facilitates the transfer of shares because share values are uncoupled from the value of the owners' assets (Hansmann and Kraakman 2000, 426). Under unlimited liability owners must recalculate their expected liability with every share transfer. The acceptance of less wealthy investors into a firm's shareholding ranks increases the potential liability of wealthier owners. Because each owner places a different value on his or her shares, depending on his or her wealth as well as the wealth of all other shareholders, shares are traded in less liquid markets than under limited liability. Weaker forms of limited liability such as pro rata liability will undo this uncoupling of individual wealth and share price to some extent, but double liability does not.⁷ Under a double-liability regime, creditors must determine whether individual shareholders are financially capable of meeting an assessment after default, but investors do not need to monitor fellow investors. Shares of double-liability firms, in fact, traded freely alongside shares of limited liability firms on local stock markets in the nineteenth-century United States, though there are no extant studies that considers the relative liquidity of these two types of shares. Hickson, Turner and McCann (2005), however, find that unlimited liability did not have a notable effect on share liquidity at one nineteenth-century Irish bank, so the effects of liability rules on share transferability remains an open question.

Easterbrook and Fischel (1984, 103) note that one of the principal issues surrounding liability rules is risk bearing and risk shifting: "Is it better," they ask, "to allow losses to lie where they fall, or to try to shift those losses to some other risk bearer?" Unlimited liability places the lion's share of bankruptcy risk on owners, so long as their aggregate wealth is sufficient to make creditors whole in the event of firm default. An unlimited liability rule may be efficient if owners are lower cost

⁷ Under pro rata liability a shareholder holding 5% of a firm's shares is liable for 5% of the firm's debts that cannot be satisfied through liquidation of the firm's assets. California's incorporated banks operated under a pro rata rule between 1848 and 1931 (Hansmann and Kraakman 2000).

monitors of the firm's health and each other's wealth than creditors. Limited liability, on the other hand, will be more efficient if creditors are superior monitors. When creditors are superior monitors, limited liability provides for efficient monitoring and risk sharing between owners and creditors. By adjusting the amount of owner-contributed equity in a firm, owners and creditors can achieve a wide range of risk-sharing arrangements. Weaker forms of liability, such as double liability, alter the nature of the agreement, but do little to diminish the parties' abilities to tailor risk-sharing agreements among themselves. Double liability, in effect, offers an off-balance sheet "trust fund" for creditors, but one less easily valued than an explicit on-balance sheet capital account. Nineteenth-century legislators and regulators likely recognized the ability to contract around the double liability rule and supplemented double liability with minimum-capital requirements, minimum reserve ratios, maximum debt-to-capital ratios, and maximum asset-capital ratios, among others.⁸

As is well known, diversification across a several different classes of investments reduces aggregate risk, but only in the case of limited liability. Under unlimited liability, broad diversification increases rather than decreases risk because each separate investment places the investor's entire estate at risk. The rational strategy under unlimited liability is for investors to minimize the number of risky investments, which in the limit is one (or, perhaps, zero) (Easterbrook and Fischel 1984, 96). Double liability retains the idiosyncratic-risk reducing benefits of broad diversification, while redistributing risk from creditors to shareholders.

⁸ Pennsylvania, for example, imposed a statutory limit on overall bank leverage such that the firm's total debts less its deposits could not exceed twice its paid-in capital (i.e., liabilities - deposits $\leq 2 \times$ capital). If the bank exceeded this ratio and failed, directors were to be held personally liable (Pennsylvania 1824, 63). New York's (1806, 64) rule mandated that debts less specie holdings could not exceed three times its paid-in capital. Other states imposed similar rules, though the exact formulation differed across states.

Hansmann and Kraakman (2000) note two additional benefits of limited liability. First, because all owners realize the same proportional gains and losses from a bank's asset management policies, regardless of their outside wealth, they have relatively homogenous economic interests, which facilitates collective decision-making. Double liability does little to alter this because all shareholders retain proportional interests. Second, limited liability eliminates the social costs of pursuing expensive litigation against individual shareholders after bankruptcy (see also Woodward 1985). The costs of securing and collecting personal judgments against individual shareholders would consume so large a fraction of the amount collected that personal liability is inefficient in the case of a widely-held firm. It is more efficient to shift some of the risk onto creditors and have creditors price that risk into debt contracts. Yet, in their study of double liability for national banks chartered after the Civil War, Macey and Miller (1992) report that a substantial fraction of assessments were collected from individual shareholders without large costs.

Esty (1998) shows that double liability operates like an equity call option in that the market price of the firm's equity is made up of two components: a long position on the call option, which is the difference between the market value of the firm's debts and the maximum shareholder liability assessment (D-L), and a short position on a bond, which is the maximum liability assessment (L). Although double liability exposed shareholders to the contingent call on the bond, it also reduced funding costs. Because shareholders faced greater liability, creditors could rationally assume that, compared to limited-liability banks, the double-liability bank would hold less risky loans and, consequently, shift less of the default risk onto creditors.

Macey and Miller (1992) and Grossman (2001), however, find that reported capital ratios were actually lower at double- than limited-liability banks. They posit two complementary

hypotheses for this finding. First, creditors did not demand as high a capitalization ratio at double-liability banks because double liability acted as an off-balance sheet entry (contingent net worth) that offered creditors a repayment guarantee. Second, creditors may have demanded lower on-balance-sheet net worth ratios because they thought the threat of assessment led to less risky asset portfolios. Unlike Macey and Miller (1992) and Grossman (2001), who rely on cross-sectional analysis, this study employs a difference-in-differences approach to determine whether and how changes in liability rules altered bank behaviors. I, too, find that double liability led to greater (measured) on-balance-sheet bank leverage.

Before investigating the effect of double liability on bank leverage, a related question considered here concerns the concentration of shareholdings and composition of shareholders under alternative liability regimes. The discussion above suggests that the extreme liability rules of joint and several (unlimited) liability on one end and limited liability on the other leads to systematic differences in the number of owners. Firms subject to joint and several liability, of which the partnership is emblematic, tended to have two or three partners at mid-century, whereas limited liability banking firms in New York circa 1820 had about 250 owners on average (Bodenhorn 2012; Hilt 2008, 664).⁹ As an intermediate liability rule, double liability is expected to lead to more concentrated ownership and, perhaps, a different composition of shareholders than limited liability banks assuming that certain observable characteristics are associated with tolerances toward risk. The evidence points toward markedly different types of share ownership by liability rule. Share

⁹ Unlimited liability joint-stock firms operated. While these firms tended to be larger than traditional partnerships, they had far fewer shareholders than limited liability firms. Hilt (2008, 664), for example, finds that joint-stock manufacturing firms in New York circa 1820, which were subject to unlimited liability had an average of 17 shareholders; limited liability insurance companies had 132 shareholders and banks, as mentioned in the text, had 252. There were, of course, other differences between manufacturing and financial firms that are not accounted for in this simple comparison, but the differences in shareholdings are suggestive.

holdings were less dispersed and more concentrated at double liability bank. It appears that shareholders and creditors cared who else owned shares in the double-liability bank.

