

Banking as an emerging technology: Hoare's Bank, 1702–1742

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London's financial market underwent dramatic change after 1700. More limited than Paris or Amsterdam in the seventeenth century, London became the leading financial centre in Europe in the eighteenth century. There is an extensive and growing literature on the causes of this change, but comparatively little on the change itself. This article provides detailed information on the operation of the London financial market around 1700 by describing the operations of a nascent London bank.

It is an often-repeated truism that goldsmiths became bankers, and we have many records of isolated transactions by goldsmith-bankers.² These fragments have been taken as the answer to a question when they could instead be seen as the question. Banking is a difficult business, and it does not resemble the goldsmith trade in the kinds of risks it involves. How did goldsmiths become bankers? Was the transition trivial, despite the difference in the economic activities, or was it a process of learning?

We argue for the latter. Learning to be a fractional-reserve banker in the early eighteenth century was a difficult task. This is shown by the rapid demise of many goldsmith-bankers at the end of the seventeenth and the beginning of the eighteenth century. Goldsmith-bankers failed after the 'Stop of the Exchequer' in 1672, and enough of them did so that goldsmiths' notes were unacceptable as currency during the 1670s. Many firms and individuals drifted into the banking business, only to give it up after a few years, and most West End bankers in 1700 were no longer in the

¹ We thank Henry Hoare for kindly permitting access to the Hoare's Bank archives and Victoria Hutchings and Barbra Sands help with the ledgers. Claudia Goldin, Farley Grubb, Ephraim Kleiman, Bob Margo, Petra Moser, Dick Sylla and Stephen Quinn helped us with their comments; seminar participants at Harvard offered important suggestions. Financial support by the Leverhulme Trust through a Philip Leverhulme Prize for Hans-Joachim Voth and through CREI (Barcelona) is gratefully acknowledged. Chris Beauchamp, Anisha Dasgupta, Marek Polonski, Elena Reutskaya and Jacopo Torriti provided excellent research assistance

² Charles P. Kindleberger, *A Financial History of Western Europe*, 2nd edn (Oxford, 1984).

business by 1725. There were only two dozen private bankers in the West End at that time; the total number of banks in London did not exceed 42 in 1770.³

The economic literature on financial-system development distinguishes four main functions: the transfer of resources, the allocation of capital, the pooling of savings, and the management of risk. Much of the recent research on the development of banking and finance prior to the Industrial Revolution has emphasised the payments function and the development of public creditworthiness, that is, the first two functions.⁴ We argue that the transition from goldsmith to deposit-taking banker was at least as important because it dramatically improved the financial system's ability to act as an aggregation device for savings, and as an allocation mechanism for capital, that is, to pool savings and manage risk.

We provide evidence of the difficulty of entering this new business from the detailed records of a West End bank in its formative years, during a crucial period of London's evolution as a financial market. Richard Hoare was a goldsmith who moved to Fleet Street in 1690, signalling his intention to complete the transition from all-purpose jeweller to banker he had begun in the 1670s. He was successful in this effort, and Hoare's Bank still exists as an independent private bank, operating from the same address as Richard Hoare and serving a selected group of families, some of whom have been with the bank for many generations.⁵ The bank's archives contain records for the early eighteenth century that document the process by which Richard Hoare made the transition from goldsmith to banker.

We argue that the increasing sophistication of Richard Hoare and his successors can be seen as the learning needed in the use of new technology. Many of the operational procedures and techniques had been used by earlier bankers, such as the use of double-entry book-keeping, and the records at Hoare's reflect the firm's adaptation to contemporary 'best practice'. Nonetheless, the bank was among the pioneers of a new economic activity, the extension of credit outside the tight-knit community of merchants or the even smaller community of princely rulers, which was financed by taking deposits. This is not to deny the existence of banks before 1700, but rather to note that they specialised almost exclusively in the financing of trade or lending to the crown, providing payment services, and extending loans to a small group of international merchants.⁶ Hoare did not introduce a new spinning

³ J. K. Horsefield, 'The duties of a banker: the eighteenth century view', *Economica*, 8 (1941); D. M. Joslin, 'London private bankers, 1720–85', *Economic History Review*, 7 (1954); Stephen Quinn, 'Goldsmith-banking: mutual acceptance and interbanker clearing in Restoration London', *Explorations in Economic History*, 34.4 (1997), p. 411.

