

NBER WORKING PAPER SERIES

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Working Paper 21494

<http://www.nber.org/papers/w21494>

NATIONAL BUREAU OF ECONOMIC RESEARCH

1050 Massachusetts Avenue

Cambridge, MA 02138

August 2015

I thank Eric Hilt for sharing data on New York bank shareholdings and charter provisions. Charles Calomiris, Ray Cohn, Joe Hughes, Richard Grossman, John Murray, Angela Redish, Will Roberds, Eugene White and participants of the Rhode College economics workshop, the 2014 Southern Economic Association meetings, Rockoffest at Rutgers University, and the 2015 Federal Reserve Bank of Atlanta/Emory University workshop on Monetary and Financial History for valuable comments on earlier drafts. Pam Bodenhorn, Ghanshaym Sharma and Danielle Zanzalari provided exceptional research assistance. The views expressed herein are those of the author and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 21494
August 2015, Revised December 2015
JEL No. G21,K2,N21

ABSTRACT

Limited liability is a defining feature of the modern corporation, but it was not always so. In the nineteenth century, several states imposed extended liability on some firms with all the other characteristics of corporations, including continuous life and freely tradable shares. But by 1850 about one-half of all US states imposed double liability on bank shareholders. This paper shows that double liability was associated with more concentrated bank shareholdings and that the change from single to double liability increased bank leverage ratios in the short term. In forcing bank shareholders to have more “skin in the game,” double liability changed investor and banker behaviors.

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1. Introduction

In November 2015 the *Wall Street Journal* (Carney 2015) reported new rules developed by the Federal Reserve System to bolster banks' loss-absorbing capacity. Under the regulations, banks will be required to hold 9.5% of their leverage exposure in shareholder-contributed equity and "plain vanilla," domestically-issued, high-grade, long-term debt. In the event of failure the bank's core creditors will be protected because the holders of the debt will bear the residual losses after the shareholders are wiped out. The proposal also implies that banks will hold less of their portfolios in foreign debt, derivatives and other relatively risky assets. In some sense the rule harkens back to the bond-secured note issue of free banking, which required banks to hold (mostly) investment-grade debt equal to their note issues. In instituting these rules, the Federal Reserve is forcing banks to hold more capital and asking bank shareholders to have more skin in the game with the expectation that in doing so banks will hold fewer risky assets and pose less of a systemic threat to the financial system.

The Federal Reserve's rules reveal long-standing regulatory concerns with bank risk taking, especially at large, systemically important financial institutions, that predates modern central banking. In the nineteenth-century United States regulators adopted various mechanisms to limit bank risk taking and reduce creditor exposure to bank defaults. Free banking's bond-secured note issue is well studied, but states also imposed various capital regulations, including minimum capital requirements and maximum leverage ratios. Regulators also prohibited or restricted certain types of loans, most notably long-term mortgage credit. But as Grossman (2010) notes, there was yet another creditor-protection option that was invoked in the US and elsewhere around the globe: extended shareholder liability. Under extended liability rules, shareholders in corporate commercial banks are variously subject to double, triple or even unlimited liability. In the event of bank failure, bankruptcy administrators assess shareholders for payment if, in resolving a bank failure, the bank's assets fall short of fully indemnifying its creditors.

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 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 are readily transferable and traded in thick, liquid markets. Moreover, limited liability firms tap into larger pools of capital and capture economies of scale unavailable to closely held or family firms, investor/shareholders can better diversify their portfolios, and consumers have greater 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, 2014).² Blandi (1934, p.39) finds virtually no mention of shareholder liability in the earliest corporate charters up to the early 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 corporation 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 place the rule above challenge (Blandi 1934; Wright 2014).³ By the 1830s the debate came down to two points. One side, made up of

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 – the law of corporations – was critical to creating that legal separation. 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 partisan political disagreements tended to shape the corporation. Bodenhorn (2005, 2011) discusses specific corporate features shaped by partisan politics at the state and federal levels.

³ In one of the earliest cases to bring a challenge before the appellate courts, the Massachusetts court found that a holder of 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 one possibly negligent manager/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 corporation was an entity completely separate from its individual shareholders. Pennsylvania courts arrived at the same conclusion in 1816, as did the United States Court of Appeals in 1824. In the latter instance, Justice Story argued that 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, the 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 demonstrate gross mismanagement of a bank by its directors,

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 1836, p.189), a populist belief that found favor into the twentieth century (Ballantine 1923, p.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 manage the firm, sought protections offered by perpetuity and limited liability; and this argument, too, was repeated into the twentieth century (Livermore 1935, p.687).

Nineteenth-century jurists, legislators and regulators resolved this fundamental debate 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 in a sector, or idiosyncratically through firms’ charters. Massachusetts’ manufacturing corporation act of 1809, for example, imposed full joint and several (unlimited) liability on all manufacturing firms’ 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 holding shares in a double-liability firm were liable up to the par value of the shares they held. Thus, if a shareholder owned a single \$100 share in a failed corporation 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 its limits extended beyond the original purchase price or par value of the shares held.

Beginning in the 1810s, several states imposed double liability on chartered commercial banks. Pennsylvania adopted double liability in 1808, but returned to single liability in 1810.⁴

acquiesced in by the shareholders. Equity offered the possibility that all the firm’s creditors could bring suit against all the shareholders as a group, a process not allowed at common law. Still, the court established a substantial hurdle, namely, proving the connection between bankruptcy and mismanagement would be a challenge.

⁴ To avoid confusion, single liability will hereafter refer to limited liability in its traditionally accepted sense. Double liability means that shareholders are subject to a call up to the par value of their shares. Extended liability implies any form of liability beyond single, including double, triple, unlimited and others.