3. Data and empirical approach

3.1 Bank shareholdings

Listings of individual shareholdings for nineteenth-century banks are not readily available, but can be unearthed in bank histories, legislative reports, in correspondence between banks and regulators in various archives, and other contemporary sources. Bank histories tend to provide information on founding shareholders or shareholders at some other critical period, such as changing from a state to a national bank charter, and only for those banks surviving long enough (typically about a century) to warrant the hiring of an historian by the bank's board to write its history.¹⁰ If the sample consisted of data drawn exclusively from these sources, it would be subject to severe survivor bias, but shareholdings taken from bank histories account for a small fraction of the sample (five of 610 banks).

Shareholdings were also gathered from lists of original subscribers, which are less subject to survivor bias, but are subject to another potentially important bias. Original shareholdings were subject to speculations surrounding the banks' initial public offerings. In the nineteenth century, New York, Pennsylvania and other states required that share offerings be made available to the public through subscriptions. Prospective shareholders subscribed to a certain number of shares, often with a maximum number limited by charter. If there were fewer shares subscribed than offered, the

¹⁰ The details appear in an appendix. A number of such histories appeared circa 1914, for example, to commemorate the one-hundredth anniversary of Pennsylvania banks originally chartered in 1814 and still in operation a century later.

subscribers had the right to purchase their subscribed shares and, under certain restrictions, additional shares.¹¹ If more shares were subscribed than was allowed by charter, the subscriptions were reduced and each subscriber received a number of shares in proportion to the ratio of shares to subscribed shares. That is, if twice as many shares were subscribed as were allowed by charter, each subscriber would receive half the number subscribed conditional that all subscribers received at least one share. In some cases speculators subscribed for many more shares than they wanted to hold and profited from their sale when trading opened. Cowen (2000, 35) describes a subscription “frenzy” in Bank of the United States shares in July 1791. The offering was oversubscribed by 20 percent, and within a month the effective share price rose 60 percent over the initial offering price. Many state-chartered bank shares were oversubscribed and commissioners tried to distribute the shares as evenly as possible, so it is possible that shares quickly changed hands after the initial offering. Lists of initial subscribers, therefore, may not reflect any sort of equilibrium distribution of shares. The data used here include 32 newly chartered Pennsylvania banks (1814-1815) and 12 newly chartered New York bank (1831-1832). Together, these represent less than 10 percent of the sample, and the regressions reported below include dummy variables to capture any systematic differences between newly chartered and more seasoned share holdings.

A third source of data, subject to yet a third kind of bias, are shareholder lists compiled by state bank commissioners or legislative committees following a financial crisis. Michigan, for example, collected information on bank shareholdings on a half-dozen chartered banks in 1840-41 following a panic and suspension of specie payments. Ohio collected similar information in 1854

¹¹ It was common, but not universal practice, for Connecticut bank charters to include an upper limit (typically 20 percent) on the fraction of outstanding shares that a single investor might hold.

after a localized panic in that state. It is not clear how a panic might influence the reported shareholdings, if at all. If panics were of the sunspot variety described by Diamond-Dybvig (1983), existing shareholders were unlikely to have sold out ahead of an unanticipated panic. Fortunately, Ohio's investigating committee collected and reported information on shareholdings in 1849 (pre-panic) and 1854 (at the outset of the panic) and found relatively stable shareholdings. The regressions also include a Panic dummy variable to capture any differences in shareholdings due to the 1840 or 1854 crises.

The fourth, most useful and most used sources of information on shareholdings are legislative documents or bank commissioner reports that provide shareholding information on all banks in a state at a point in time. Among the data used here, Massachusetts, Maine, New Hampshire, and Wisconsin all published some type of regular shareholder information. Maine published annual reports in the 1840s and the reports from 1840, 1843, 1845, and 1849 are used here. New York (1831, 1832) and Wisconsin (1855, 1857, 1858, 1865) collected and published information on shareholding at nearly all their banks. Massachusetts (1858, 1860) published information only on the number of shares held by the largest shareholder, which is less useful than a complete listing of shareholdings. Nevertheless, it provides some information on share concentration. New Hampshire (1849, 1850, 1855), on the other hand, published only the total number of shareholders, which also provides some useful information on the dispersion of shareholdings.

Table 1 provides summary statistics on bank shareholdings for 610 banks that operated between 1810 and the 1864. The first column reports statistics for the full sample; columns 2 and 3 report statistics for the sample parsed by whether the banks in question operated under a double liability or limited liability rule. By modern standards, early American banks were closely held

corporations with just 92 shareholders, on average. It is apparent, however, that banks operating under double liability had just 14 percent as many shareholders as banks operating under full limited liability (44 versus 293). The contingent liability (or being short a callable bond) associated with double liability seemingly dissuaded at least some prospective shareholders from investing in banks. Double liability is also associated with greater shareholder concentration, whether measured by the fraction of shares held by the largest shareholder or the five largest shareholders. The largest shareholder held, on average, 9 percent of shares under limited liability, but 23 percent of shares under double liability. Similarly, the five largest shareholders under limited liability owned 28 percent of shares compared to 62 percent of shares at double liability banks. Without controlling for other potentially confounding factors, double liability led to less dispersed and more concentrated shareholdings. This is consistent with Hansmann and Kraakman's (2000) belief that extended liability tends to increase the costs of shareholders monitoring one another and transferring shares. Double liability altered the calculus for bank owners who faced a tradeoff between, on the one hand, spreading shareholding relatively widely and thereby tapping into larger pools of capital and, on the other, monitoring and funding costs that increased in the number of shareholders. It also points to the costs of creditor monitoring. It was less costly to monitor a few, high net-worth investors than a lot of middling investors.

It is interesting, as well, to consider whether double liability rules were associated with different types of shareholders. The data afford the opportunity to explore whether alternative liability rules were associated with differences in the fraction of shares held by individuals sharing a common surname, which is measured in two ways: the variable *Common* is the fraction of shares owned by people sharing a surname with at least one other shareholder; and, *Largest common* is the

fraction of shares owned by people sharing a surname that, collectively, held the largest block of shares among those with a common surname. That is, *Common* measures the fraction of shares held by people with, for example, the surname Smith, Jones, and Johnson. It is designed to capture the possibility that a small group of families might through their combined voting power control a bank and its risk-taking policies. With their combined voting power they could install a board of directors who would implement their preferred policies and not necessarily those favored by minority shareholders. *Large common*, by comparison, is the fraction of shares held by those individuals with a common surname who jointly own the largest block of shares. Consider the example of the Commercial Bank of Philadelphia, at which individuals with the surname Pleasants held 1,212 shares, the Bayards held 348 shares, the Carrolls owned 410 shares and the Schotts owned 204 shares. These four families, plus others with common surnames holding smaller stakes, held nearly 62 percent of the banks shares, which is the value of *Common* for this bank; the Pleasants' stake represented just over 8 percent of the bank's shares, which is the value of *Large common*. The univariate comparison in Table 1 reveals that the difference in *Common* between double- and limited-liability banks is barely significant at conventional levels (p -value = 0.09), but the difference in the fraction of shares owned by the single family holding the largest block is significantly larger at double-liability banks. It appears that shareholdings at double liability banks were not only more concentrated, they were more likely to have a controlling family block.

