

Bank Capital Structures without Government Rules: Evidence from Victorian Britain

Abstract

Government regulation of the banking sector is pervasive, making it difficult to analyze empirically how banks would choose their capital structures if there were no mandates. An exception occurred in the late nineteenth-century United Kingdom when all government rules for banks were removed. Despite this deregulation, banks maintained very high capital adequacy, with robust levels of equity, and even higher amounts of additional capital through extended liability. Post-deregulation, banks did not increase their risk taking, either through their loan book or via aggressive expansion.

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1. Introduction

The capital structures of banks are often regarded as being crucial to financial stability, with higher amounts of equity providing a cushion against losses, reducing the risk of insolvency. There is still an ongoing debate as to why banks choose a particular capital structure, and how government involvement affects these decisions. Admati and Hellwig (2014) argue that banks are encouraged to hold low levels of equity due to government favouritism towards debt (such as government provision of deposit insurance, the likelihood of bailouts, and tax-deductibility). In contrast, DeAngelo and Stulz (2015) suggest that, even in the absence of government involvement, a low amount of equity is optimal given a liquidity premium for banks' provision of safe debt. Allen et al. (2015) propose that, without government mandates, banks have a cost incentive to use deposits, but they will also hold some equity to reduce financial distress costs.¹

Although there have been a multitude of studies on the capital structures of non-financial companies, Allen et al. (2015, p.603) note that there have been relatively few empirical studies of bank capital structure. Given the pervasive, and ever-changing, nature of government regulation, supervision, taxation, deposit insurance and bailouts, it has been particularly difficult to analyse what capital structures banks would choose in an unregulated market. One approach that can be taken is to analyse past experiences, when particular government interventions were not present or when they were initially introduced. For example, Calomiris and Jaremski (2019) have analysed the introduction of deposit insurance at the state level in the early twentieth-century United States. They find that deposit insurance weakened market discipline and led to a reduction in capital ratios. Koch et al. (2016) show that prior to the Great Depression, the largest U.S. banks increased their capital without regulatory pressure, whilst before the Great Recession they kept levels low and at the regulatory

¹ Other recent theoretical contributions in this area have been made by Gornall and Strebulaev (2018), Begenau (2020), and Bahaj and Malherbe (2020).

minimum. Indeed, when the Global Financial Crisis was in its early stages, Bernanke (2008) was clear that he would ‘strongly urge financial institutions to remain proactive in their capital-raising efforts’. In the aftermath of the crisis, the Basel III framework was agreed, with a key pillar of the reforms being an increase in the minimum amount of equity that banks were required to hold (BIS, 2010, 2022).

Whilst examples from the United States are informative, relying just on U.S. data to infer the capital structures that would be chosen by banks in a completely free market is complicated, since U.S. banking has a long history of being shaped by regulation. For example, capital requirements have been imposed at the federal level for nationally chartered banks since the National Bank Act of 1863. This legislation set a minimum level of what would now be referred to as Tier 1 capital for national banks. This minimum capital was originally stipulated in absolute terms, rather than as a proportion of risk-weighted assets, but it varied according to the size of the town or city where the bank operated (White, 1983). Arrangements similar to Tier 2 capital also played an important role. For national banks there was a double liability requirement which stipulated that, in the event of liquidation, shareholders could lose not only the value that they had invested but would also be liable for an additional amount up to the par value of the shares held (Grossman, 2007; Mitchener and Richardson, 2013; and Aldunate et al., 2021). These regulations applied to national banks, but requirements of single, double, triple, or unlimited liability were also imposed on state-chartered banks (see White, 1983). Regulatory conditions on capital adequacy have therefore influenced the behaviour of banks in the United States for a prolonged period of time.

The situation in the United Kingdom was very different. Originally, there was a strict government requirement that all commercial banks’ deposits had to be fully covered by shareholder capital, through unlimited liability. In other words, all insolvent banks had to repay depositors, with shareholders personally bearing any losses. By exposing bank shareholders to

unlimited liability, there was a large pool of Tier 2 capital that gave an overall capital adequacy ratio of 100 per cent. However, from 1858, there was complete deregulation, and banks could incorporate (or reincorporate) under limited liability, with no specific requirements on capital. Another Act was introduced in 1879 to make the conversion to limited liability even easier, again without any requirements on capital adequacy. This deregulation led to an era with no mandatory rules on how banks should operate, no supervisory body, no deposit insurance, and no likelihood of a government bailout (Turner, 2014).

In this paper we ask, did the laissez-faire era result in banks choosing low levels of capital adequacy in order to lower the risk to shareholders at the expense of depositors? On the contrary, after 1858 many banks initially opted to maintain unlimited liability. When they did eventually convert after the 1879 Act, our findings suggest that banks chose high capital adequacy ratios, with a combination of Tier 1 and Tier 2 “extended” capital that covered about 77 per cent of risk-weighted assets. This is an order of magnitude greater than the minimum requirement under the current framework of Basel III.

Compared to U.S. national banks, that were influenced by government legislation, we find that contemporaneously U.K. banks held lower levels of Tier 1 capital, but significantly higher levels of Tier 2 capital. Despite being able to limit their liability, most banks after 1879 kept very high levels of extended shareholder liability – in 1887 the average was 4.3 times their paid-in capital, i.e., quadruple liability. A total of only 15 per cent operated under double liability or less (the U.S. national bank requirement at the time), whereas the remaining 85 per cent of banks voluntarily chose higher levels of extended shareholder liability. This arrangement allowed banks to use a lower amount of paid-in capital, that increased shareholders’ return on equity, but still maintained strong protection for depositors.

A move from unlimited liability to a self-chosen capital level involves a reduction of ‘skin in the game’. If capital were to be reduced substantially this may encourage banks to

become riskier in their lending, because some of the consequences of bank failure would be transferred to depositors. However, if high capital levels were maintained, there may have been little impact on lending decisions. To examine this, we hand collect information on over 20,000 loan applications for a sample of banks. We run a difference-in-differences analysis to compare banks which converted to limited liability after 1879, relative to those that were already limited liability prior to 1879. Our data reveals that banks that converted to limited liability did not increase their risk-taking, relative to those that were already limited liability, which suggests that the use of voluntary capital levels continued to ensure prudent lending.

The conversion to limited liability could also have given managers greater scope to expand and ‘empire build’ (see, e.g., Laeven and Levine, 2009 and Saunders, Strock, and Travlos, 1990). Conversion to limited liability would substantially reduce the downside risk faced by large wealthy shareholders. Consequently, shareholders would have less incentive to restrain managerial expansion. We examine balance sheet data for the 138 U.K. banks before and after 1879. We find no evidence that banks that removed unlimited liability experienced significantly higher growth in lending, deposits, assets, or their branch network, than banks that were already limited liability.

We also examine the reaction of shareholders to the introduction of the new capital adequacy regimes by banks. We compute the equity abnormal returns around the dates when banks announced their intention to move to limited liability. We document substantial excess returns around announcement dates that suggests that the reduction of liability was valued by shareholders. The benefit of reducing tail risk for shareholders was larger than any harm to bank reputation, or problems with retaining depositors.

In addition to our contribution to the literature on the optimal capital structures of banks, our research also speaks to other areas of research, such as the effect of changes in owner liability. Koudijs et al. (2021) use a natural experiment which took place in New England

between 1867 and 1880. They find that a decrease in a bankers' liability was followed by an increase in bank risk taking. By way of contrast, Grodecka and Kotidis (2016) find that the abolition of double liability in Canada was not accompanied by such an increase.

To the best of our knowledge, this is the first paper that examines the capital structure chosen by banks when they were freely able to remove unlimited liability. The only other work that attempts to examine the decisions made historically about liability, but which is focused on the choices made by state legislatures rather than banks, is Grossman (2007). He focuses on the choice of liability regimes by different U.S. states in the 70 years before 1930 and finds that double liability was more likely to be chosen where the likelihood and potential cost of bank failures was higher.