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). Pennsylvania and Massachusetts modified their rule in 1850 such that shareholders were doubly liable but only for a bank's note issues not its other debts (Wisconsin 1852; Blandi 1934; Livermore 1935; Kimmer 1927; Marquis 1937; Leonard 1940). Dodd (1948, p.1377) could not identify any 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. It is not immediately obvious that his explanation holds for the nineteenth century. 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 increased measured bank leverage, a 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. Using New York as a case study, this article employs a difference-in-differences approach, which takes the adoption of double liability as a treatment effect. Between the law's passage in 1845 and its implementation in 1850, leverage at New York banks increased by about 25 percentage points. Over the long run (1845-1860), leverage decreased by a modest 5 percentage points. Thus, creditors viewed the double-liability contingent guarantee as less than certain, but it may have allowed banks to increase its asset portfolio without increasing its capital. This last was a valuable consequence in a capital-scarce economy (Calomiris and Haber 2014).

Not only did the regulatory change toward double liability influence bank portfolio choices, it also altered the mix of shareholders. Some individuals who might invest under limited liability will choose not to if doing so exposes them to assessments in the event of failure. Acheson and Turner (2006) and Hickson, Turner, and McCann (2005) find that changes in liability rules changed the number and mix of shareholders at nineteenth-century Irish banks. Using a unique data set of detailed bank shareholdings, which spans liability regimes in the early nineteenth-century United States, the results presented here show that double liability is associated with about 12% as many shareholders as single-liability banks. Additionally, share concentration was about 27 percentage points higher at double liability banks, a 3 percentage point reduction in the number of female shareholders and a 10 percentage point decline in family block holdings. Thus, double liability altered the investment calculus and changed the nature of corporate risk taking.

2. The law and economics of single 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) means that the totality of each owner's personal estate can be assessed to make creditors whole in the event of the firm's insolvency. Under unlimited liability wealthy investors will not want to join with relatively impecunious investors because the costs of insolvency are disproportionately borne by wealthy investors. Thus, wealthy investors will prefer 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* is as important as *what one invests in*.

Second, single liability generates economies in monitoring among owners in that it eliminates the costs of owners continually monitoring and updating estimates of all other owners' net worth (Winton 1993).⁵ Single liability also reduces creditors' monitoring costs

⁵ Winton (1993, p.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, a firm's liability choice (limited or unlimited) would be endogenous to its balance sheet

because the firm's net shareholder equity (i.e., capital plus retained earnings less unrealized losses) 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, p.40). Like single 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, however, alters creditor monitoring. In addition to monitoring a debtor firm's capital accounts, creditors must generate and update estimates of the shareholders' abilities to meet a call on shares in the event of bankruptcy.

Third, by eliminating shareholders' continual monitoring of one another, single liability facilitates the transfer of shares because share values are uncoupled from the value of the owners' assets (Hansmann and Kraakman 2000, p.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 shares of limited liability firms. Double liability does not undo this uncoupling of investor wealth and share value. Creditors must form estimates of shareholders' ability to meet an assessment, but investors do not need to monitor their fellow investors. Shares of double-liability firms, in fact, traded freely alongside shares of single-liability firms on regional stock markets in the nineteenth-century United States, though there are no extant studies that consider 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 rule on share transferability remains an open question.

Fourth, Easterbrook and Fischel (1984, p.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. Unlimited liability may be an efficient rule if owners are lower cost monitors of the firm's health and each other's wealth than are creditors. Single

choices. But nineteenth-century firms were constrained to a choice between partnership and corporation and presumably chose the option closer to the investors' preferences.

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 contingent "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.⁶

A fifth advantage of limited liability is that it facilitated diversification. As is well known, diversification across several different classes of investments reduces aggregate risk, but only in the case of single liability. Under unlimited liability broad diversification increases rather than decreases risk because each separate investment places the entirety of the investors' estate at risk. The preferred strategy under unlimited liability is for investors to reduce the number of risky investments, which in the limit is one or, perhaps, zero (Easterbrook and Fischel 1984, p.96). Double liability retains the idiosyncratic-reducing benefits of broad diversification while redistributing some fraction of insolvency risk from creditors to shareholders.

Hansmann and Kraakman (2000) note two additional benefits of single liability. First, because all owners realize the same proportional gains and losses from a bank's asset management policies regardless of their outside wealth, shareholders have relatively homogeneous economic interests, which facilitates collective decision making. Double liability does not alter this because all shareholders retain proportional interests. Second, single 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

⁶ Pennsylvania (1824, p.63), for example, imposed a statutory limit on overall bank leverage such that a bank's total debts less its deposits could not exceed twice its paid in capital (i.e., liabilities-deposits ≤ 2 *capital). If the bank exceeded this ratio and failed, directors were personally liable for the excess. New York's (1804, p.64) rule mandated that debts less specie could not exceed three times its paid-in capital. New Jersey's rule was that total indebtedness less deposits could not exceed twice the paid-in capital (Knox 1903, p.433). Using the accounting identity and rearranging terms implies that New Jersey banks' assets were to satisfy assets-deposits-retained earnings ≤ 3 *capital. Other states imposed similar rules, though the precise formulation differed across states.

personal liability is inefficient for widely held firms. It is more efficient to shift some of the risk onto creditors and have them price that risk into debt contracts and have a single authority resolve the bankrupt firm. In their study of double liability banks chartered after the Civil War, Macey and Miller (1992) and White (2011) report that receivers appointed by the US Comptroller of the Currency or state bank regulators recovered a substantial fraction of the assessments levied against individual bank shareholders at relatively modest costs.

Esty (1998) shows that double liability operates like an equity call option in that the market price of a 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 a contingent call on the bond, it also reduced funding costs. Because shareholders faced greater liability, creditors could assume that, compared to a single-liability bank, a double-liability bank would hold less risky loans and consequently, shift less of the default risk onto creditors. Koehn and Santomero (1980) and Kim and Santomero (1988), however, show that more stringent capital regulation gives banks incentives to realign their portfolios in a way that sometimes increases risk. Although regulators tend to prefer less levered banks, asking banks to hold more capital without strict regulation of portfolios will induce some banks to take on more risk.