A third measure designed to capture systematic differences between limited- and double-liability banks is the fraction of shares held by unaffiliated women and minor children, which is defined as female and child shareholders not sharing a surname with an adult male shareholder. Contemporaries often considered shares of established, well-managed banks as appropriate

investments for the support of widows, spinsters and orphaned children. Banks shares had fairly consistent dividend yields (dividend / market price) of 4 to 6 percent, which made them attractive investments for trusts. It is not clear how double liability would affect the attractiveness of banks shares for trusts designed to maintain widows and orphans. On one hand, the potential for the trust to be called on in the event of bank failure could have catastrophic consequences for a trust fund just sufficient to support the beneficiary. On the other, if double liability encouraged bank's managers to invest in less risky portfolios, the liability rule may have made the double-liability bank an attractive investment. For some trusts a smaller, less variable yield was preferred to a larger, more variable one. The univariate comparison in Table 1 suggests the latter effect. Unaffiliated women and minors held a greater fraction of shares in double-liability (3.3 percent) than in limited-liability (1.8 percent) banks.

The shareholding data are used to investigate whether an association exists between double-liability and the various shareholding measures, after controlling for other features likely to influence the concentration or composition of shareholding. Specifically, I estimate an ordinary least squares (OLS) regressions of the following form:

$$\text{Shareholdings}_{it} = \beta_0 + \beta_1 \text{Double Liability}_{it} + \beta_x X_{it} + \varepsilon_{it}$$

where i indexes the bank and t indexes the year. X is a vector of bank-specific control variables thought to influence shareholdings independent of the liability rule. These include the bank's age, the year bank shareholdings are observed, whether the bank was a free bank rather than a chartered bank, whether it was a new bank in either Pennsylvania or New York, whether the shareholdings were observed in a post-crisis recession, shareholder voting rights, and the natural logarithm of the population of the city or town in which the bank was located.

Bank age (in years since establishment) is likely to influence share ownership because shares change hand and holdings may become either more or less concentrated over time. Helwege, Pirinsky and Stulz (2007) find that most modern firms begin with relatively concentrated share holdings that tend to become more dispersed over time. The controls for new banks in Pennsylvania and New York are also included to capture any systematic dispersion effect. Pennsylvania in 1814/15 and New York in 1831/32 wrote into the bank's charters various restrictions on subscriptions to limit highly concentrated ownership. In response to constituent pressures to liberalize chartering and provide greater access to ownership, legislators in both states worked to spread share ownership as widely as possible (Bodenhorn 2006). The rules were more effective in Pennsylvania than in New York so separate dummy variables are included in the regressions.

A free banking variable is included to capture the effects of liberalized bank chartering after 1836. Prior to free banking, banks were incorporated by way of legislative charters, which were idiosyncratic though certain common features appear over time. Free banking laws, in contrast, were among the nation's first general incorporation laws that made incorporation an administrative procedure rather than a legislative prerogative. One feature is that free banking laws tended not to place any limits on the number of shares or shareholders. A free banking dummy variable is included to capture any systematic difference across chartering regimes. New York adopted free banking in 1838, Ohio in 1851 and Wisconsin in 1852 (Rolnick and Weber 1982), though most of the free banks included in this sample are from Wisconsin.

Bodenhorn (2014) reports that shareholder voting rights had a pronounced effect on the concentration and composition of shareholdings. Nineteenth-century banks operated under either of two share voting regimes: straight voting, or one share-one vote rules; or, graduated voting rules in

which the number of votes increased with the number of shares owned, but votes did not increase linearly in shares. At the Bank of the United States, for instance, shareholders with two shares got two votes, while a shareholder with ten shares could cast six votes, and one with 30 shares could cast 11, with a 30-vote limit for shareholders with a hundred or more shares. Hilt (2006) and Bodenhorn (2014) contend that graduated voting rules protected minority shareholders from majority shareholder tunneling or other forms of self-serving behavior. Graduated voting was associated with considerably less concentrated shareholdings, and with a larger fraction of shares held by individuals sharing surnames, as well as a larger fraction of shares held by unaffiliated women and minors. In the sample used here, New York, Ohio, Indiana, Illinois and Wisconsin banks operated under one share-one vote regimes. All other states included in the sample required banks to operate under some form of graduated voting.

City or town population (linearly interpolated between census years) is included to capture the effect of local market size on shareholdings. Although some banks reported shareholders residing in far-distant locations (two Wisconsin banks' majority owners reported a New York City residence), about half of all shareholders resided in the same town as the bank. About three-fourths of shareholders resided in the same state. There is no meaningful or statistically significant difference in local ownership at limited- and double-liability banks.

3.2 Bank leverage

A second issue of continuing concern to those wishing to understand bank risk taking is whether and how bank owners having more "skin in the game" (double-liability in this instance) affected a bank's risk-taking or leverage that might be apparent on its balance sheet (Mitchener and

Richardson 2013). This study uses the change in the New York regulation as a test case of whether and how double liability changed bank behavior. During the 1846 New York constitutional convention, one delegate proposed a modification of New York's banking law so as to impose double liability on its banks (they had operated under limited liability since 1829). The proposal was included in the constitution, but double liability did not go into effect until 1850, which gave the banks and bank shareholders time to prepare for the new regime. New York then provides a classic example of a regulatory treatment, which can be exploited econometrically to better understand how double liability and limited liability induced banks into different behaviors. In 1850 Pennsylvania imposed a variant of double liability in which shareholders were doubly liable but only for the note issues of the bank not the entirety its debts. Notes and deposits were the principal liabilities, but by 1850 note issues were gradually giving way to deposits as the most widely used medium of exchange so the change in liability in Pennsylvania should have less pronounced effects on observable bank behaviors.

Because New York and Pennsylvania implemented double liability at a different time than other states, it is reasonable to approach a change in liability rules like a treatment effect on a group of treated banks. If we suppose there are two groups of banks indexed by treatment status $T = 0, 1$ where $T=0$ indicates banks that were not treated (i.e., the control group) and $T=1$ indicates banks that were treated (i.e., incumbent banks subject to a change in liability status). If the two groups are observed in two time periods, $t=0, 1$, where $t=0$ indicates the period prior to change in regime and $t=1$ indicated the period after the change in regime. Banks are observed pre-treatment and post-treatment and are indexed by $i=1, 2, 3, \dots, n$. Using this notation, we can write the standard difference-in-differences estimator as follows:

$$Y_i = \alpha + \beta T_i + \gamma t_i + \delta(T_i \times t_i) + \varepsilon_i$$

where α is a constant term, β is the treatment group specific effect, which accounts for permanent differences in the average realization of Y between the control and treatment groups, γ is the effect of a time trend common to treatment and control groups, and δ is the effect of the treatment on the treated, which is simply the product of the treatment dummy and post-treatment time dummy.