We also contribute to the broader literature which examines the role of shareholder liability and bank risk-taking. The literature which examines the United States finds that double liability reduced bank risk taking (Esty, 1998; Grossman, 2001; Mitchener and Richardson, 2013; Goodspeed, 2017; Aldunate et al., 2021) or constrained bank management to be conservative (Bodernhorn, 2015). There is also some evidence that shareholder liability curbed bank risk taking in the U.K. in the late nineteenth and early twentieth century (see Grossman and Imai, 2013; Turner, 2014). However, in the case of the Netherlands in the 1920s and Sweden at the turn of the twentieth century, there is little evidence of an effect of shareholder liability on risk taking (see Colvin, 2018 and Kenny and Ögren, 2021). Furthermore, moderate levels of extended liability did not ensure the stability of the U.S. banking system, which mostly used double liability, during the Great Depression (see Grossman, 2001; Anderson et al., 2018) or the stability of the Australian banking system during the 1893 crisis (Hickson and Turner, 2002).

2. Liberalization of British banking

Before 1825, banks in the U.K. were restricted to the partnership organizational form, with just five important exceptions that were chartered by the government, i.e., the Bank of England, Bank of Scotland, Royal Bank of Scotland, British Linen Bank, and Bank of Ireland. These five banks had been incorporated between 1694 and 1783 and were allowed to operate under limited liability.

With the liberalization of incorporation law in 1825 and 1826, other banks could be incorporated, but only with unlimited liability. This meant that bank shareholders had to guarantee full coverage of deposits if a bank were to fail. This requirement aimed to encourage confidence amongst depositors, and stability of the banking system. It should also have led to low risk-taking by banks, since shareholders were exposed to the risk of losses beyond what they had already invested in the bank. Despite these risks, many new institutions were established, with 137 unlimited liability banks in the U.K. by 1849 (Turner, 2014). In 1856 there was further liberalization of general incorporation law, which allowed essentially any company to form with limited liability, but banks were specifically excluded from this.

However, just a few years later, in 1858, the law was amended to enable banks to also register with full limited liability. No requirements were imposed on the banks, it was essentially a complete deregulation of the banking sector. During the debates in Parliament, the proposer of the 1858 Bill noted that it had been suggested to him that banks should be asked to pay up half of their capital, and that the other half could be called up if the bank failed. This would have created a double liability system, similar to the approach that would be introduced several years later in the United States. However, he argued that, although he thought this would be a wise approach for banks to undertake, he “did not think that it would be desirable for Parliament to lay down minute regulations for banks, for, looking to the past, there existed

clear and distinct proofs of the evil of such a course of legislation”.² The Act was passed without any such prescriptions, and this was confirmed in 1862 with the consolidation of legislation into the Companies Act.

Every bank that was established after 1858 chose limited liability, suggesting that it was attractive for new institutions. However, very few incumbent banks took up the opportunity to convert, with only seven relatively small institutions doing so between 1860 and 1866. These seven banks controlled less than 0.8 per cent of the U.K.’s branch network in 1866. Due to the reluctance of established banks to convert, unlimited banks still held circa 80 per cent of the deposits in the U.K. in 1875 (Dun, 1876).

Why did only seven small banks convert after the liberalization of the late 1850s? It was likely driven by concerns that customers would withdraw their savings from institutions that tried to limit the risk to shareholders, at the expense of depositors. The Overend, Gurney and Company discount house failed in 1866, soon after limiting its liability in 1865. Its collapse and the subsequent crisis caused several of the new limited banks to face runs and collapse (see Schneider, 2022; Sowerbutts, Schneeberg, and Hubert 2016; and Turner, 2014, p.125). In addition, one of the recently converted banks, the Cumberland Union Bank, got into difficulties, which required the wealthy chairman of the bank to make a personal pledge to cover any losses (Crick and Wadsworth, 1936, p.130). These events deepened depositor cynicism about limited liability and made established banks even more reluctant to convert (Clapham, 1944, vol. II, p.406).

3. Desired capital levels

What levels of capital adequacy did each type of bank choose during this initial phase of liberalization? To answer this question, we use hand-collected balance sheet data from *The*

² Hansard, February 11, 1858, vol. 148, cc1169-84.

Economist's banking supplement in 1878.³ Data are available in a consistent format, with liabilities broken down into capital, deposits, and acceptances; and assets separated into cash, investments, loans, and bank premises.

In addition to the levels of paid-up capital, there was also data provided on the level of uncalled capital. Shares were often issued as partly paid-up, so that a further proportion could be demanded from shareholders at any time in the future. The call was at the discretion of directors, possibly to cover losses or to finance expansion, or by creditors in the event of liquidation. This was an extra cushion for depositors if all called up capital had been exhausted.

Unlimited banks also used partly paid shares. Bank liquidators first demanded unpaid capital in the case of bankruptcy. If the uncalled capital did not cover the deficit between assets and liabilities, the liquidator was then free to call up additional funds from shareholders (Acheson and Turner, 2008). Because of the joint and several nature of the unlimited shareholder liability, the liquidator would have targeted the wealthiest shareholders in the first instance.⁴ Thus, uncalled capital was a means by which the wealthiest shareholders ensured that they were not disproportionately targeted in a liquidation.

<< INSERT TABLE 1 >>

A comparison of limited and unlimited banks is shown in Table 1. The reserve funds of banks, mostly retained earnings, was similar for both limited and unlimited and represented about 7 per cent of assets. However, there were large differences in the amount of paid-up capital held by each type of bank, at 18.8 per cent of assets for limited banks, much higher than the 10.8 per cent for unlimited banks. There was also a significant difference in off-balance sheet capital, with limited banks having 37.9 per cent of assets underpinned by uncalled capital, compared to 16.9 per cent for unlimited banks. The overall result was that unlimited banks had

³ The liability status of each bank comes from the *Stock Exchange Yearbook*.

⁴ In practice, bank liquidators made equal calls on all shareholders until depositors were repaid in full (see Turner, 2009, 2014).

a buffer for losses of about 34.8 per cent of assets before unlimited liability would be required. Limited banks had an average buffer of 63.7 per cent of assets.

The modern framework, which is used in the Basel Accords, measures capital adequacy by considering different tiers of capital. The Bank for International Settlements notes that “Basel III also introduced an explicit going- and gone-concern framework by clarifying the roles of Tier 1 capital (going concern) and Tier 2 capital (gone concern) ... Common Equity Tier 1 capital (CET1) is the highest quality of regulatory capital, as it absorbs losses immediately when they occur ... In contrast, Tier 2 capital is gone-concern capital. That is, when a bank fails, Tier 2 instruments must absorb losses before depositors and general creditors do” (BIS, 2019). If we apply this approach to our sample period, the paid-up capital and reserve fund would be classified as Tier 1. Uncalled capital does not strictly meet the criteria of Tier 2 under Basel III, which requires capital to be issued and paid-in, but it operated similarly. For unlimited liability banks the additional capital that would be called up if the bank failed played a similar role to Tier 2.

In terms of risk-weighted assets, Basel considers the potential losses that could occur on the different types of assets held by the bank. Advances and Discounts are given a 100 per cent risk weighting. Given the security of cash, and the banks’ own buildings, we apply zero weight to them. Similarly, under Basel, sovereign bonds which have the highest credit ratings are zero weighted, and we assume that British government bonds during this era met that criterion. Other bonds and stocks should be weighted according to their respective risk and, to be conservative, we apply a 100 per cent risk weighting to these assets. On the 1878 balance sheets of the banks, investments were not split into British government bonds and other investments. However, in later years this split was often reported, with approximately 50 per cent of investments in British government bonds, and 50 per cent in other assets. We therefore assume a 50/50 split in the earlier years as well.

In 1878 limited banks' Tier 1 to Risk-Weighted Assets ratio was 30.6 per cent, and for unlimited banks it was 21.1 per cent (see Table 1). Limited banks had Tier 2 capital to Risk-Weighted Assets ratio of 45.2 per cent, compared to unlimited banks' level of 19.7 per cent. Together, limited banks had average capital ratios of 75.8 per cent of risk-weighted assets, compared to 40.8 per cent for unlimited banks.

Pre-1879 capital ratios were not mandated by government. The decision was left entirely to each bank to decide what was appropriate. Limited banks voluntarily chose to hold much higher levels of paid-up capital than today's banks, and also embed higher levels of uncalled capital in their shares, to provide extra assurance that any potential losses would be covered. It was hoped that this would assure depositors, and a contemporary expert believed this coverage made limited banks almost as safe as unlimited ones (Dun, 1876).