Available data on nineteenth-century banks does not reveal much about portfolio allocations, but leverage (asset-to-capital), loan-to-asset and retained earnings-to-equity ratios are readily calculable from published balance sheets. Using cross-sectional differences in liability rules, Macey and Miller (1992) find that reported leverage ratios were higher at double-liability than at single-liability banks; Grossman finds a small, statistically insignificant, decline in leverage, though double liability is associated with lower failure rates. Macey and Miller (1992) posit two competing hypotheses for their finding. First, creditors may have demanded lower on-balance sheet net worth because the threat of assessment induced banks to take on less risky portfolios. But the Koehn and Santomero (1980) and Kim and Santomero (1988) analyses suggests the opposite in at least some cases.

Second, creditors did not demand as high a capitalization ratio at double-liability banks because the added liability acted an off-balance sheet entry (contingent net worth) that offered creditors a repayment guarantee. To see this, define leverage as the asset-capital ratio ($L = A /$

K). Further assume that bank shareholders have some expectations concerning the probability ($0 \leq \rho \leq 1$) that a double-liability assessment will be made; and, if a call is made, shareholders expect to meet some fraction of the call ($0 \leq \alpha \leq 1$). A change from single to double liability, thus, induces a change in leverage to $L' = A' / (K + \rho\alpha K)$. If the bank's on-balance sheet capital (K) does not change in response to the change from single to double liability, measured leverage will naturally increase because $A' > A$. For actual, not measured, leverage to be equal before and after the change in liability regime, it must be the case that $(A' / A) = (1 + \rho\alpha) > 1$, or the percentage change in leverage be equal to the expected contingent call (i.e., $\% \Delta L = \rho\alpha$). A difference-in-difference measure of the change in leverage then provides a measure of the expected call (or the implicit guarantee), which also represents the proportional change in the value of assets that a bank can finance with a given amount of actual paid-in capital. Calomiris and Haber (2014) contend that the real value of double liability was that the contingent nature of double liability offered a guarantee to bank creditors and freed up capital to be used in alternative (nonbank) investments. This latter effect was important in a capital-scarce economy such as the early nineteenth-century United States.

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

3. Liability regime and bank shareholdings

3.1 Data and empirical approach

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. Most of the data used in this study come from one of three sources. Several state legislative committees, including New York and Pennsylvania, gathered data on the original shareholders, or those subscribing to and paying for shares at the bank's opening. These lists of initial subscribers may not reflect an equilibrium condition, however, because there was sometimes a "frenzy" of trading that surrounded the era's initial public offerings (Cowen 2000, p.35). Initial subscribers sometimes obtained shares with the intention of selling them as soon as trading opened, and regulators sometimes mandated that shares be distributed as widely as possible, so that every subscriber received at least a few shares even if the initial offering was oversubscribed. The analysis includes 32 newly chartered Pennsylvania banks (1814-1815) and 12 newly chartered New York banks (1831-1832). Together, these represent less than 10% 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 second set of records used here are shareholder lists compiled by state bank commissioners or legislative committees following a financial crisis. Michigan, for example, collected information on bank shareholdings for a half-dozen chartered banks in 1840-1841 following a panic and suspension of specie payments. Ohio collected similar information in 1854 after a localized panic. It is not clear how a panic might influence reported shareholdings, if at all. If panics were of the sunspot variety described by Diamond and Dybvig (1983), existing shareholders were unlikely to have sold out ahead of the 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 financial crises.

The third and most useful sources of shareholding information are legislative documents or bank commissioner reports that provide information for all banks in a state at a point in time. Among the data used here, Indiana, Massachusetts, Maine, New Hampshire, and Wisconsin published some type of regular shareholder information. Maine published annual shareholding reports in the 1840s; New York in 1826, 1831 and 1832, and Wisconsin between the mid-1850s and the mid-1860s. Massachusetts (1858 and 1860) published only the number of shares held by

the largest shareholder, which is less useful than complete lists but provides information about the concentration of share ownership. In the 1850s New Hampshire reported only the total number of shareholders, which also provides some useful information on the dispersion of shareholdings. (A detailed listing of sources is provided in the Data Appendix.)

Table 1 provides summary statistics on bank shareholdings for 610 banks that operated between 1810 and 1864. Column 1 reports statistics for the full sample; columns 2 and 3 parse the sample by liability rule. By modern standards, early American banks were closely held corporations with 92 shareholders, on average. It is apparent, however, that double-liability banks had just 14% as many shareholders as single-liability banks. 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% of shares at single-liability banks, but 23% of shares at double-liability banks. Similarly, the five largest shareholders at single-liability banks owned 28% of shares compared to 62% at double-liability banks.

The greater concentration of shareholdings at double-liability banks is consistent with Hansmann and Kraakman's (2000) contention that extended liability tends to increase the costs of shareholders monitoring managers and creditors monitoring shareholders. Double liability altered the investment calculus for investors because the contingent call placed more of the investors' net worth at risk, so they would have been more interested in the daily goings-on at the bank. Double liability also changed the calculus for creditors because they now had to monitor not only the bank's managers and its capital accounts, but the net worth of its shareholders. It was less costly for creditors to monitor a few, high net worth investors than a large number of middling investors. For the bank to issue debt at competitive rates, it had to limit its shareholdings to fewer, presumably higher-wealth individuals whose net worth was more readily observable.