The unbiasedness of the difference-in-difference estimator rests on three assumptions: that the additive nature of the estimating equation is correct; that expected value of the error term is zero; and that the error term is uncorrelated with either the treatment or the time variable. Two concerns with the last condition – zero correlation between the error and the treatment and/or time variable – are relevant here. First, because there was a lag between enactment and the onset of the treatment in New York, we need to be reasonably confident that no other confounding event or regulatory intervention occurs between pre- and post-treatment for either the control or treatment group. Second, we need to be confident that the time (or trend) variable is not capturing some other feature of bank leverage that would be captured in the error term.

Discussions in Knox (1903), Dewey (1910), and the annual acts of assembly for several states, reveal that it is no trivial matter to find a sizeable control group for which no new meaningful regulations are imposed in the 1846 to 1850 period. One state – Maine – met the criteria of having a reasonably large number of banks (33) and no new regulations imposed during the event window (1846-1850).¹² Due to concerns that Maine and New York may not be directly comparable, given the lack of anything like banks the size or centrality of New York City banks in Maine, three variations of the difference-in-differences regressions are estimated: one that includes all Maine and

¹² In 1849 Pennsylvania had 44 banks; New York had 168.

New York banks, a second with a dummy variable that equals one if the bank was located in New York City, and a third that excludes the New York City banks. The results are robust across specifications.

A second source of concern with estimating the difference-in-difference effects is that the principal source of bank balance sheet information (Weber 2011) does not consistently report data for the same month or, even, the same quarter, though Weber provides reports closest to year-end. Bodenhorn (2003) reports a strong seasonal component to loans and to note issues surrounding the movement of agricultural goods to market in late autumn and early winter. So simply choosing pre- and post-treatment balance sheets from any point in the year could lead to a violation of the third assumption (the zero correlation between the error term and the trend component). Thus, unless control and treatment group data are taken from the same season any estimated difference-in-difference effect may be driven as much by seasonal changes in balance sheet ratios as by changes driven by the treatment. The restriction that the treatment and control group data be from the same quarter further restricted the choice of potential controls to Maine. Pennsylvania banks consistently reported in either late October and early November, so the difference-in-differences are estimated for those years in which Maine (October or November) and New York (October and December) balance sheets were available in mid- to late autumn.

Table 2 reports summary statistics for the difference-in-difference sample pre- and post-treatment for New York and Pennsylvania (treated) and Maine (untreated). An inspection of the values allays concerns that Maine and New York banks might be fundamentally different in observables. Although New York had many more banks, the average bank in the two states, measured by natural log of assets, were comparable. Banks in New York were larger, whether

measured by assets, loans or capital, but New York and Maine banks operated with comparable loan-to-asset ratios (0.7-0.8), demand liabilities-to-total liabilities (0.5), though New York banks held back more retained earnings-to-total shareholder equity (0.10 versus 0.04) than Maine banks. More importantly, for our purposes, they also operated with comparable asset-to-capital ratios, the principal measure of bank leverage (risk) used here as in Macey and Miller (1992) and Grossman (2001). The asset-to-capital ratio, defined as total assets divided by capital plus retained earnings, is an often used metric of risk taking because the ratio reflects the capacity of the bank to sustain losses on its loan portfolio that are borne by the shareholders. Lower ratios imply that shareholders are assuming relatively more of the risk of failure; higher ratio imply that creditors are assuming relatively more risk.

Panel A of Table 2 also provides a baseline estimate of the difference-in-difference estimate for the treatment effect, before controlling for any potential confounding factors, which is calculated as $DD = (Y_{NY,1850} - Y_{NY,1845}) - (Y_{Maine,1850} - Y_{Maine,1845}) = 0.421$. That is, the asset-to-capital ratio among New York banks increased by 0.421 percentage points relative to the Maine banks as a result of the change from limited to double liability. Regression results reported below confirm this result, which is robust to the addition of several additional correlates including bank size and New York City location.

Figure 1 provides an alternative nonparametric test to determine whether the change from limited to double liability altered New York's bank balance sheets. The figure provides kernel density estimates of asset-capital ratios for 1845 (before) and 1850 (after). Visual inspection suggests some difference; the mass of the distribution appears to have moved right and the peak is less pronounced. A two-sample Kolmogorov-Smirnov test, which takes into account the shape and

location of the density function, rejects the null hypothesis of equal distributions at $p=0.007$. The values are, on average, smaller in 1845 than in 1850, or prior to the change in the liability rule.

Panel B of Table 2 reports the same information and repeats the same exercise for Pennsylvania and Maine banks in 1849 and 1854. Recall, that Pennsylvania's liability rule was modified in 1850. Under the new rule, shareholders were doubly liable, but not for the entirety of the banks debts, only its circulating notes. Depositors and other creditors were not protected by the double liability rule. In the event of failure, shareholders were less likely to be called on to make the note holder whole, and the calls would almost by necessity be smaller than if bankruptcy courts could make calls equal to the bank's total liabilities. The baseline difference-in-difference estimate of the enactment of Pennsylvania's 1850 partial double liability rule was a 0.228 relative percentage point increase in the asset-to-capital ratio. Banks in New York and Pennsylvania responded in the same fashion observed by Macey and Miller (1992) and Grossman (2001). The implicit guarantee allowed shareholders to commit smaller proportional amounts of capital to banks, which freed up capital to be invested elsewhere and still offered protections to creditors of all types. The next section further explores these issues in a regression setting.

4. Empirical results

4.1 Double liability and the nature of bank shareholdings

Univariate comparisons provided in §3.1 above point to notable differences in the concentration and composition of bank shareholdings at limited- and double-liability banks. This section provides OLS regressions to further investigate the strength of the associations, after controlling for potentially confounding variables.

Table 3 presents coefficient estimates from three OLS regressions, with standard errors clustered on the location (city or town) in which the bank was located. The standard errors (and significance levels) are not notably different if the regressions are estimated using the Huber-White robust adjustment. The dependent variables are the three measures of concentration – log shareholders, percentage of share held by the largest shareholder, and the percentage held by the five largest shareholders. The regressions appear to be well specified; the included regressors account for 50 to 70 percent of the variation in the dependent variable, and most of the regressors are individually statistically significant. Banks operating under graduated voting rights, banks in more populous towns, and banks observed later in the antebellum era have more shareholders and less concentrated shareholdings. Free banks and banks observed around a recession are associated with fewer shareholders and more concentrated ownership. It does not appear that Pennsylvania's and New York's efforts to spread share ownership through subscription restrictions were particularly effective, which is consistent with Bodenhorn's (2006) depiction of the corrupt practices in the distribution of early bank shares. Because these are cross-sectional OLS regressions, the estimated effects cannot be interpreted as causal; they are, however, consistent with prior expectation about their likely effects.