4. Crisis and Conversions

In October 1878, an unlimited liability institution, the City of Glasgow Bank (CGB), failed. It had the third largest branch network in the U.K. and was considered Glasgow's premier bank (Acheson and Turner, 2008). The bankruptcy proceedings against it revealed that there was a £5.2 million deficit of assets against its liabilities to the public of £10.3 million; about 4 per cent of Scotland's GDP (Turner, 2014).

Given its unlimited liability status, the substantial shortfall between the CGB's assets and liabilities had to be fully met by its shareholders. Initially, a call on unlimited liability of £500 per share was made (which was five times the paid-up value, and about twice what the market price had been). However, only about one third of the shareholders could meet this call. Consequently, to cover the outstanding balance a further call was made of £2,250 per share on those shareholders that had been able to fully pay the initial call, forcing many of them into

personal bankruptcy. Only 254 of its 1,819 wealthy shareholders remained solvent (see Acheson and Turner, 2008; Checkland, 1975; and Lee, 2012; Couper, 1879).

There was no bank run or panic following the CGB collapse. Other Scottish banks quickly stemmed any problems that could have emerged by immediately accepting CGB notes and allowing its depositors (except those who were shareholders) to transfer their deposits (Fleming, 1883, p.150). The Caledonian Bank which held four shares in the failed bank was temporarily suspended by the official liquidator of the City of Glasgow Bank from doing business, until the CGB bankruptcy proceedings were completed. A few small banks subsequently collapsed, but these failures were unrelated to the CGB (Turner, 2014, pp.88-89). In other words, the CGB failure was not part of a wider systemic problem in the banking system.

However, the CGB failure created fears amongst shareholders in other unlimited liability banks. Figure 1 shows that unlimited liability banks' stock prices fell by 17.1 per cent within three months of the CGB crisis and limited liability banks' prices fell 10.5 per cent. The falls were most pronounced amongst Scottish banks. However, declines were observed across the U.K., with English and Irish banks falling by 11.2 per cent, compared to a fall of 6.1 per cent for non-banks.

<< INSERT FIGURE 1 >>

The CGB crisis showed that unlimited liability had a major benefit in that it successfully protected depositors, but this was only achieved at the cost of bankrupting many shareholders. This created a dilemma for bank management, shareholders, and the government, about how to proceed.

The large unlimited liability banks were concerned that converting to limited liability could lead customers to fear for the safety of their deposits. Conversion of liability was actively discussed at the shareholder meetings of banks throughout the U.K. in the months after the

crisis. For example, at the London and Westminster Bank annual general meeting the chairman noted that in its current unlimited status “it possessed the confidence of foreign and colonial governments and of the richest institutions at home and abroad, and that it had a very valuable clientele, whose interests as customers and depositors would have to be regarded. If the liability were altered, it must be done on such terms as would not lessen the confidence, and security, and high position which the bank enjoyed” (*Daily News*, January 16, 1879). The chairman of the Union Bank of London claimed that “if any one bank adopted this principle [of converting to limited liability], and others did not, it would undoubtedly lose much of its most valuable business” (*Daily News*, January 9, 1879).

However, the failure of the CGB resulted in shareholders questioning the wisdom of holding shares that could reduce them to poverty. This could result in the exit of wealthy shareholders in which case unlimited liability would become a shadow of itself, with reduced security to depositors (Rae, 1885). In the months following the crisis it was argued that “it has been a matter commonly known in City circles for some little time past that the wealthy shareholders of the leading banks had declared their determination either to bring about some reform or be rid of the terrible responsibility of their shares. Of what use is unlimited liability if there be no wealthy shareholders?” (*The Standard*, January 9, 1879).

The solution that was put forward was the Companies Act of 1879, which facilitated the limitation of liability by introducing “reserve liability”. Proposed by the banker George Rae, reserve liability meant a bank could set an upper limit, per share, of shareholder capital at risk in the event of bankruptcy. Its purpose was to protect depositors whilst capping shareholder losses. Many banks already had uncalled capital, which was callable at any time at the discretion of directors, but reserve liability could only be called up in the event of a bank failure. Therefore, reserve liability could provide reassurance for depositors without exacerbating principal-agent problems between shareholders and bank management.

Almost all banks made use of the new Act, although adoption was staggered. Figure 2 shows that banks started to limit their liability in early 1880, and the majority had converted by 1884. Nine small English banks were still unlimited by 1887, but the last had converted by 1896.

<< INSERT FIGURE 2 >>

The Companies Act only provided a framework for liability conversion, it left much of the detail to be decided by the banks themselves. As the Act worked its way through Parliament, the Chancellor of the Exchequer commented:

I am anxious to propose as little as possible in the way of Government interference with the management of institutions of this kind. There is a natural tendency on the part of many persons, when any great catastrophe happens, to call at once for Government interference and assistance. I am very shy indeed of making proposals in that direction. I do not propose that there shall be anything in the way of legislation which shall be of a compulsory character. We propose simply to remove an obstacle which has now been found to exist, and which at present prevents a bank from taking into further consideration the form and constitution which might suit it best.⁵

Under the Act, banks could stay with unlimited liability, adopt pure limited liability, or adopt some amount of reserve liability. They were free to choose and faced no compulsion. During the parliamentary debate, one of the first speakers suggested implementing a uniform rule of double liability, based on the model operating amongst national banks in the United States.⁶ However, the bill passed into law with no government compulsion on the liability regime, or level of liability. Unlike in the U.S., the safety of deposits was to be assured entirely through private contracting, not through government mandate.

5. How did shareholders respond?

The decision if, when, and how, a bank would convert from unlimited liability was left to each individual bank. Shareholders had to consider not only the direct impact on their own liability,

⁵ Hansard, April 21, 1879.

⁶ Hansard, April 21, 1879.

but also the indirect effect via changes in the composition of the shareholders. The owners had to assess whether the changes would affect the stability and profitability of the bank.

The City of Glasgow Bank failure had demonstrated that the shareholders of unlimited banks had their entire wealth at stake, down to their “very last acre and sixpence” (Turner, 2009). It also illustrated to the wealthiest shareholders that they would have to cover any outstanding liabilities if their fellow shareholders were unable to pay the calls. Reserve liability meant that the amount shareholders would be liable for would be capped at a given amount per share. The lower the amount of extended capital, the lower the personal loss that the shareholder would face if the bank failed. However, if the capital adequacy of the bank was set at too low a level, it could deter depositors, reduce the stability of the institution, and increase the possibility that the bank would fail. Did the levels of capital proposed by the banks achieve a balance that was supported by shareholders?

The first measure that we use to evaluate this was whether the resolutions to convert brought forward by bank directors were approved by shareholders. We search the *British Library Newspapers* database to find information on company meetings in which the proposals were discussed, and find reports from 30 general meetings. In 26 cases the vote was unanimous in support, and in 4 cases there were a handful of dissenters.

The second measure we use is an event study. Each announcement is a newspaper article stating that a shareholders’ general meeting would vote on a resolution to limit liability. Of the 81 unlimited banks in 1879, we found 25 announcement dates reported in the newspapers between 1879 and 1887. We collect share price and dividend data from the *Investor’s Monthly Manual (IMM)* to calculate the return for each bank. We also construct a value weighted market index of 500 non-bank shares reported in the IMM. The average return of bank shares in each month around their announcement date is shown in Figure 3, along with the abnormal return in excess of the index of non-banks. This illustrates a clear positive return

for banks around their respective announcement dates, suggesting that shareholders viewed the announcements positively.

<< INSERT FIGURE 3 >>

We test the statistical significance of these returns in Table 2 for various window sizes. For each window we only include the returns of companies whose shares traded during that period, and exclude those observations where prices stayed exactly the same which suggests a lack of trading. For the 17 banks whose share price moved during the announcement month, the average abnormal return was a statistically significant 3.1 per cent. A wider window of minus one to plus one month, or from zero to two months, also shows statistically significant positive results.