⁴ P. G. M. Dickson, *The Financial Revolution in England: A Study in the Development of Public Credit, 1688–1756* (New York: 1967); Larry Neal, *The Rise of Financial Capitalism* (Cambridge, 1990); Stephen Quinn, 'Money, finance and capital markets', in Roderick Floud and Paul Johnson (eds.), *Cambridge Economic History of England* (Cambridge, 2003).

⁵ H. P. R. Hoare, *Hoare's Bank: A Record, 1673–1932* (London: Hoare's Bank, 1932).

⁶ Neal, *The Rise of Financial Capitalism*; Quinn, 'Goldsmith-banking'; Herman Van der Wee, 'Monetary, credit and banking systems', in E. E. Rich and C. H. Wilson (eds.), *The Cambridge Economic History of Europe* (Cambridge, 1977).

device, but turned a relatively new idea – lending to private individuals financed by deposits – into a successful business.

To switch from goldsmith to credit intermediary at that time was to enter into a difficult business. Hoare's joined a handful of financial-pioneer goldsmith-bankers. Just as the use of any new machine requires a process of learning and adaptation, so too the introduction of commercial banking to the wider public of London required organisational innovation by Richard Hoare and his associates. Hoare's Bank survived, in contrast to most other entrants into this new business. This longevity made Hoare's Bank atypical of early banks. We would like to contrast Hoare's business practices with those of banks that did not succeed and derive some conclusions about the key factors of success in this fashion, but that obviously is not possible. Yet the varying fortunes of this unusual bank can tell us much about the challenges faced by nascent banks. If it was difficult for the rare success to make the transition to banker, how much harder was it for others?

This new activity was similar to modern banking, but different in several respects. Typical of new activities, it was fraught with uncertainty. Legal issues surrounding bank transactions introduced confusions and ambiguities lasting well into the nineteenth century. Typical of the eighteenth century, banking also was subject to many restrictions. The usury laws perhaps were the most obvious and most important of these for existing banks; the prohibition of joint-stock banks may have been more important for potential entrants.⁷

We first discuss the nature of the learning process of Richard Hoare and his partners and discuss some measures of learning for a nascent bank. We then describe data from balance sheets and use them to provide an overview of the bank's business in the early eighteenth century. The key results from this exercise are then discussed in the context of learning the business of banking as a new 'technology'. Finally, we turn to individual lending transactions on loans to reinforce our conclusions, demonstrating how credit was extended to particular individuals and how the interest rate charged on these transactions evolved over time. Given the usury laws, banking decisions in early eighteenth-century London were directed towards selecting suitable borrowers, not the interest rate at which they borrowed.

I

We conceptualise the process of learning in business organisations in a manner inspired by the work of Alfred Chandler. He chronicled changes in business structures and strategies in a series of volumes, arguing that changes in managerial practices were innovations as important as introducing new machines. Hoare's Bank

⁷ J. K. Horsefield, 'British banking practices, 1750–1850: some legal sidelights', *Economica*, 19 (1952), pp. 308–21; Peter Temin and Hans-Joachim Voth, 'Credit Rationing and crowding out during the industrial revolution: evidence from Hoare's Bank, 1702–1862', *Explorations in Economic History*, 42.3 (2005).

did not have any new machines to use; it was extending its expertise into new dimensions.