The variable of current interest is the effect of double liability on bank shareholdings. If double liability rules were imposed exogenously and independent of bankers' actions and their political lobbying activities, then we might assign a causal effect to the coefficient. From the individual banker's perspective, rule changes were largely beyond his control, but given that the rules were evolving, it is probably not the case that the rule was exogenous to bankers' behaviors and portfolio choices writ large. If, say, pre- and post-treatment shareholding data were available for New

York, it might be possible to investigate causal effects of the 1850 legal change, but such data are not available. Still, although the OLS estimates imply large changes in the nature of shareholdings across liability regimes – double-liability banks have 12.5% as many shareholders, with the single largest shareholder, on average owning 27.3% more shares – that are not out of proportion with the effect of graduated voting, the era’s other significant corporate-governance rule, which Bodenhorn (2014) argues can be taken as exogenous. Voting rules were not in flux; once adopted they tended to remain unaltered for decades.

The effect of double liability on shareholder concentration seen here are also consistent with the effects of liability rule changes in Irish banking in the nineteenth century. Acheson and Turner (2006) find that the number of shareholders increased five-fold after the introduction of limited liability and Hickson, Turner and McCann (2005) find that moving from unlimited to quadruple liability doubled the number of shareholders and share ownership was significantly more diffuse. Double liability to limited liability was a less pronounced change than was unlimited to quadruple liability, so the magnitude of its effect is smaller, but the direction of the changes found in nineteenth-century Irish and American banking are the same.

Table 4 reports the results of three OLS regressions in which the dependent variable captures some component of the composition of shareholdings – holdings by women, by individuals sharing a surname with another shareholder, and the largest block held by individuals sharing a surname. With the exception of women and minor children, double liability is not associated with notable changes in the composition of shareholdings. The estimated coefficient on double liability in the “Women” regression suggests a 3.1 percentage point difference between double-liability and limited-liability banks. This differential represents about three-fourths of a standard deviation in women

shareholdings. After controlling for other factors, trusts administered for women and minor children appear to be less willing to invest in double-liability banks, perhaps because the contingent liability represented a risk trustees were unwilling to impose on the trusts' beneficiaries.

One of the purported advantages of limited liability is that alters the calculus of potential investors. Under limited liability, they are free to diversify because the decision of which firms or industries to invest in is divorced from the decision of who to invest with. Unlike unlimited liability, limited liability makes the shareholders' outside wealth irrelevant to the investment decision of others. A priori it does not appear that double liability should alter that calculus. Creditors need to be concerned with the ability of shareholders to meet the additional call, but there is no obvious reason why shareholders should concern themselves with the identities of other shareholders. The exception arises if there are diseconomies in creditor monitoring. The benefits of lower funding costs that flow from double liability are likely to be erased if the costs to creditors of determining the financial capacities of dozens (or scores or hundreds or thousands) of shareholders quickly outweigh the lower risk costs of the added double-liability guarantee. The guarantee is meaningless if shareholders are unable to meet calls, so the credit-cost advantage accrued only to those banks whose creditor monitoring costs were relatively low. It may have accrued mainly to banks with fewer shareholders and more concentrated shareholdings, which would be consistent with the results.

4.2 Differences in bank leverage: treatment effects

The dependent variable is the ratio of total assets to total shareholder equity (paid-in capital + retained earnings), which is the variable of interest in Macey and Miller (1992) and Grossman (2001), although the latter paper discusses the effect of double liability on bank failures, as well.

Before discussing the results, it should be noted that New York, Pennsylvania and Maine imposed unique limits on their bank's debt ratios and made directors personally liable for violations of the limits.¹³ These rules map into different implicit limits on asset-capital ratios, but New York and Maine banks operated with a ratio of between 2 and 3, with very few above 4. Similarities in the ratios allay any concerns that the two state's banks are not comparable.¹⁴ Pennsylvania banks, by comparison tended to operate with ratios between 2.5 and 4, with few exceeding that value. The analysis hereafter drops observations where the ratio exceeds 10 because these appear to be driven by errors in the data. The results are robust to limiting the sample to banks with ratios less than 8 or less than 12.

The first three columns of Table 5 report true pre- and post-treatment effects estimates in that the pre-treatment period (1845) is prior to the adoption of double liability in New York's 1846 constitution and the post-treatment period is after the law took effect in January 1850. Column 1 reproduces the simple difference-in-difference estimate calculated from the ratios and reported above in §3.2. Not controlling for bank size or location, the effect of the imposition of double liability was to increase the asset-capital ratio by 42.1 percentage points. Column 2 controls for bank size (logarithm of assets) and New York City location and the results are comparable. The asset-capital ratio increased for the treatment group by 39.6 percentage points. Column 3 excludes New York City banks, but controls for bank size. Here, too, the effect of the treatment is comparable; the asset-

¹³ For comparability I have rewritten the rules in terms of paid-in capital, which was the common element across states. New York's rule was: $(\text{total assets} - \text{cash}) \leq 4 * \text{capital}$; Maine's rule: $(\text{total assets} - \text{deposits}) \leq 3 * \text{capital}$; and Pennsylvania's rule: $\text{total assets} \leq 4 * \text{capital}$.

¹⁴ A simple count of banks by adherence to the rule are: 13 of 148 New York banks exceeded the legal ratio; none of Maine's 32 banks exceeded the limit; but 11 of Pennsylvania's 44 banks exceeded the legal limit. It was not unlawful to exceed the limit, but doing so exposed the directors to personal liability for the bank's debts in the event of bank failure.

capital ratio increases by 38.5 percentage points. The imposition of double liability increased the relative value of the ratio by 14.8 percent of the 1845 mean value of the ratio (i.e., $0.39 / 2.64$), which appears to be economically meaningful as well as statistically significant.

The last three columns of Table 5 repeat the exercise using 1849 as a proxy post-treatment period to investigate whether New York banks took advantage of the delayed implementation of the rule change to alter their ratios in anticipation of the change. It appears that the banks had, by 1849, altered their behavior in anticipation of the liability-rule change. A few months prior the law's full implementation, New York's banks had altered their asset-capital ratios by about 30 percentage points, or about three-quarters of the eventual change in the ratio.

If concerns about the comparability of banks in New York and Maine linger, I also conducted a difference-in-difference test only for New York City and Philadelphia banks using 1849 as the proxy post-treatment observation. (Recall, that Philadelphia enacted a rule change in 1849 to take effect in 1850, hence the "proxy" test.) The results are similar to the New York-Maine tests; the asset-capital ratio among New York City's banks increased by 34.3 percentage points relative to Philadelphia's banks. Given that Philadelphia and New York were traditional money centers served by several large, nationally networked banks and a fringe of small- to medium-sized competitors, the comparability of the last result with the prior ones lends some credibility to the New York-Maine test.

Table 6 reports the difference-in-difference estimates for the imposition of partial double liability in Pennsylvania in 1850. Because the rule change imposed double liability only for note issues rather than entirety of the banks' debts, it is unlikely to have had as pronounced an effect on the banks' ratios. Although the estimated treatment effects are not statistically significant at

conventional levels, they still imply a 15 to 25 percentage point relative change in the leverage ratio at Pennsylvania banks.