<<INSERT TABLE 2 >>

These findings are consistent with media commentary of the time which noted the increase in prices. In December 1879, the IMM remarked that bank shares had been subdued “until the City, London and County, and London and Westminster banks notified their adoption of limited or reserve liability, when a smart rebound resulted”.⁷ In 1880, the IMM again noted that “in the face of large new issues of new capital upon the adoption of limited or reserve liability, the London banks are all higher – most of them much higher – and generally it may be affirmed that provincial banks followed their example”.⁸ In 1882, they also commented that “every fresh announcement of the adoption of limited and reserve liability has met with an immediate response from the market, and now all the joint-stock banks in London, in Scotland, and in Ireland have embraced the provisions”.⁹

⁷ *Investor’s Monthly Manual*, December 1879, p.445

⁸ *Investor’s Monthly Manual*, December 1880, p.460

⁹ *Investor’s Monthly Manual*, December 1882, p.569

The positive response to early adopters likely encouraged other banks to follow a similar path, moving away from unlimited liability but still retaining high levels of capital adequacy that ensured the stability of the banks.

6. Capital Adequacy after Conversion

Banks were free to choose, but how did they respond to this freedom? To analyse this, we collect annual data on the balance sheets of banks from *The Economist*, from 1878 to 1887, and construct capital adequacy ratios for each bank. In Table 3 we compare the ratios of banks that converted from unlimited to limited during this period, to those that were already limited liability in 1878.

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Column 5 of Table 3 shows that in 1878 the banks that were already limited had significantly higher levels of capital than those that were unlimited. Limited banks had more Tier 1 and explicit Tier 2 capital than the unlimited banks.

By 1887 the banks that had converted to limited liability (the *Converters*) had made substantial changes to their capital adequacy. This was driven almost entirely by a substantial increase in explicit Tier 2 capital (uncalled capital), which almost trebled from 19.8 per cent of risk-weighted assets, to 56.1 per cent (column 8). There were also some smaller increases in Tier 1 capital, which increased from 21.2 to 24.6 per cent of risk-weighted assets (column 8). Interestingly, banks that were already limited in 1878 did not adjust their capital adequacy ratios in a statistically significant way, and Table 3 reveals that their capital ratios fell slightly during this period (column 7).

In Table 4 we report the results of a difference-in-differences analysis which examines changes in capital adequacy between 1878 and 1887. The *Converters* group consists of the unlimited banks which adopted limited liability following the City of Glasgow crisis (1878 to

1887). The comparison group are the already limited liability in 1878 banks. This allows us to measure the effect of the conversion on capital ratios. We control for bank size because the *Converters* tended to be larger banks, and for potential differences due to regional variation with dummies for banks headquartered in Scotland and Ireland.

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Column 1 shows that *Converters* started off with significantly lower levels of Tier 1 capital. *Converters* increased their Tier 1 capital by 1887, but it was not a statistically significant change. The second column shows that the *Converters* also began with lower Tier 2 uncalled capital, but this increased by 39.3 percentage points from 1878 to 1887. When Tier 1 and Tier 2 are combined, the overall increase in the capital ratios of *Converters* was 43.5 percentage points. We show in Figure 4 that the change occurred at the time of conversion, when the average bank doubled its uncalled capital ratio.

<< INSERT FIGURE 4 >>

To show that these changes were broad based, and not being driven by a small number of banks, in Figure 5 we plot the distribution of the uncalled capital to total assets ratio in 1878 and 1887 of the *Converters*. The whole distribution shifts substantially to the right, indicating a pervasive effect on converting banks.

<< INSERT FIGURE 5 >>

When unlimited banks converted to limited liability, they retained high levels of capital adequacy. There were only modest changes in Tier 1 equity capital, but substantial increases in Tier 2 capital, that would be called up if the bank failed. Notably, even though they were free to choose their own levels of liability, no bank chose pure limited liability. Every converting bank used some amount of uncalled capital, with the lowest uncalled capital equal to 16.9 per cent of assets.

7. Comparison to United States

Did passage of the 1879 act in the U.K. ensure the stability of its banking system as adequately as government regulation could have? To analyse this, we use the United States as a benchmark. Although government supervision of the banking sector in the U.S. during the nineteenth century was lighter touch than in the modern era, it was considerably more prescriptive than the environment in the U.K.

At the federal level, the National Banking Act of 1863 placed numerous restrictions on national banks, and it set up the Office of the Comptroller of the Currency to supervise them. This legislation led to major differences between the U.S. and the U.K. The National Banking Act was interpreted as a prohibition on operating branches (White, 1983, p.14).¹⁰ In contrast, the liberal approach taken in the U.K. meant that a smaller number of much larger banks could operate across a wide geographical area. By 1887, there were over 3,000 national banks in the United States, compared to under 150 joint stock banks operating in the U.K. Table 5 shows that the average total assets for U.K. banks was £4.24 million compared to £0.18 million for the U.S.

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The U.S. National Banking Act imposed a minimum amount of capital, depending on the size of the town in which it operated, \$200,000 for larger cities, \$100,000 for other cities, or \$50,000 for small towns.¹¹ In 1887 U.S. banks had higher Tier 1 equity capital (paid-up capital and reserves), at about 49.0 per cent of risk-weighted assets, compared to U.K. banks which sat at about 26.3 per cent. For context, the Basel III accords set a minimum requirement of 6.0 per cent in the modern era.

¹⁰ See National Banking Act, 13 Stat. 99 (Chapter 106), Section 8.

¹¹ National Banking Act, 13 Stat. 99 (Chapter 106), Section 7

In terms of Tier 2 capital, the National Banking Act specified that shareholders were liable for double liability, “the extent of the amount of their stock therein at the par value thereof, in addition to the amount invested in such shares”.¹² Table 5 shows that the average ratio of capital subscribed to the amount actually paid up in U.K. banks was 4.3, or over quadruple liability. The consequence of this was that although U.S. banks had considerable Tier 2 capital, at 34.5 per cent of risk-weighted assets, it was much greater in the U.K. at 51.2 per cent.

The overall result was that banks in both countries held very high levels of Tier 1 and 2 capital, around 80 per cent of risk weighted assets. For comparison, Basel III suggests 8 per cent, plus a capital conservation buffer of 2.5 per cent, and a small additional counter-cyclical buffer.¹³ This suggests either that banking was much more conservative during the 1880s or perceived to be much riskier than it is now. There is little evidence that unregulated British banks chose markedly lower capital ratios than their U.S. brethren. In addition, the large British banks were much more geographically diversified than U.S. banks, which implies that they would need lower capital ratios to avoid bankruptcy than American banks.

As well as national banks, there were also U.S. state banks which tended to have similar, but somewhat weaker regulations. Minimum capital requirements were often lower, and double liability emerged more gradually across the states (Grossman, 2001; White, 2009; Mitchener and Jaremski, 2015). In the decades after the passage of the National Act, U.S. banks considerably reduced their capital adequacy ratios, partly due to inflation reducing the real level of the minimum capital requirements. Bank failures remained quite low but rose during the panics of 1893 and 1907. Capital adequacy continued to fall after the Federal Reserve was set

¹² National Banking Act, 13 Stat. 99 (Chapter 106), Section 12

¹³ ‘The Basel Framework’, Basel Committee on Banking Supervision, Section 20.1

up in 1913, and failures began to increase during the 1920s, before the widespread problems during the Great Depression (White, 2009).

In the U.K., the more liberal environment allowed the banking sector to consolidate, to form even larger banks which were arguably more diversified and better able to absorb risks. Capital adequacy also fell, but the banking system generally avoided any widespread panics or failures, even during the 1930s (Turner, 2014). In both the U.K. and the U.S. there were gradual, but notable, declines in capital adequacy in the late 19th and early 20th centuries.

The comparison with the U.S. suggests that the lack of regulation in the U.K. did not harm its banking system. During the late nineteenth century, even though there were no minimum capital requirements, or any regulatory need to have extended liability, U.K. banks maintained high capital adequacy ratios. This ensured that depositors at the banks should have been confident of being paid in full, and always were paid in full (see Turner 2014). In addition, the U.K. banking system had the flexibility to choose between Tier 1 and Tier 2 capital, whichever it considered optimal. The result was lower amounts of common equity being tied up in U.K. banks, but higher amounts of extended liability which would be available if needed.