It is interesting, as well, to consider whether double liability was associated with different types of shareholders. The data afford the opportunity to explore whether alternative regimes were associated with differences in the fraction of shares held by individuals sharing a common surname, which proxies for family block holdings. The variable *Common* is the fraction of shares

owned by people sharing a surname with at least one other shareholder; that is, it measures the fraction of shares held by people with, for example, the surnames Smith, Jones and Johnson, among others. 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 and leverage policies. If the family held a sufficiently large fraction of shares they could elect a board of directors that would implement policies preferred by the controlling clan(s). Consider, for example, 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, along with others with common surnames holding smaller stakes, held nearly 62% of the bank's shares. The univariate comparison in Table 1 reveals that the 5 percentage point difference in *Common* between single- and double-liability banks is barely significant at conventional levels ($p\text{-value}=0.09$), and is about one-fifth the standard deviation in the variable. It is possible then that not only were shareholdings more concentrated at double-liability banks, but they may have been more likely to fall under sway of a controlling family bloc.

A second measure designed to capture systematic differences between single- and double-liability banks is the fraction of shares held by unaffiliated women and children, which is defined as female and child shareholders not sharing a surname with an adult male shareholder.⁷ Contemporaries considered shares of established, well-managed banks as appropriate investments for the support of widows, spinsters and orphaned minors. Bank shares had fairly consistent dividend yields, which made them attractive investments for trusts. How double liability affected a share's attractiveness is ambiguous. On one hand, the potential for the trust to be assessed in the event of bank failure could have catastrophic consequences for a trust just sufficient to support a beneficiary, which would have diminished its attractiveness. On the other, if double liability encouraged a bank's managers to hold less risky portfolios, the rule may have made shares more attractive, so long as returns were sufficient to support the beneficiary. The univariate comparison in Table 1 reveals that unaffiliated women and children held a larger fraction of shares in double-liability (3.3%) than in single-liability (1.8%) banks.

⁷ Women and children sharing a surname with a male shareholder are excluded from this measure because some families may have divided shares among family members in order to maximize voting power in graduated-voting banks.

3.1 Regression analysis of liability regime and shareholdings

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 ordinary least squares (OLS) regressions of the following general form:

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

where i indexes banks and t indexes years. X is a vector of bank-specific control variables likely to influence shareholdings independent of the liability rule. These include a bank's age, the year observed, whether the bank is a free bank rather than a chartered bank, whether it was a new bank in Pennsylvania (1814-1815) or New York (1831-1832), whether the shareholdings were observed immediately prior to a financial crisis, 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 hands 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 shareholdings that become more dispersed over time. The controls for new banks in Pennsylvania and New York are also included to capture a localized age effect because both states wrote into their banks' charters restrictions on subscriptions designed to limit concentrated holdings. The rules were more effective in Pennsylvania than in New York so separate dummy variables are included in the regressions (Bodenhorn 2006).

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

Alternative voting rights had profound effects on the concentration and composition of shareholdings. Nineteenth-century banks operated under either of two share voting regimes:

straight or one share-one vote rules; or graduated voting in which votes per share declined in the number of shares owned. Hilt (2006) and Bodenhorn (2014) contend that graduated voting rules protected minority shareholders from majority shareholder tunneling or other forms of self-dealing behavior. Graduated voting is associated with less concentrated shareholdings and with a larger fraction of shares owned by individuals sharing surnames. New York, Ohio, Indiana and Wisconsin banks operated under one share-one vote regimes; all other states imposed some form of graduated voting.

City and town population (linearly interpolated between census years) is included to capture the effect of local market size on shareholding. Although some banks reported shareholders in far-removed locations (New Yorkers held majority stakes in two of Milwaukee's banks), about half of shareholders resided in the same town as the bank. About three-fourths resided in the same state.

Table 2 presents estimated coefficients from four OLS regressions with clustered standard errors. The dependent variables are four measures of concentration – log shareholders, fraction of shares held by largest single shareholder, fraction of shares held by women and children, and fraction held by individuals with common surnames. The regressions appear to be well specified; the included regressors account for 50% to 70% of the variation in the dependent variables and many of the regressors are individually statistically significant. Banks operating under graduated voting rules, banks in more populous towns, and banks observed in later years have more shareholders, less concentrated shareholdings, more female shareholders and banks with a larger fraction of shares owned by family groups. Free banks and banks observed around a panic are associated with fewer shareholders and less concentrated shareholdings, though the effects are small on female and family shareholdings. Pennsylvania's efforts to spread share ownership were more effective than New York's, which is consistent with Bodenhorn's (2006) finding that initial share allocations were corrupted by New York's Jacksonian-era Democratic legislators. Because these are cross-sectional OLS regressions, the results cannot be interpreted as causal; they are, however, consistent with prior expectations.

The variable of current interest, of course, 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, we might attribute a causal interpretation to the coefficient. From the individual bankers' perspective, rule changes were largely beyond his

control, but given that the rules were evolving in this era, it is probably not the case that the rule was exogenous to bankers' choices writ large. If, say, pre- and post-treatment shareholding data were available for New York it might be possible to investigate the causal effects of the 1850 regulatory change, but such data are not available.

The OLS estimates point to double liability having a profound effect on shareholdings. The estimate in Column 1 (log of shareholders) implies that double liability banks had just 12.5% as many shareholders as single-liability banks. Subsequent columns report estimates that suggest that the largest shareholder at double-liability bank held a 27.3 percentage point larger stake than the average largest shareholder in a single-liability bank. Women and minor children shareholders at double-liability banks held a 3 percentage point lower fractional stake and family blocks about 10 percentage points less than at single-liability banks.

The effect of double liability on shareholder concentration observed here are 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. The move from double to single liability was a less pronounced change than was the change from unlimited to quadruple liability, so the magnitude of the single to double effect is smaller, but the direction of changes found in nineteenth-century Irish and American banking are the same.