The higher on-balance-sheet leverage ratios for double liability banks are consistent with the shareholding results. If the creditor monitoring cost advantages accrued mainly to those double liability firms with more concentrated shareholdings, and bank investors responded to the possibility of reduced funding costs by limiting the number of shareholders, then double liability banks would appear to operate on thinner capital margins. They were not, of course. If it were possible to reproduce the creditors' expected value of the contingent call and incorporate that value in the banks' capital accounts, we might find that they operated on higher effective (on- plus off-balance-sheet) capital ratios. The value of that contingent call depended on contemporary beliefs about the willingness of courts and bankruptcy administrators to make the assessments and the shareholders to meet them, neither of which is observable. What is observable, however, is that double liability banks operated with notably more on-balance-sheet leverage and the difference-in-difference approach helps assure us that we have identified a plausibly causal effect.

5. Concluding comments

The banking crises of the 1980s and the 2000s led many to conclude that modern bankers do not have enough "skin in the game" (Barth 1991; Macey and Miller 1992; Mitchener and Richardson 2013). Deposit insurance subsidies and implicit "too-big-to-fail" bailout guarantees encourage banks to operate with risk-adjusted capital ratios that free markets would make too expensive for the bankers to allow them to be profitable. Barth reports that regulatory capital at savings and loans fell to as little as 3 percent in the mid-1980s, though the Bank for International Settlements (2014)

reports a baseline regulatory capital-asset ratio of 8 percent, subject to adjustments based on a bank's counterparty risks. Historically, banks not subsidized by deposit insurance and without the too-big-to-fail backstop operated with much higher ratios – the average capital-asset ratio at New York banks in 1850 was an astonishing 39 percent; in 1900 it was 14 percent (Weber 2011; New York Superintendent of Banks 1901). The modern approach to limit risk taking has generally advocated for either more regulation, especially capital regulation, or reduced subsidies, or both.

An alternative approach, and the one adopted in the Jacksonian era of small government and maintained during the National Banking era up to the New Deal reforms, was extended shareholder liability.¹⁵ The belief then was that double liability would reduce bank risk-taking. During the Congressional debates over the National Banking Act of 1863, Senator Sherman argued that double liability “tends to prevent stockholders and directors of a bank from engaging in hazardous operations” (quoted in Grossman 2007, 62). Macey and Miller (1992), Esty (1998), Grossman (2001) and Calomiris and Wilson (2004) found that it had the predicted effects; banks subject to double liability were more closely held and held proportionately fewer risky assets.

A study of the early nineteenth century does not shed any light on the riskiness of bank assets per se, but it does show that the imposition of double liability rules altered bank behaviors and influenced shareholdings. The difference-in-difference results reveal that the imposition of double liability actually encouraged bankers to increase their (measured) leverage. Asset-capital ratios, after the imposition of double liability, increased by about one-quarter, which suggests that bank creditors viewed the contingent liability as a credible guarantee. That is, creditors expected that shareholders

¹⁵ Bodenhorn and White (2015) find that the New Deal reforms led to smaller bank boards of directors and Mitchener and Richardson (2013) find that the New Deal reforms, especially deposit insurance, led to greater bank leverage.

would make good on the call if the bank failed. One advantage of this was that shareholders tied up less of their investment capital in bank stock, which freed it for other investments. The second notable consequence of double liability is that it was associated with less dispersed, more concentrated shareholdings. Although the shareholder data used here does not distinguish between bank insiders (e.g., presidents and directors), the higher concentration is consistent with Espy's (1998) finding that double liability was associated with high levels of inside ownership. In the early twentieth century, high inside ownership facilitated the valuation of shareholder guarantees and discouraged risk taking. The topic deserves further study, but the early nineteenth-century results point to the same effect. The expected decrease in risk taking believed to follow from double liability is indirectly evident in its effects on shareholdings and leverage.

Appendix A: Extended liability rules by state

New York (1846, in effect in 1850)

“The stockholders in every corporation and joint-stock association for banking purposes, issuing bank notes or any kind of paper credits, to circulate as money, after the first day of January, one thousand eight hundred and fifty, shall be individually responsible, to the amount of their respective share or shares of stock in any such corporation or association, for all its debts and liabilities of every kind contracted after said first day of January, one thousand eight hundred and fifty.” Article VIII, §7, Constitution of the State of New York (1846).

Pennsylvania (1850)

“The stockholders of every such bank, in addition, to the corporate liability, shall be jointly liable to the creditors of the said bank, being note-holders, in their individual capacities, for the amount of the notes issued; and in manner of enforcing such liability shall be as follows: in case the said bank shall violate the provisions of this act, so as to forfeit its charter, or become insolvent and in failing circumstances by reason of the mismanagement of its affairs, and is compelled to make an assignment under the provisions of this act, the assignees so appointed shall proceed to make a fair and equitable appraisal of the assets of the said bank of every description, at their cash value; and also to make a list of all the debts due by the said bank, and if it shall appear that the assets are insufficient to redeem the notes in circulation, the stockholders of the said bank shall be liable to make up such deficiency, in proportion to the respective amounts of stock held by each, at the time such assignment is made.” *Laws of the General Assembly of Pennsylvania passed at the session of 1850*, Ch. 322 (p. 490). Harrisburg: Theo. Penn & Co., Printers to the State, 1850.

Maine (1831):

“That in the case of any loss or deficiency of the capital stock in any Bank aforesaid, which shall arise from the official mismanagement of the Directors, the persons who are Directors at the time of the mismanagement shall in their private and individual capacities be respectively liable to pay the same; and in case of their inability to pay such loss or deficiency, the persons who are stockholders at the time of such official mismanagement shall be liable in the same manner as Directors. Provided however, That in no case shall any one stockholder be liable to pay a sum exceeding the amount of the stock actually then held by him. And provided further, That the liability of such stockholder as aforesaid, shall not continue beyond the term of one year from and after the time he shall have duly transferred his stock, pursuant to the provisions of this Act.

“That the holders of stock in any Banking corporation aforesaid in this State, when its charter shall expire, shall be chargeable in their private and individual capacities, and shall be holden for the payment and redemption of all bills which may have been issued by said corporation, remaining unpaid, in proportion to the stock they may respectively hold; Provided however, That his liability shall continue for the term of two years only from and after notice given in the newspapers, which shall publish the laws of the State, that charter has expired.” *Laws of the State of Maine*, Vol. III, Chapter 519, p. 390. Portland: Thomas Todd, Printer for the State, 1831.

Rhode Island (post-1833 (re)charters):

“... that the stockholders of said corporation shall be personally and individually liable for all debts due from said bank: Provided, that the corporation be first sued, and the corporate property be first exhausted in payment of the debts of the corporation.” “An Act to Incorporate the Stockholders of the Coventry Bank.” Rhode Island Acts (June 1836, pp. 9-10).

“... the stockholders of the said bank shall be personally and individually liable for the debts due from said bank,

in case of fraud or embezzlement, or violation of any of the provisions of the act relating to incorporated banks and insurance companies, and for other purposes therein mentioned; Provided, the corporation first be sued, and the corporate property and effects exhausted in the payments of said debts.” “An Act to incorporate the Traders Bank.” Rhode Island Acts (June 1836, p. 102).