8. Did banks increase risk taking with their loans?

High capital adequacy ratios can help to deal with bank failure in two ways. Ex-post, they provide a cushion of equity that can absorb losses and ensure that there are sufficient funds to cover deposits, even if there are losses on loans. The Tier 2 capital called up from the City of Glasgow Bank shareholders under the terms of unlimited liability ensured that the depositors were covered in full. After the widespread movement to extended liability, there was a notable lack of bank failures in subsequent decades. Analysing the effectiveness of voluntary capital ratios at protecting depositors, ex-post, is not feasible, as so few British banks failed.

However, the absence of failures is in itself informative, as it speaks to the ex-ante benefit of high capital adequacy ratios, namely reduced risk-taking by banks. If shareholders have invested a large amount of capital, and have even more at risk through extended liability, they should be reluctant to let managers take gambles on high-risk lending. This ‘skin in the game’ should lead shareholders to more closely monitor management.

With unlimited liability, there are very strong incentives to ensure that the bank is being run prudently, otherwise the entire wealth of the shareholder is at risk. With strict (or ‘single’) limited liability, the incentives for prudent management are much reduced relative to unlimited liability. U.K. banks chose a middle path, which was to maintain high levels of extended liability after 1878. Did the capital adequacy levels selected by banks ensure that a prudential approach to lending was maintained, or did the converting banks have an increased likelihood of approving riskier loans?

To analyse this, we collect data on individual bank lending decisions before and after banks limited their liability. The main source of loan applications is the minutes of bank directors since directors typically reviewed all loans (Crick and Wadsworth, 1936, p.35; Holmes and Green, 1986, p.42; Munn, 1988, p.54; Orbell and Turton, 2001, p.15). Most minute books, however, simply state that loans were approved, but provide no details. Fortunately, we locate the minutes of several banks which recorded details of lending applications in the years just before and after the 1879 Companies Act and the potential limitation of liability. Appendix Table 1 reports information on the banks for which we find data on loan applications.

Our sample of seven banks constituted 10.3 per cent of the assets and nearly 10 per cent of bank branches of English and Scottish banks in 1879. The banks in our sample between them serviced most regions in England and Scotland and contains one of the large London-based banks. Two of the banks were already limited before 1879 and five banks converted during the period 1880-1883. This sample of loan applications before and after the limitation

of liability is therefore uncontaminated by the later amalgamation movement in British banking (Grossman, 1999; Newton, 2000; Collins and Baker, 2001; Braggion et al., 2017, 2022).

As well as information on whether the loan was approved or not, there are also some loan characteristics provided which give an insight into the possible riskiness of a loan. First, loan size, with larger loans reducing diversification possibilities for the bank. Second, the type of security, if any, acting as collateral. Collateral in this era consisted of financial instruments, real estate, or personal guarantees. Financial instruments were more liquid and more easily valued, real estate was tangible, whereas guarantees were difficult to quantify. Third, we observe the type of borrower. Some limited liability companies were borrowers. The limited liability nature may, all else equal, reduce the likelihood of full repayment. Financial institutions that borrowed from banks, such as small building societies and insurance companies, may have been riskier because of their leveraged nature.

We examine the approval rates of loans, conditional on these risk factors, and how this changed over time. We test the extent to which the conversion to limited liability affected approval decisions by using a difference-in-differences analysis. The first group are the *Converters*, the second group are banks that were already limited prior to 1878. We exclude loans during the period from 1880 to 1883, the years of conversions and immediately adjacent years.

Table 6 shows that prior to 1879 applications for loans to *Converters* were much smaller in size than applications to limited liability banks. *Converters* were also less likely to use guarantees as a form of collateral, and more likely to use financial instruments and real estate. Converting banks also received fewer applications from limited companies than limited liability banks.

<< INSERT TABLE 6 >>

Table 6 also shows that these differences persisted between the banks in the 1884-1887 period. However, the relative balance changed somewhat. For *Converters*, the proportion of loan applications backed by collateral of financial instruments increased, but the proportion supported by real estate and guarantees fell slightly. Applications from limited companies and other financial institutions, which had always been low, fell further. For those banks that had already been limited, an increasing proportion of loan applications were backed by real estate, and less by guarantees. There was also a notable increase in the proportion of loan applications which were made by limited companies. Taken together, these results suggest that, if anything, *Converters* received loan applications that were slightly less risky after conversion, whilst those banks that had always been limited received slightly higher risk applications.

In Table 7 we analyse the factors that affected loan approval rates using a logit analysis to examine the decision made about the loan, with the dependent variable equal to 1 if it was approved, or 0 if rejected. The results suggest that larger loans were significantly less likely to be approved. Offering any type of security as collateral tended to increase approval rates, with the largest benefit being for those backed by financial instruments, followed by real estate, followed by guarantees. Applications from limited companies were significantly less likely to be accepted. These results are consistent with expectations around the perceived riskiness of particular characteristics, with higher risk loan applications less likely to be approved.

<<INSERT TABLE 7 >>

In Table 7, we focus on whether the approval rates of banks changed after their conversions from unlimited liability. Over the sample period, approval rates increased from 86.6 to 88.4 per cent for those banks that had always been limited, and for *Converters* the approval rates increased from 94.3 to 95.8 per cent.

The results suggest that unlimited banks had traditionally approved a higher proportion of loan applications, shown in the coefficient on *Converters*. However, there was no significant

change after adopting limited liability, as shown by the coefficient on *Post* Converters*. Banks still maintained their traditional prudent approach to loan approval after moving to limited liability, and the lack of regulatory minimums on capital adequacy did not significantly alter risk taking on their loan book.

9. Did banks increase risk taking by expanding aggressively?

The conversion to limited liability may also have encouraged banks to aggressively expand their business and thus take on greater operational or enterprise risk. If the capital at risk had been reduced to a low level, there may have been an incentive to increase risk, secure in the knowledge that banks would benefit from the upside, but the costs of any failure would be limited. For example, banks could attempt to take in more deposits, lend more widely, and expand the branch network.

To test if banks engaged in empire building after the limitation of liability, we use the balance sheet data from 1877 to 1887 from *The Economist's* annual banking supplement. Once again, we employ a difference-in-differences analysis to examine the effect of converting from unlimited liability, using the banks which were limited before 1879 as a comparison group. In Table 8 we measure the effect of the conversion to limited liability on four measures, namely loans, deposits, total assets, and the number of branches. We include dummies for Scotland and Ireland to control for any possible regional differences.

<<INSERT TABLE 8 >>

The coefficients on *Converters* confirms that switching banks had traditionally been larger than those that were already limited. The coefficients on *Post*Converted* in Table 8 are not statistically significant, suggesting that converting away from unlimited liability did not lead to more aggressive expansion by those banks, at least before 1887. This suggests that

maintaining high capital adequacy, and a large amount of ‘skin in the game’ continued to ensure managerial discipline, and prevented ‘empire building’.

10. Conclusion

In the nineteenth century, Britain moved away from regulations on banks’ liability, which implied 100 per cent capital adequacy, to an almost completely deregulated system which imposed no restrictions on banks. When British banks were given the choice, they still maintained very high levels of capital. Compared to the United States, which had a more prescriptive system, British banks chose lower levels of Tier 1 capital, but much higher levels of Tier 2 capital than U.S. banks.

There were no major crises for many decades following the disappearance of unlimited liability. Our analysis suggests that U.K. banks maintained as prudential an approach to managing the risk of their loan book as they had before. There is also no evidence that the shift led to more aggressive empire building. Liability changes were also viewed favourably by shareholders.

Our results suggest that in an environment almost entirely free of government regulation, banks chose capital structures with relatively high amounts of equity and additional capital which could be called upon if needed. However, in the current era, where other government policies are in place which distort incentives, such as deposit insurance and the possibility of bailouts, banks would not necessarily adopt such a prudent approach if all capital requirements were to be dropped.