One of the purported advantages of limited liability is that it alters the calculus of potential investors. Under limited liability, investors 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 one shareholder's 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 a contingent call, but there is no obvious reason why shareholders should concern themselves with the identities of other shareholders. An exception arises, however, if there are diseconomies in creditor monitoring. The benefits of lower funding costs that flow from double liability may be eliminated if the costs to creditors of determining the financial capacities of dozens (or scores, or hundreds) of shareholders outweigh the incrementally larger expected recovery in the event of

failure. The double-liability guarantee is meaningless if shareholders are unable to meet calls or if creditors are unable to analyze shareholder net worth so the credit cost advantage accrued only to those banks whose creditor monitoring costs were relatively low. The cost advantages may have accrued mostly to banks with fewer and more concentrated shareholdings, which would be consistent with the results.

4 Liability regime and bank leverage

4.2 Bank leverage

A second issue of interest with respect to shareholder liability is whether and how bank owners having more “skin in the game” affected a bank’s choice of leverage (Michener and Richardson 2013). This study uses changes in New York’s liability rule to better understand how double liability altered bank behaviors. During the 1846 New York constitutional convention, one delegate proposed a modification of New York’s banking law to impose double liability on its banks (they had operated under single liability since 1829). Following an extended debate the legal change was written into the new constitution, but did not go into effect until 1 January 1850, which provided a period for the banks to prepare for the regulatory change.

It is reasonable to approach New York’s change in liability rules like a treatment effect on a group of treated banks so long as the rule change was not an endogenous regulatory response to rising leverage ratio, which does not appear to be the case in New York. The average bank leverage ratio was 2.89 in 1835; it declined to 1.77 in 1840, which was a predictable response to the financial panics of 1837 and 1839. Average leverage ratios gradually returned to their pre-recession levels; 2.55 in 1845 and 2.84 in 1850 (calculated from Weber 2015).

If we assume two groups of banks indexed by treatment status $T = 0,1$ where $T=0$ indicates banks not treated (i.e., the control group) and $T=1$ indicates treated banks. 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 $t=1$ indicates the period after the change in regime. Banks are observed pre- and post-treatment and indexed by $i=1, 2, 3, \dots, n$. Using this notation we can write the standard difference-in-difference estimator as:

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

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 the treatment and control groups; and δ captures 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 the 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), annual acts of state assemblies, and constitutional conventions for several states reveal that it is no trivial matter to find a reasonable control group for which no new meaningful regulations were imposed in the interval between 1845 and 1850. New York did not issue any new regulations during this period. New Jersey's banking regulations remained unchanged between 1812 and 1850, when the state enacted free banking (Knox 1903, p.434). According to Weber's (2015) bank census no free banks entered before early 1851, so New Jersey might serve as a reasonable comparison group. One point of concern, however, is that New Jersey did not have a regional financial center on par with New York City. For that reason, I also use Pennsylvania as a control group. The only change in Pennsylvania's banking regulations in this period involved a change to partial-double shareholder liability in 1850, but it was less sweeping than New York's change. Pennsylvania's law imposed double liability only for a bank's note issues. That is, if a Pennsylvania bank failed its shareholders faced an assessment equal to any shortfall between the recovery value of its assets and its outstanding notes, up to the par value of the shares. The new regulation represented a relatively trivial change for Pennsylvania banks because noteholders held a prior claim in bankruptcy settlements and the change does not appear to have altered their note-issuing practices in the short term; between 1849 and 1851, for example, the mean circulation-to-debt ratio increased from 0.493 to 0.514 (p-value = 0.66) and the mean circulation-to-deposit ratio fell

from 2.474 to 2.442 (p-value = 0.95). The new regulation did not alter its lending practices, either, as is evident below.

A second source of concern with estimating difference-in-difference effects is that the principal source of bank balance sheet information (Weber 2011) does not consistently report data in the same month or even the same quarter. Bodenhorn (2003) reports a strong seasonal component to loans and to note issues surrounding the crop cycle, such that loans and note issues peak in the 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 effects may be driven as much by seasonal changes in balance sheet ratios as by changes resulting from the treatment. The restriction that the treatment and control group data be drawn from the same quarter further restricted the choice of potential control years to 1847 for the New York-New Jersey pre-treatment date (New York banks reported in February 1847; New Jersey banks reported in January) and 1850/51 for the post-treatment date (New York banks reported in December 1850; New Jersey in January 1851). The month-year requirement restricts the New York-Pennsylvania comparison to 1845 (NY and PA reported in November) and 1850 (NY reported in December, PA reported in November).

As discussed above and in Macey and Miller (1992) and Grossman (2001) double liability is expected to alter a bank's risk taking. The issue is how best to measure it. Lamoreaux's (1994) and Bodenhorn's (1999) studies of micro loan-level records reveal that banks often financed idiosyncratic projects. Lacking individual-level loan records, this study adopts three standard measures of bank risk taking as indicators of changing preferences toward risk before and after enactment of the double liability law. Macey and Miller (1992) and Grossman (2001) focus on the leverage ratio (the inverse of the capital-asset ratio). The asset-to-capital ratio (defined here as total assets divided by paid-in capital plus retained earnings) is an often used metric of risk taking because it reflects the capacity of the bank to sustain losses on its loan portfolio that are borne by shareholders. Lower ratios imply that shareholders are assuming relatively more failure risk relative to creditors; higher ratios imply that creditors are assuming relatively more default risk (Mitchener and Richardson 2013).

A second measure – $\text{debt}/(\text{debt}+\text{equity})$ – is proposed by DeAngelo and Stulz (2013). They note that banks face a tension between their incentive to profit from liquidity creation and the costs of constructing a portfolio of relatively safe claims. The DeAngelo-Stulz debt-leverage measure captures a source of bankruptcy risk that concerned nineteenth-century bank shareholders. A bank's principal debts (bank notes and deposits) were fixed-dollar denominated claims; its collateral assets ($= \text{debt} + \text{equity}$) fluctuated in value with changes in macroeconomic conditions and were of longer maturity (typically 30 to 365 days). The debt-leverage ratio captures the extent to which a bank can absorb declines in the dollar value of debt before its shareholder equity is depleted and should be inversely related to a bank's shareholders' taste for risk.