Massachusetts (1850)

“...holders of stock in any bank, at the time when the charter shall expire, shall be liable in their individual capacities for the payment and redemption of all bills which may have been issued by said bank, and which shall remain unpaid, in proportion to the stock” held at the bank’s dissolution. Angell and Ames (1871, 628).

Angell and Ames (1871, 628) suggest that the law, as written, was ambiguous concerning the “in proportion to” clause in the 1850 act. Two subsequent cases involving the closings of the Chelsea Bank and the Nahant Bank, clarified the issue. Massachusetts’ court of equity held that the legislative’s intent was to impose double liability (“... each [shareholder] is severally liable in such sum, not exceeding the par value of his shares, as the amount of unpaid bills may require.”) See *Crease v. Babcock*, 10 Met. 525 and *Grew v. Breed*, 10 Met 569 for the details of the court’s rulings.

Appendix B: Shareholding sources

Connecticut

Hartford Bank (1792).

Litchfield Bank (1858). U. S. House. 35th Congress, 2d Session. “Condition of the Banks.” House Executive Document No. 112. Washington: James & Steadman, 1859.

Indiana

Indiana. Senate. Journal of the Bank Investigating Committee: A Select Committee of the Indiana Senate, 1857. Indianapolis: Joseph J. Bingham, state printer, 1857.

Kentucky

Bank of Kentucky. *A List of the Present Holders of the Original Stock in the Bank of Kentucky; Also, a List of Spurious Stock*. Louisville: Morton & Griswold, printers, 1841.

Maine

Maine. “List of Stockholders (with Amount of Stock Held by Each,) in the Banks of Maine.” *Documents Printed by Order of the Legislature of the State of Maine during Its Session A. D. 1840*. Augusta: Wm R. Smith & Co., Printers to the State, 1840.

Maine. “List of Stockholders, (with Amount of Stock Held by Each,) in the Banks of Maine.” *Documents Printed by Order of the Legislature of the State of Maine, during its Session A. D. 1843*. Augusta: Wm. R. Smith & Co., Printers to the State, 1843.

Maine. “List of Stockholders, Amount of Stock Held By Each, Jan. 1, 1845.” *Documents of the Legislature of the State of Maine during Its Session A.D. 1845*. Augusta: Wm. T. Johnson, Printer to the State, 1845.

Maine. “List of Stockholders, Amount of Stock Held By Each, Jan. 1, 1849.” *Documents of the Legislature of the State of Maine during Its Session A.D. 1849*. Augusta: xxx, Printer to the State, 1849.

Massachusetts

Massachusetts Bank (1785-1855, selected years). N. S. B. Gras. *The Massachusetts First National bank of Boston, 1784-*

1934. Cambridge: Harvard University Press, 1938.

Michigan

Bank of Michigan (1840). Michigan. House of Representatives. "Reports of the Majority and Minority of the Bank Investigating Committee, Together with the Minutes of the Committee." *Documents Accompanying the Journal of the Senate of the State of Michigan at the Annual Session of 1840*, vol. II. George Dawson, State Printer, 1840.

Other Michigan banks (1836-1839). Michigan. House of Representatives. *Documents Accompanying the Journal of the House of Representatives of the State of Michigan at the Annual Session in 1839*. Detroit: J. S. and S. A. Bagg, State Printers, 1839.

New Hampshire

New Hampshire Board of Bank Commissioners. "Bank Commissioners' Reports." *Journal of Honorable Senate of the State of New Hampshire, At Their Session Held at the Capitol in Concord, June 3, 1847*. Concord: Butterfield & Hill, State Publishers, 1847.

New Hampshire Board of Bank Commissioners. *Reports of the Bank Commissioners made to His Excellency the Governor, June Session, 1849*. Concord: Butterfield & Hill, State Printers, 1849.

New Hampshire Board of Bank Commissioners. "Bank Commissioners' Reports." *Journal of Honorable Senate of the State of New Hampshire, June Session, 1850*. Concord: Butterfield & Hill, State Publishers, 1850.

New Hampshire Board of Bank Commissioners. *Report of the Bank Commissioners made to His Excellency the Governor, June Session, 1855*. Concord: Amos Hadley, State Printer, 1855.

New York.

Bank of New York (1791). Henry W. Domett. *A History of the Bank of New York, 1784-1884* (4th ed.). New York: privately printed, 1884.

Merchants Bank (1803).

Bank of America, Bank of Washington & Warren, Chemical Bank, Dry Dock Bank (1826). Eric Hilt, "When Did Ownership Separate from Control? Corporate Governance in the Early Nineteenth Century." *Journal of Economic History* 68:3 (September 2008), 645-685.

Chemical Bank (1844). Chemical Bank. *History of the Chemical Bank, 1823-1913*. New York: Privately printed, 1913.

Eighth Avenue Bank, Lewis County Bank (1854): New York State Assembly. "Annual Report of the Superintendent of the Banking Department." Assembly Doc. No. 10. Albany: C. Van Benthuysen, 1855.

All other NY banks (1831-1832): New York State Assembly. "Report of the Bank Commissioners on the Resolution of the Assembly on the 28th March, 1832. Assembly Document No. 89. Albany: E. Crosswell, state printer, 1833.

Ohio

Ohio. General Assembly. *Documents, Including Messages and Other Communications made to the Forthly-Seventh General Assembly of the State of Ohio*. Columbus: Chas. Scott, state printer, 1849.

Ohio. Auditor of State. *Appendix to Annual Report of Auditor of State. Series of Reports Made on the Condition of the Ohio Stock Banks as Ascertained by Charles Reemelin, Esq., Acting as Special Examiner under the Appointment of the Auditor and Secretary of State*. Columbus: Statesman Steam Press, 1855.

Pennsylvania

Bank of North America (1782). Lawrence Lewis ...

Gertrude MacKinney, ed. *Pennsylvania Archives*, 9th series, vols. 5-6. 1931.

Vermont

Bank of Orleans (1865). Frederick W. Baldwin, ed. *History of "Bank of Orleans," "Irasburgh National Bank of Orleans," "Barton National Bank," "Barton Savings Bank," "Barton Savings Bank and Trust Company."* Burlington, VT: Free Press Printing Company, 1916.

Wisconsin

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Table 1
Summary Statistics – Bank Shareholdings

	Observations	Full Sample	Limited liability	Double liability
Shareholders		92.64 (228.45)	292.68 (453.66)	43.74 (53.89)**
log(shareholders)		3.347 (1.633)	4.890 (1.200)	2.969 (1.498)**
Single largest	610	0.211 (0.231)	0.091 (0.076)	0.231 (0.242)**
Five largest	450	0.556 (0.306)	0.283 (0.183)	0.623 (0.293)**
Common surname		0.346 (0.242)	0.386 (0.189)	0.336 (0.252)*
Large common		0.161 (0.197)	0.096 (0.068)	0.177 (0.215)**
Women and children	416	0.030 (0.043)	0.018 (0.282)	0.033 (0.043)**
Institutional investors	417	0.029 (0.066)	0.019 (0.049)	0.031 (0.069)*
Bank age	610	10.08 (11.95)	1.35 (4.33)	11.56 (12.20)**
Capital (\$000)	610	175.96 (242.39)	231.40 (324.40)	166.61 (224.72)**
Year observed	610	1849.5 (12.5)	1825.1 (8.8)	1853.6 (7.4)**
Year established	610	1839.4 (14.8)	1823.8 (8.7)	1842.0 (13.9)**
log(population)		8.853 (1.409)	8.752 (1.931)	8.870 (1.302)

Sources: see Appendix B.