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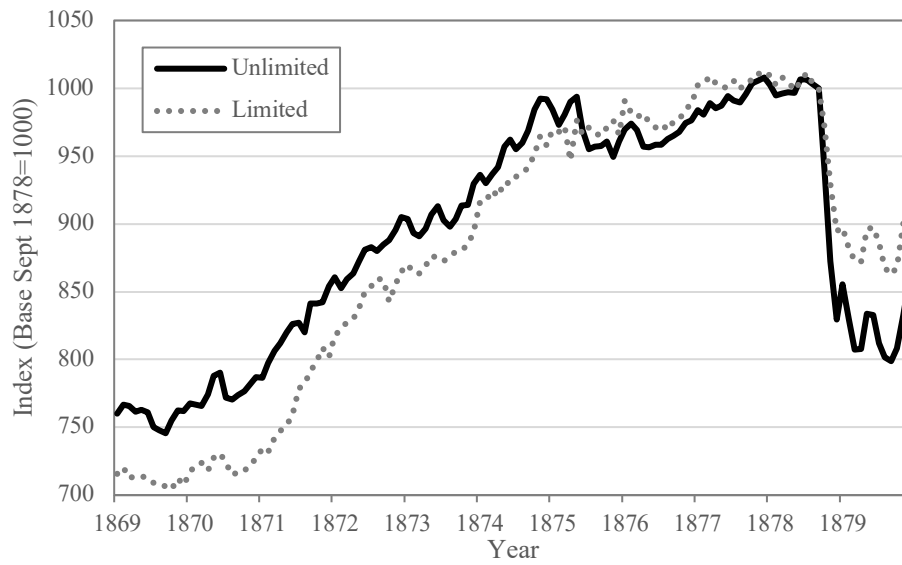
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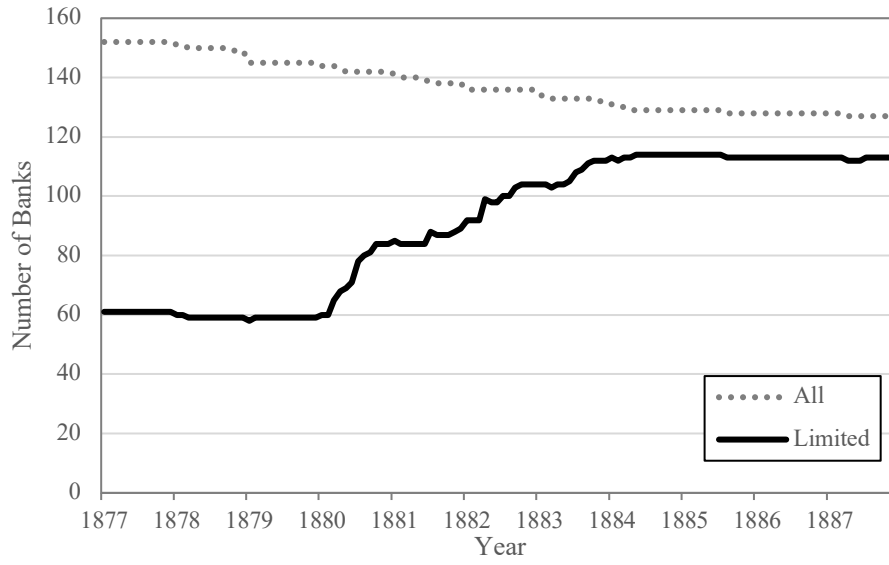
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Figure 1: Capital Gains Index of U.K. Banks, 1869-1879



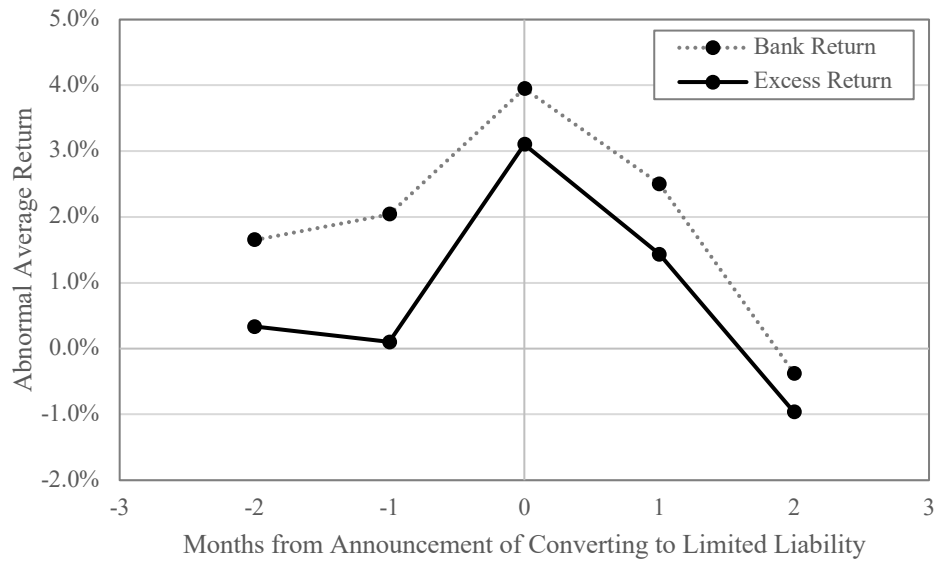
Notes: Market capitalisation weighted index of share prices. Data from *Investor's Monthly Manual*. Liability status of banks obtained from the *Stock Exchange Yearbook*.

Figure 2: Number of U.K. Banks by liability status, 1877-1887



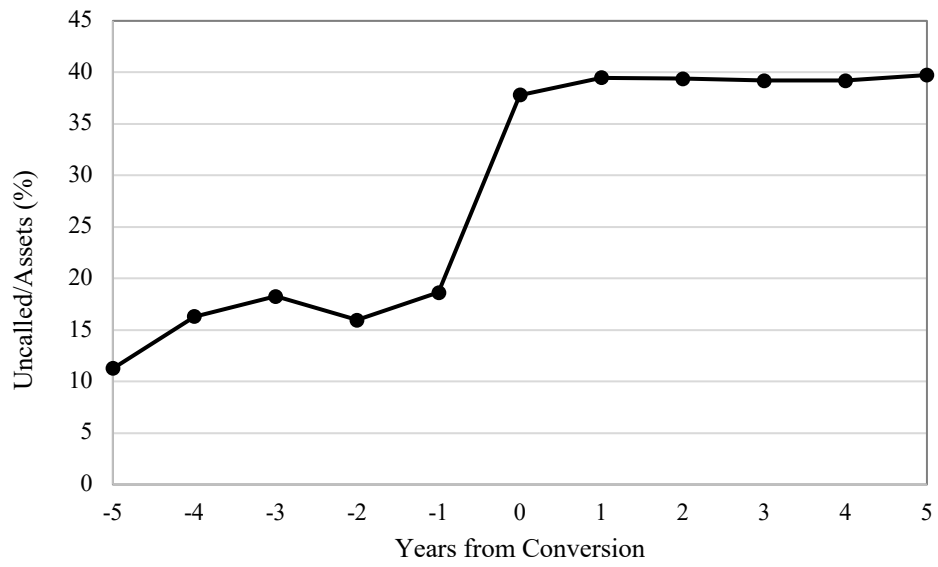
Notes: Data from *Banking Almanac and Yearbooks*, 1877-1887 and *Stock Exchange Yearbooks*, 1877-1887.