A third measure of bank-risk taking behavior – $\text{retained earnings} / \text{total equity}$ – captures shareholders' concerns with free cash flow. Holding a larger fraction of total shareholder equity as retained earnings increases a bank's capacity to weather declines in the value of loans or other assets before owner-contributed equity is impaired. So this measure, too, reflects on bank leverage and risk taking. It also responds to any tension between the shareholders' preferences for distributing free cash flows and management's capacity to direct corporate resources to achieve managerial preferences (Bøhren, Josefsen and Steen 2012; Jensen 1986). At least some shareholders preferred dividends in part because dividends provided income for widows, orphans, and charitable organizations and in part because dividends limited management's ability to hold back and expropriate bank earnings. Other shareholders, however, may have preferred retained earnings because more retained earnings increased a bank's ability to lend and its capacity to absorb loan losses.

Table 3 reports summary statistics for the difference-in-difference samples pre- and post-treatment for New York, New Jersey (untreated) and Pennsylvania (plausibly untreated). The short-term increases in bank leverage are consistent with long-run trends (1840-1860) for mid-nineteenth-century US banks. Leverage was increasing generally throughout the era (Bodenhorn 2003, p.292). The issue is whether the leverage increased relatively more at the newly treated banks in New York relative to New Jersey and Pennsylvania. Mean values reveal that, although New York had more banks and, in New York City, larger banks than either of the comparison states, all three states' banks operated with comparable roughly comparable leverage, debt-to-asset, and retained earnings-to-equity ratios, though New York's banks held back somewhat

more retained earnings as a fraction of total shareholder equity than banks in the comparison states.

The final row in each panel reports the baseline difference-in-difference calculation, defined as:

$$(DD = [L_{ny, 1850} - L_{ny, 1845}] - [L_{nj/pa, 1850} - L_{nj/pa, 1845}])$$

Between 1845, prior to New York incorporating double liability for banks into its revised constitution and the law going into effect in 1850, New York's bank leverage ratio increased by 27 percentage points relative to New Jersey's banks and 26 percentage points relative to Pennsylvania's. The changes appear substantial in that they are about 10 percent of the original leverage ratio or nearly 30 to 40 percent of the original standard deviation. In both instances, the change was driven mostly by changes in the New York bank's portfolio choices; increases in New Jersey bank's operating ratios mitigate the substantial change among New York's banks, and the leverage ratio at Pennsylvania's banks increases by a modest 2.5 percentage points. New York's banks became more leveraged after the imposition of double liability.

The second column of Table 3 reveals that the debt-equity ratio declined relative to the comparison states by 5 to 6 percentage points, which represents only about 3 to 4 percent of the original values. A decline in the debt-equity ratio implies less risk; a lower ratio implies less leverage and an increased ability of banks to absorb declines in asset values without reducing the bank's shareholder-contributed equity. The third column shows that New York's banks also increased its retained earnings ratio. Although the comparative changes are small – 0.5 to 1.5 percentage points – they, too, represent more substantial percentage changes of up to 13 percent of the original values. That New York's banks were holding back comparatively more of their retained after the change in the law suggests reduced risk taking on the part of the average bank.

4.2 Differences in bank leverage: regression estimates of treatment effects

Table 4 reports difference-in-difference regression coefficient estimates for New York relative to New Jersey and Pennsylvania. Because New Jersey did not have any large banks comparable to the large New York City banks nor did it have any free banks before 1851, the table reports three variations on the regressions: one that includes all banks; a second with a

dummy variable that equals one if the bank was a free bank; and a third that includes a free bank dummy variables as well as controls for New York City and Philadelphia banks.⁸ The estimated effect of the treatment (i.e., New York * post) is similar regardless of specification.

The first three columns of the upper panel of Table 4 report the regressions that compare New York and New Jersey for the autumn of 1847 and 1850, which was after the New York constitutional convention changed the liability rule in 1845 and ten months after the law went into effect in 1850.⁹ The difference-in-difference coefficient is between 0.245 and 0.275, depending on specification. Relative to New Jersey's banks, New York's banks increased their leverage by about 25 percentage points, or about 10 percent of the New York mean leverage ratio prior to the regulatory change. Columns 4 through 6 provide the difference-in-difference estimate using Pennsylvania as a control group. These estimates suggest that the mean leverage ratio in New York increased by between 22 and 26 percentage points relative to Pennsylvania. That is, a given value of on-balance sheet shareholder equity financed about 11 percent more assets after the institution of double liability. The contingent, callable capital allowed banks to increase by a substantial amount the value of assets supported by a given capital.

The difference-in-difference results for New York in the 1850s differ from Grossman's (2001) results for state banks in the postbellum era. Using a sample of state banks with different liability regimes, he finds that, in cross-section, lower leverage ratios for banks operating under multiple-liability rules. He finds the same for a case-study comparison of Alabama and Mississippi, in which he relies on contiguity to control for common economic structure and macroeconomic shocks. The difference between his results and those reported here might be due to the changed circumstances between the antebellum and postbellum eras; the National Banking acts and state regulatory changes were, after all, designed to correct for perceived shortcomings in antebellum regulations and excessive bank risk taking. But the difference may also result from

⁸ New York's existing chartered banks were required to convert to free banks when their charters expired. Because there were several banks chartered or rechartered in the 1830s with 30-year charters, they had not yet converted by 1850. Two additional alternative specifications were estimated: one with the natural logarithm of assets as a control for the size differential between New York City and Philadelphia banks relative to country banks; and a second with both log assets and city dummies. The estimated coefficients are similar in magnitude and significance as those in Table 4 and are not reported.