Table 2
Summary statistics – Change in liability rule

Panel A: New York change in 1850				
	New York (1845)	New York (1850)	Maine (1845)	Maine (1850)
Assets/capital	2.635 (1.149)	2.979 (1.416)	2.279 (0.439)	2.202 (0.345)
log(Assets)	12.950 (1.116)	13.039 (1.062)	12.040 (0.516)	12.214 (0.504)
New York City	0.162 (0.370)	0.159 (0.366)	--	--
Observations	148	176	32	31
Panel B: Pennsylvania change in 1850				
	Pennsylvania (1849)	Pennsylvania (1854)	Maine (1849)	Maine (1854)
Assets/capital	2.770 (0.783)	3.064 (0.786)	2.138 (0.434)	2.205 (0.495)
log(Assets)	13.602 (0.842)	13.772 (0.730)	12.116 (0.479)	12.129 (0.622)
Philadelphia	0.341 (0.479)	0.289 (0.458)	--	--
Observations	44	45	32	69

Sources: Liability rules Appendix A; balance sheet data (Weber 2011).

Table 3
Determinants of bank share concentration

	log(shareholders)	Single largest	Five largest
Double liability	-2.079 (.528)**	0.273 (0.041)**	0.412 (0.090)**
Graduated voting	1.883 (0.475)**	-0.229 (0.034)**	-0.386 (0.100)**
Bank age	-0.007 (0.011)	-0.000 (0.000)	0.000 (0.002)
Capital (\$000)	0.002 (0.001)**	-0.000 (0.000)	-0.000 (0.000)
Free bank (0/1)	-0.963 (0.202)**	0.140 (0.041)**	0.087 (0.047)
log(population)	0.161 (0.053)**	-0.012 (0.009)	-0.033 (0.014)**
Pennsylvania new bank (0/1)	1.158 (0.279)**	0.041 (0.041)	-0.039 (0.072)
New York new bank (0/1)	-0.169 (0.199)	0.008 (0.020)	-0.009 (0.039)
Recession (0/1)	0.956 (0.281)**	-0.133 (0.043)**	-0.142 (0.060)*
Year	0.046 (0.024)*	-0.004 (0.001)**	-0.005 (0.004)
Constant	-81.592 (43.581)	7.022 (1.665)**	10.548 (7.007)
Observations	470	610	450
F-statistic	74.94**	35.13**	49.10**
R-square	0.70	0.51	0.62

Notes: standard errors clustered on city/town. ** implies p-value<0.01; * implies p-value<0.05.

Sources: For shareholdings see Appendix B; balance sheet data Weber (2011).

Table 4
Determinants of bank share concentration

	Women	Common surname	Largest common surname
Double liability	-0.031 (0.009)**	-0.096 (0.091)	-0.002 (0.068)
Graduated voting	0.049 (0.013)**	0.159 (0.063)*	-0.008 (0.053)
Bank age	0.001 (0.001)	0.000 (0.002)	-0.001 (0.001)
Capital (\$000)	0.000 (0.000)	0.000 (0.000)**	0.000 (0.000)
Free bank (0/1)	-0.001 (0.004)	0.036 (0.045)	0.036 (0.036)
log(population)	0.002 (0.002)	-0.019 (0.013)	-0.013 (0.010)
Pennsylvania new bank (0/1)	-0.024 (0.011)*	0.165 (0.063)**	-0.017 (0.040)
New York new bank (0/1)	-0.003 (0.004)	0.109 (0.052)*	0.029 (0.022)
Recession (0/1)	0.015 (0.011)	0.015 (0.053)	-0.026 (0.047)
Year	0.001 (0.000)*	0.004 (0.004)	0.003 (0.003)
Constant	-1.995 (0.856)*	-7.142 (6.679)	-4.882 (5.245)
Observations	417	417	417
F-statistic	9.45**	9.15**	11.40**
R-square	0.36	0.09	0.09

Notes: standard errors clustered on city/town. ** implies p-value<0.01; * implies p-value<0.05.
Sources: For shareholdings see Appendix B; balance sheet data Weber (2011).

Table 5
Difference-in-differences estimate – New York liability rule change

	<u>NY-Maine (1845 and 1850)</u>			<u>NY-Maine (1845 and 1849)</u>		
New York	0.356 (0.122)**	0.518 (0.180)**	0.571 (0.191)**	0.356 (0.122)**	0.560 (0.177)**	0.578 (0.186)**
Post	-0.077 (0.085)	-0.021 (0.094)	-0.006 (-0.097)	-0.141 (0.084)	-0.112 (0.094)	-0.109 (0.095)
NY*Post (Treatment)	0.421 (0.139)**	0.396 (0.140)**	0.385 (0.154)*	0.313 (0.123)*	0.289 (0.127)*	0.307 (0.139)
Constant	2.278 (0.076)**	6.132 (1.706)**	7.184 (1.945)**	2.279 (0.078)**	6.727 (1.643)**	0.307 (0.139)**
Observations	387	387	335	380	380	330
F-statistic	13.28**	9.76**	7.11**	10.59**	7.81**	6.84
R-square	0.05	0.09	0.10	0.04	0.10	0.12
NYC dummy	N	Y	excluded	N	Y	excluded
log(Assets)	N	Y	Y	N	Y	Y

Notes: dependent variable = total assets / (paid-in capital + retained earnings). Standard errors clustered on bank.
** implies p-value<0.01; * implies p<0.05.

Sources: Liability rule changes see Appendix A, balance sheet data from Weber (2011).

Table 6
Difference-in-differences estimate – Pennsylvania liability rule change

Pennsylvania-Maine (1849 and 1854)			
Pennsylvania	0.632 (0.141)**	0.651 (0.171)**	0.592 (0.190)**
Post	0.067 (0.080)	0.068 (0.082)	0.066 (0.080)
Penn*Post (treatment)	0.228 (0.158)	0.253 (0.166)	0.143 (0.191)
Constant	2.128 (0.077)**	3.054 (1.014)**	1.906 (1.150)
Observations	190	190	162
F-statistic	17.61**	12.29	10.69**
R-square	0.27	0.28	0.24
Philadelphia dummy	N	Y	excluded
log(Assets)	N	Y	Y

Notes: dependent variable = total assets / (paid-in capital + retained earnings). Standard errors clustered on bank.
** implies p-value<0.01; * implies p<0.05.
Sources: Liability rule changes see Appendix A, balance sheet data from Weber (2011).

Figure 1

Kernel density estimates of Asset-capital ratio in New York before and after