Figure 3: Excess Returns around Announcement Date



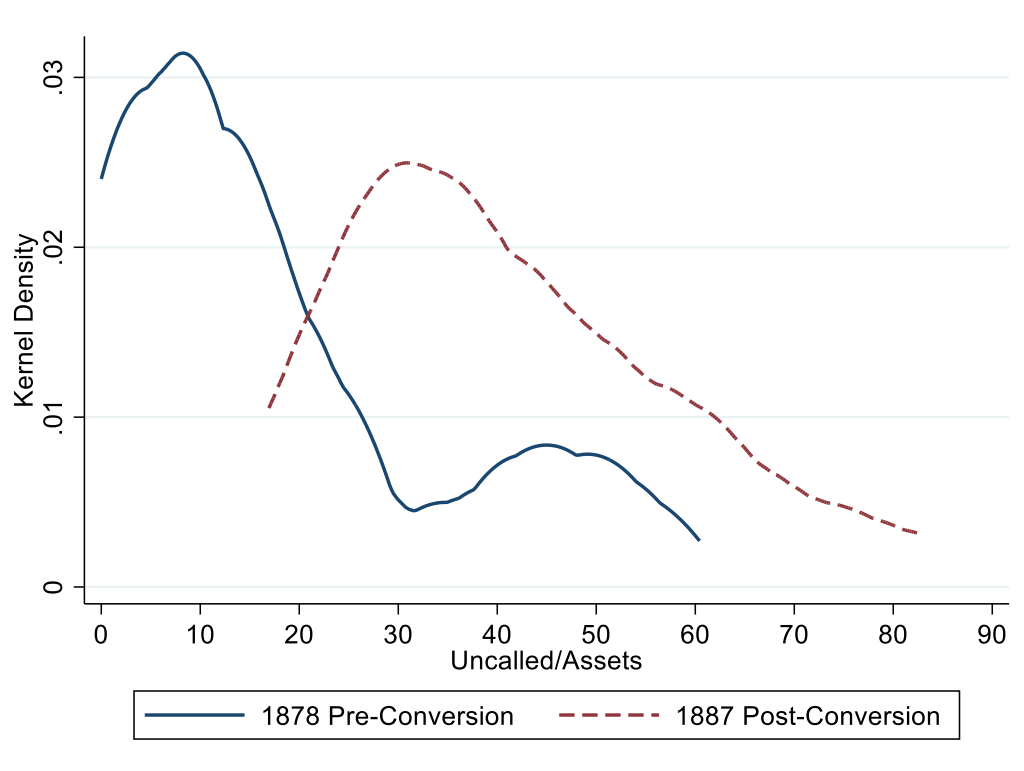
Notes: Announcement date is when a newspaper first reported that a general meeting would discuss the conversion of a bank away from unlimited liability. We only include banks that were traded during the announcement month. We exclude returns for the months in which the paid up value of shares changed.

Figure 4: Average Uncalled Capital/Assets Ratios for Banks that converted to limited liability between 1879 and 1887



Notes: Average Uncalled Capital/Total Asset ratio for the years around a conversion to limited liability. Uncalled Capital is the Total Capital Liability (Callable and Reserved) from *The Economist's* annual banking supplement.

Figure 5: Distribution of Uncalled/Assets for Converting Banks 1878 vs 1887



Notes: The solid line is the distribution of the Uncalled Capital/Total Assets ratio in 1878 for banks that would convert before 1887. The dashed line is the distribution of the uncalled capital/total assets ratio in 1887 for those banks that converted between 1879 and 1887. Uncalled Capital is the Total Capital Liability (Callable and Reserved) from *The Economist's* annual banking supplement.

Table 1: Characteristics of Limited vs Unlimited U.K. Banks in 1878

	Limited In 1878	Unlimited In 1878	Difference	
<i>Characteristics</i>				
Shareholders	639.1	862.4	223.3	
Branches	16.0	25.7	9.7	
Year of Establishment	1852.5	1833.9	-18.6	***
Scottish	5.7%	10.3%	4.6%	
Irish	3.8%	9.0%	5.2%	
Market Cap (£m)	1.1	1.5	0.3	
Total Assets (£m)	2.5	6.3	3.8	***
<i>Balance Sheet Assets</i>				
Advances/Assets (%)	80.1	79.0	-1.1	
Investments/Assets (%)	6.7	9.5	2.7	
Cash/Assets (%)	10.2	9.9	-0.3	
Buildings/Assets (%)	2.9	1.6	-1.4	***
<i>Balance Sheet Liabilities</i>				
Deposits/Assets (%)	70.2	76.3	6.0	**
Notes/Assets (%)	0.9	2.9	2.0	***
Acceptances/Assets (%)	3.1	3.1	0.0	
<i>Balance Sheet Capital</i>				
Capital Paidup/Assets (%)	18.8	10.8	-8.0	***
Reserves/Assets (%)	7.0	7.0	-0.1	
<i>Off-Balance Sheet Capital</i>				
Uncalled Capital/Assets (%)	37.9	16.9	-20.9	***
<i>Capital Adequacy Ratios</i>				
(Tier 1)/RWAssets (%)	30.6	21.1	-9.5	***
(Tier 2)/RWAssets (%)	45.2	19.7	-25.5	***
(Tier 1 + Tier 2)/RWAssets (%)	75.8	40.8	-35.0	***
(Tier 1 + Tier 2U)/RWAssets (%)	75.8	100.0	24.2	***
<i>Sample in 1878</i>				
Banks with Capital data	53	78		
Banks with Assets data	43	40		

Notes: We include joint stock banks in *The Economist* which operated in the United Kingdom, excluding the Bank of England and non-traditional lenders. Shareholder data is obtained from the *Banking Almanac and Yearbook*, and market capitalisation data from the *Investor's Monthly Manual*. Tier 1 equals Paid-up Capital plus Reserves. Tier 2 equals Uncalled Capital. Tier 2U equals Uncalled Capital and the remainder covered by Unlimited Liability. RWAssets refers to Risk-Weighted Assets which is composed of Advances and Discounts at 100% of their book value, and Investments in non-government bonds or stocks at 100% of their book value. Investment breakdown is not reported in 1878, but they are assumed to be split 50:50 between government bonds and other investments because this is the approximate split in subsequent years. *** p<0.01, ** p<0.05, * p<0.1

Table 2: Cumulative Abnormal Returns around Announcements

Window	Observations	CAR	SE	T
0	17	3.1%	0.8%	3.89***
-1 to +1	19	4.1%	1.2%	3.53***
0 to +2	21	2.8%	0.9%	3.00***

Notes: The announcement date is when a newspaper first reported that a general meeting would discuss the conversion of a bank away from unlimited liability. Window size in months. Includes banks which were traded at least once within window. Excludes returns for the months in which the restructuring actually took place. *** p<0.01.

Table 3: Mean Capital Adequacy Ratios in 1878 and 1887

	1878		1887		Difference between Bank Types				Difference between Time Periods		
	Limited in 1878	Unlimited	Limited in 1878	Converted	1878	1887			Limited in 1878	Unlimited to Converted	
	(1)	(2)	(3)	(4)	(5) = (2 - 1)	(6) = (4 - 3)			(7) = (3 - 1)	(8) = (4 - 2)	
Tier 1/RWAssets	29.6	21.2	28.5	24.6	-8.5	***	-3.9	*	-1.1	3.5	**
Tier 2/RWAssets	46.6	19.8	43.1	56.1	-26.8	***	13.0	**	-3.5	36.3	***
(Tier 1+Tier 2)/RWAssets	76.2	40.9	71.6	80.7	-35.2	***	9.1		-4.6	39.8	***

Notes: We include banks which had data available for both 1878 and 1887. For each period, n=35 for Limited in 1878, and n=36 for Unlimited/Converted. We report means and differences in means. The *Limited in 1878* banks are those that were limited liability before 1879 and the *Unlimited/Converted* banks are unlimited banks that converted to limited liability between 1879 and 1887. Tier 1 equals Paid-up Capital plus Reserves. Tier 2 equals Uncalled Capital. RWAssets refers to Risk-Weighted Assets which is composed of Advances and Discounts at 100% of their book value, and Investments in non-government bonds or stocks at 100% of their book value. Investment breakdown is not reported in 1878, but they are assumed to be split 50:50 between government bonds and other investments because this is the approximate split in subsequent years. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Difference in Differences on Capital Adequacy Ratios between 1878 and 1887

	(1) Tier1/RWA	(2) Tier2/RWA	(3) Tier1&2/RWA
Post*Converters	4.176 (2.783)	39.297*** (7.850)	43.473*** (9.098)
Converters	-4.907** (1.991)	-21.983*** (5.920)	-26.891*** (6.621)
Post	-0.326 (2.364)	-2.521 (6.290)	-2.848 (7.263)
LogTotAssets	-3.859*** (0.709)	-4.957*** (1.694)	-8.816*** (2.008)
Scotland	-1.192 (1.174)	-9.387* (5.310)	-10.579* (5.470)
Ireland	1.196 (2.304)	12.003 (8.068)	13.199 (10.086)
Constant	84.507*** (10.900)	117.215*** (24.109)	201.722*** (29.079)
Observations	142	142	142
R-squared	0.316	0.318	0.356