⁹ The sample is restricted to banks with a leverage ratio less than 8. Errors in the New York data generated leverage ratios as high as 150, which are surely the result of reporting or data entry errors. Some errors were readily corrected (e.g., capital reported as 30,000 rather than 300,000), but others were not and were dropped. The results are nearly the same if the sample is restricted to banks with calculated leverage less than 4, 6, or 10. The sample is not balanced, in that it includes all banks operating before or after the regulatory change. Use of a balanced panel of only those banks observed in both regimes generates quantitatively similar results.

alternative empirical designs. If I estimate the effect of double liability on New York banks using a single cross-section of New York, New Jersey and Pennsylvania after the change, the estimated coefficient on New York is -0.179 (p-value = 0.076). Thus, a post-regulatory cross-sectional regression generates a notably different association, but one that cannot be interpreted as causal.

Panel B of Table 4 reports the results of difference-in-difference regressions using the debt-liability ratio as the dependent variable. The regressions consistently show a post-regulatory decline in the debt-liability ratio in New York relative to New Jersey and Pennsylvania. The estimated effect is modest in magnitude (the implied relative change is 5% of the pre-regulation mean) and the coefficients are not statistically significant. Between 1845 and 1850, the ratio declined in all three states, but declined by about twice as much in New York (12 percentage points) as in the other states (6 percentage points). The results for the retained earnings ratio are not reported; the ratio increased by about 2 percentage points in all three states over this period. Thus, the introduction of double liability in New York in 1850 prompted the banks to alter some features of risk-taking discernible on their balance sheets. Double liability banks increased their leverage by a substantial amount, decreased their debt-to-liability ratios somewhat, but appear to have neither increased nor decreased the equity buffer against losses by holding back some earnings rather than paying them out as dividends.

4.3 Was double liability credible?

If we calculate a long-run difference-in-difference coefficient for New York and Pennsylvania between 1845 and 1860 (recognizing, of course, that the all other regulation constant condition is almost surely violated), it implies that leverage at New York's banks, relative to Pennsylvania's, declined by 5.2 percentage points. The long-run effect of the change to double liability, therefore, is to decrease leverage by about 30 percentage points relative to the short-term effect. The question is why the (mis)measured long-term effect is much smaller in magnitude and the opposite sign of the short-term effect. It is not the case that leverage increased for the control group, which was a constant at 2.82. A more likely explanation is that time brought experience with how failed banks would be resolved, including how assessments would be made and collected after failure. One purpose of double liability was to induce banks' shareholders to encourage managers to close and liquidate voluntarily prior to failure and the need for assessments. Using the balance sheets provided in Weber (2011), an analysis of 12 New

York banks that closed between January 1850 and December 1857 finds that six closed with positive net worth (assuming that bad loans exactly exhausted shareholder equity). Of those banks that “failed,” the data generate an estimated shortfall (assessment) of 50% of shareholder equity reported in the quarter prior to failure. Unfortunately, the extant data do not report what fraction of the assessment was realized by the receivers.

In his monograph explaining how receivers should wind down different types of firms, Edwards (1857) provides the details surrounding the resolution of the Empire City Bank of New York City, which closed in 1854. The receiver assessed the shareholders \$12.12 per \$100 share for an aggregate of \$140,890.¹⁰ But the shareholders’ attorneys were able, through various legal maneuvers, to delay collections on the assessment for nearly three years. In September 1857, the New York court of equity terminated the case by rendering final judgment against the shareholders. No further information is provided, so it is impossible to determine what fraction of the assessment was collected. Macey and Miller (1992) and White (2011) find that receivers collected about 50% of the assessments in the National Banking Era (1864-1914). Using their 50% value as the expected collection rate on the assessment means that depositors and other (non-banknote) creditors of the bank received about 74 cents on the dollar. It is likely then that the smaller long-term effect of double liability rule, compared to the short-run effect, resulted from creditors learning how failed and closed banks would be resolved. Because shareholders could delay the collections and may not have paid them in full, the expected value of the callable contingent capital declined over time.

Overall, the evidence from New York points to double liability having a substantial short-term effect on bank leverage. Leverage increased, but by less than the full nominal value of the contingent capital call. That is, assets increased less than potential liability, which reflects on either the shareholders taste for risk or the price of credit imposed by monitors to reflect their increased monitoring costs, or both. It is unclear how double liability affected bank balance sheets in the long run, but a back-of-the-envelope-type calculation suggests that its long-run effect was mitigated by delayed and incomplete collections from shareholders of failed banks.

¹⁰ Using balance sheet data and the price of collateral bonds (to estimate repayment rates on banknotes prior to assessment), the estimated assessment is 29% of paid-in capital, compared to the 12% actually assessed by the receiver. The bank’s note holders were paid in full because the value of the collateral bonds was sufficient to redeem the bank’s outstanding notes (Warren Weber, personal communication).

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; Grossman 2001; 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.¹¹ 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, at least in the short term. Asset-capital ratios, after the imposition of double liability, increased by about one-quarter, which suggests that bank creditors initially viewed the contingent liability as a credible

¹¹ 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.

guarantee. That is, creditors expected that shareholders 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.

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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).

Maryland (1851)

“The Legislature hereafter shall grant no charter for banking purposes, or renew any banking corporation now in existence, except upon condition that the stockholders and directors shall be liable to the amount of their respective share or shares of stock in such banking institution, for all its debts and liabilities upon note, bill or otherwise.” Maryland. Constitutional Convention (1851, Art. III, §45)

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

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Table 1
Summary statistics – bank shareholdings

	Obs	Full sample	Single liability	Double liability
Shareholders	470	92.64 (228.45)	292.68 (453.66)	43.74 (53.89)**
ln(shareholders)	470	3.35 (1.63)	4.89 (1.20)	2.97 (1.50)**
Single largest	610	0.21 (0.23)	0.09 (0.08)	0.23 (0.24)**
Women and children	417	0.03 (0.04)	0.02 (0.28)	0.03 (0.04)**
Common surname	417	0.35 (0.24)	0.39 (0.19)	0.34 (0.25)*
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 (12.50)	1825.1 (8.80)	1853.6 (7.40)**
Year established	610	1839.4 (14.80)	1823.8 (8.70)	1842.0 (13.90)**
ln(population)	610	8.85 (1.41)	8.75 (1.93)	8.87 (1.30)

Notes: ** implies statistically significant difference between single- and double-liability banks (p-value < 0.01).