Notes: We run difference-in-differences regressions with data for 1878 and 1887 and includes banks which had data for both periods. Tier 1/RWA equals (Paid-up Capital plus Reserves)/Risk-Weighted Assets. Tier 2 equals (Uncalled Capital)/Risk-Weighted Assets. Tier1&2/RWA equals (Paid-up Capital + Reserves + Uncalled Capital)/Risk-Weighted Assets. Uncalled Capital is the Total Capital Liability (Callable and Reserved) from *The Economist's* annual banking supplement. Converters equals 1 for banks that were unlimited liability in 1878 and converted to limited liability by 1887. Post equals 1 in 1887. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Comparison between U.K. and U.S. National Banks

	U.K. Banks 1887 (1)	U.S. National Banks 1887 (2)	Difference U.K. – U.S. (3) = (1) – (2)
Total Assets per Bank (£m)	4.24	0.18	4.06 ***
Subscribed/Paid-up Capital	4.3	2.0	2.3 ***
Tier 1/RWAssets (%)	26.3	49.1	-22.8 ***
Tier 2/RWAssets (%)	51.2	34.5	16.7 ***
(Tier 1+Tier 2)/RWAssets (%)	77.5	83.6	-6.1 **

Notes: U.S. data from the 1887 Annual Report of the Comptroller of the Currency. Conversion of assets from U.S. dollars to U.K. pounds at the gold standard par rate of exchange of 4.86. Number of U.S. National Banks is 3,049. Number of U.K. Banks with balance sheet data is 119.

Table 6: Characteristics of Loan Applications

	Applications 1874 to 1879		Applications 1884 to 1887		Difference between Bank Types				Difference between Time Periods			
	Already Converters Limited (Pre-Conv.)		Already Converters Limited (Post-Conv.)		1874 to 1879		1884 to 1887		Already Limited		Converters	
	(1)	(2)	(3)	(4)	(2 – 1)		(4 – 3)		(3 – 1)		(4 – 2)	
Size of Loan (£)	5131.8	1373.2	4842.7	1379.5	-3758.5	***	-3463.2	***	-289.1		6.2	
Security: Any	60.9%	76.7%	69.7%	80.0%	15.8%	***	10.3%	***	8.8%	***	3.3%	***
Security: Financial Instrument	9.1%	31.0%	10.0%	40.4%	21.9%	***	30.4%	***	0.8%		9.3%	***
Security: Real Estate	13.7%	34.3%	20.4%	32.5%	20.7%	***	12.1%	***	6.7%	***	-1.8%	**
Security: Guarantee	27.0%	11.5%	23.0%	10.5%	-15.5%	***	-12.5%	***	-3.9%	**	-1.0%	**
Borrower: Financial Institution	1.9%	1.9%	1.3%	0.7%	0.0%		-0.6%	**	-0.6%		-1.2%	***
Borrower: Limited Company	8.8%	2.8%	17.2%	2.2%	-5.9%	***	-15.0%	***	8.4%	***	-0.6%	**

Notes: Data sources for loan applications are in Appendix Table 1. ‘Security: Any’ does not sum to the individual components as the type of security was not always reported, and some loans may have multiple security types. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Logit Regressions of Loan Approvals

	(1)	(2)	(3)	(4)	(5)
Post*Converters	0.128 (0.142)	0.116 (0.143)	0.057 (0.146)	0.089 (0.143)	0.064 (0.148)
Converters	0.953*** (0.091)	0.797*** (0.096)	0.542*** (0.095)	0.928*** (0.091)	0.364*** (0.101)
Post	0.166 (0.123)	0.173 (0.123)	0.120 (0.126)	0.202 (0.124)	0.115 (0.128)
Size of Loan		-0.130*** (0.022)			-0.138*** (0.022)
Security: Fin. Instrument			1.962*** (0.112)		1.957*** (0.113)
Security: Real Estate			1.135*** (0.083)		1.169*** (0.083)
Security: Guarantee			0.855*** (0.100)		0.802*** (0.102)
Borrower: Fin. Institution				-0.093 (0.234)	0.171 (0.242)
Borrower: Ltd. Company				-0.386*** (0.126)	0.034 (0.132)
Constant	1.868*** (0.080)	2.825*** (0.187)	1.464*** (0.086)	1.909*** (0.081)	2.478*** (0.189)
Pseudo-R2	0.021	0.025	0.085	0.022	0.090
Observations	20,248	20,248	20,248	20,248	20,248

Notes: We include loans from banks listed in Appendix Table 1 for the period from 1874 to 1879, and 1884 to 1887. The dependent variable equals 1 if a Loan was approved, and 0 otherwise. Converters equals 1 for banks that were unlimited liability and then converted to limited liability. Post equals 1 for the period 1884-1887. Robust standard errors in parentheses. Marginal effects at mean from column 5 logit regression are Post*Converters=0.0026, Converters=0.0149, Post=0.0047, Size of Loan=-0.0056, Security: Fin. Instrument=0.0797, Security: Real Estate = 0.0476, Security: Guarantee=0.0327, Borrower Fin. Institution=0.0070, Borrower: Ltd. Company = 0.0014. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Bank Size Regressions

	(1)	(2)	(3)	(4)
	Log Loans	Log Deposits	Log Tot Assets	Log Branches
Post*Converters	-0.118 (0.335)	-0.154 (0.372)	-0.103 (0.353)	-0.060 (0.454)
Converters	0.745*** (0.243)	0.824*** (0.269)	0.741*** (0.253)	0.632* (0.337)
Post	0.029 (0.237)	0.247 (0.260)	0.200 (0.241)	0.310 (0.340)
Scotland	0.926*** (0.264)	1.006*** (0.279)	1.009*** (0.272)	1.851*** (0.226)
Ireland	0.302 (0.240)	0.276 (0.270)	0.323 (0.250)	0.907* (0.469)
Constant	13.906*** (0.169)	13.795*** (0.183)	14.148*** (0.165)	1.883*** (0.241)
Observations	142	142	142	122
R-squared	0.219	0.213	0.218	0.313

Notes: We run difference-in-differences regressions with data for 1878 and 1887 and includes banks which had data available for both periods. Converters equals 1 for banks that were unlimited liability and then converted to limited liability. Post equals 1 in 1887. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 1. Bank Loan Application Data

Bank	Established (year)	Limited liability from (year)	Years for which we have loan data (inclusive)	Number of loans	Branches in 1879	Total Assets in 1879 (£'000)
<i>Already Limited in 1878</i>						
Royal Bank of Scotland	1727	1727	1877-85	2,116	109	15,712
London and Provincial Bank	1864	1864	1875-87	1,833	75	2,883
<i>Converters</i>						
Sheffield and Rotherham Bank	1836	1880	1874-87	3,908	5	1,699
Yorkshire Banking Company	1843	1880	1877-86	5,854	25	2,291
Bradford Banking Company	1837	1881	1877-85	598	1	3,031
Union Bank of London	1839	1882	1876-87	15,244	5	18,790
Sheffield Union Bank	1843	1883	1875-9; 85-7	2,050	6	666
Total				32,556	218	45,072
% of English and Scottish banking system					9.7	10.3

Notes: Loan application data are from (1) Bradford Banking Company - HSBC Archives: Directors' Minute Books, 1877-1885; (2) London and Provincial Bank - Barclays Archives: London and Provincial Bank Fair Minutes, 1875-1887; (3) Royal Bank of Scotland - Royal Bank of Scotland Archives: Minutes of the Court of Directors, 1877-1887; (4) Sheffield and Rotherham Bank - Royal Bank of Scotland Archives: Directors' Minute Books, 1874-1887; (5) Sheffield Union Bank - HSBC Archives: Directors' Minute Books, 1875-1879, 1885-1887; (6) Union Bank of London - HSBC Archives: Directors' Minute Books, 1876-1887; (7) Yorkshire Banking Company - HSBC Archive: Directors' Minute Books, 1877-1886. Other data from *The Bankers' Almanac and Yearbook* (1880), *The Economist Banking Supplement* (1880), and *Stock Exchange Yearbooks*, 1879-89.