Sources: see Data Appendix B.

Table 2
Determinants of bank share ownership

	ln(shareholders)	Largest Shareholder	Women and children	Common Surname
Double liability	-2.079 (0.528)**	0.273 (0.041)**	-0.031 (0.009)**	-0.096 (0.091)
Graduated voting	1.883 (0.475)**	-0.229 (0.034)**	0.049 (0.013)**	0.159 (0.063)*
Bank age	-0.007 (0.011)	-0.000 (0.000)	0.001 (0.001)	0.000 (0.002)
Capital (\$000)	0.002 (0.001)**	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)**
Free bank (0/1)	-0.963 (0.202)**	0.140 (0.041)**	-0.001 (0.004)	0.036 (0.045)
Ln(population)	0.161 (0.053)**	-0.012 (0.009)	0.002 (0.002)	-0.019 (0.013)
Pennsylvania new bank	1.158 (0.279)**	0.041 (0.041)	-0.024 (0.011)*	0.165 (0.063)**
New York new bank	-0.169 (0.199)	0.008 (0.020)	-0.003 (0.004)	0.109 (0.052)*
Recession	0.956 (0.281)**	-0.133 (0.043)**	0.015 (0.011)	0.015 (0.053)
Year	0.046 (0.024)*	-0.004 (0.001)**	0.001 (0.000)*	0.004 (0.004)
Constant	-81.592 (43.581)	7.022 (1.665)**	-1.995 (0.856)*	-7.142 (6.679)
Obs	470	610	417	417
F-stat	74.94**	35.13**	9.45**	9.15**
R-square	0.70	0.51	0.36	0.09

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

Table 3
Summary statistics and basic difference-in-difference estimates for bank leverage
New York, New Jersey and Pennsylvania

State	Year(s)	Assets/ capital	Debt/ debt+equity	Retained/ equity	Obs
Panel A: New York-New Jersey comparison, 1847 and 1850					
New York	1847	2.433 (0.703)	1.539 (0.292)	0.111 (0.083)	144
New York	1850	2.835 (1.122)	1.416 (0.459)	0.134 (0.117)	178
New Jersey	1847	2.439 (0.708)	1.579 (0.371)	0.116 (0.102)	26
New Jersey	1850	2.566 (0.663)	1.516 (0.463)	0.124 (0.104)	26
Diff-in-diff 1847-1850		0.275	-0.060	0.015	
Panel B: New York-Pennsylvania comparison, 1845-1850					
New York	1845	2.549 (0.888)	1.538 (0.289)	0.110 (0.091)	146
New York	1850	2.835 (1.121)	1.416 (0.459)	0.134 (0.117)	178
Pennsylvania	1845	2.815 (0.788)	1.455 (0.285)	0.125 (0.084)	45
Pennsylvania	1850	2.840 (0.662)	1.382 (0.170)	0.144 (0.080)	47
Diff-in-diff 1845-1850		0.261	-0.049	0.005	

Notes:

Sources: author's calculations from Weber (2011).

Table 4
Difference-in-difference estimates of leverage and debt ratios
New York-New Jersey and New York-Pennsylvania comparisons

Panel A: Assets/Capital						
	<u>NY-NJ (1847-1850)</u>			<u>NY-PA (1845-1850)</u>		
New York	-0.006 (0.149)	-0.094 (0.151)	-0.166 (0.152)	-0.266 (0.138)	-0.389 (0.134)**	-0.297 (0.134)**
Post	0.127 (0.109)	0.127 (0.109)	0.109 (0.188)	0.025 (0.091)	0.025 (0.092)	0.008 (0.097)
NY*Post	0.275 (0.139)*	0.249 (0.136)†	0.245 (0.137)†	0.261 (0.130)*	0.225 (0.129)†	0.237 (0.129)†
Free bank		0.187 (0.111)†	0.225 (0.106)*		0.259 (0.121)*	0.298 (0.115)**
NYC			0.327 (0.110)**			0.338 (0.114)**
Philadelphia						0.575 (0.215)**
Constant	2.439 (0.137)**	2.439 (0.137)**	2.439 (0.137)**	2.815 (0.117)**	2.815 (0.117)**	2.649 (0.117)**
Obs	374	374	374	416	416	416
Panel B: Debt / (Debt + Equity)						
	<u>NY-NJ (1847-1850)</u>			<u>NY-PA (1845-1850)</u>		
New York	-0.041 (0.076)	-0.082 (0.076)	-0.069 (0.076)	0.083 (0.048)	0.035 (0.049)	-0.017 (0.051)
Post	-0.063 (0.095)	-0.063 (0.095)	-0.063 (0.095)	-0.073 (0.034)*	-0.073 (0.035)*	-0.066 (0.034)
NY*Post	-0.059 (0.101)	-0.073 (0.100)	-0.073 (0.100)	-0.049 (0.048)	-0.067 (0.047)	-0.073 (0.047)
Free bank		0.084 (0.041)*	0.076 (0.040)†		0.100 (0.040)*	0.092 (0.040)*
NYC			-0.058 (0.044)			-0.058 (0.044)
Philadelphia						-0.225 (0.044)**
Constant	1.579 (0.072)**	1.579 (0.072)**	1.579 (0.072)**	1.455 (0.042)**	1.455 (0.042)**	1.520 (0.044)**
Obs	406	406	406	444	444	444

Notes: standard errors clustered on bank; † implies p-value < 0.10; * implies p-value < 0.05; ** implies p-value < 0.01.

Sources: author's calculations from Weber (2011).