Hoare's move from goldsmith to banker involved learning at two levels: how to emulate lending practices already widely used at the time (firm-specific copying), and how to adapt the system of deposit banking so that it could serve as the basis for a commercially successful enterprise (innovation).⁸ We cannot distinguish perfectly between the two – there had been goldsmiths holding deposits and merchant bankers providing international payment services for a long time, but only at the end of the seventeenth century were a few pioneers combining deposit-taking with lending and brokerage services. Hoare's Bank was one of these pioneers, extending credit to a West End clientele. As Chandler did, we use the records of a successful business to represent changes in the industry.⁹ Our method also is similar in spirit to some recent analysis of evolving stock-market institutions.¹⁰

Since we have more data than Chandler typically did, we can get inside the new bank to some degree. We therefore further conceptualise the learning process as the accumulation of human capital – a set of 'operating instructions', probably largely unwritten, that evolved gradually over time, crystallising what experience had taught the partners. The partners invested in education by foregoing profits initially in order to be able to earn higher profits later. More precisely, we infer that the Hoares used what Fudenberg and Levine call *fictitious play* in their account of learning in repeated games, modifying their behaviour in response to the results of their strategy. We of course only see the outcomes, but we argue later that this kind of learning is better than the alternatives to explain what we see. This learning process was cumulative over the first decades of the eighteenth century, but it must have been affected also by a few dramatic events.¹¹

Richard Hoare and his sons were not just learning a new trade where they could learn from established tradesmen. They were innovating and learning at the same time, participating in 'technological innovation as a learning process'.¹² Richard Hoare and his sons therefore had no template against which to measure themselves. We look back at them and evaluate their actions relative to standards that have been formulated since they lived and learned. We should not expect the Hoares to have gone to the best practice as we now see it, and we should not expect them to have been able instantly to operate a bank along modern lines. Extensive exploration was

⁸ We thank an anonymous referee for helping us clarify these points.

⁹ Alfred Dupont Chandler, *Strategy and Structure: Chapters in the History of the Industrial Enterprise* (Cambridge, MA, 1990); Alfred Dupont Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, MA, 1977).

¹⁰ Ann Carlos, J. Key and J. Dupree, 'Learning and the creation of stock-market institutions: evidence from the Royal African and Hudson's Bay Companies, 1670–1700', *Journal of Economic History*, 58.2 (1998).

¹¹ Gary Becker, *Human Capital* (New York, 1964); Drew Fudenberg and David K. Levine, *The Theory of Learning in Games* (Cambridge, MA, 1998), p. 7.

¹² Nathan Rosenberg, *Inside the Black Box: Technology and Economics* (Cambridge, 1982), p. 120.

needed to find a viable business model, which might not in hindsight be the best one possible.

Deposit banking presents a number of challenges. Four are central from our point of view. First, margins are low since the cost of funding cannot fall below zero. The obvious solution to this problem – using a high ratio of deposits to equity to leverage up returns on capital – is fraught with risks. A ‘run’ can quickly spell the end of an otherwise successful venture, even if assets exceed liabilities. Managing the risk of illiquidity is the first challenge for any nascent deposit-taking banker. It was compounded by period-specific factors, such as the usury limit on interest rates. The unlimited-liability partnerships of the time heavily penalised even modest levels of risk-taking, since, if worst came to worst, all family assets could be lost. Second, access to credit creates a whole host of incentive problems. Repayments are uncertain, and defaults can easily overwhelm a poorly capitalised bank. Since regular payments (either interest or principal) were uncommon, bankers had only the most vague notions about how their loans were performing prior to their being paid off. Monitoring to reduce the risk of insolvency is costly if it involves a large number of borrowers. Lending to fewer individuals can keep costs low, but leads to a concentration of risks. Third, in a new business such as banking, customers’ expectations about the range of services offered and their prices are not yet stable. They are partly in a state of flux because competitors may decide to change the price/service mix that they offer. Banks need to decide which preferences of their customers to take seriously, and which ones to ignore – conditional on a convergence of business practices in the relevant market segment. Finally, nascent bankers needed to decide whom to serve. Customer segmentation is never easy, but it was probably especially hard in the early eighteenth century. Merchants had great liquidity needs and offered substantial collateral as well as plenty of indirect information about their reliability and wealth. They also offered a market for associated services such as international payments. The gentry and nobility had a specific life-cycle component to their borrowing needs – great as older sons, negligible after they inherit the title and estate from their father. Those with positive net worth often kept money on deposit in London to facilitate payments and to invest in government securities; those in debt may have few assets that could serve as collateral other than the prospects of getting lucky in the genetic lottery.

Today, we know how many of these problems were overcome. We have rules of thumb for sensible leverage ratios, loan durations, diversification of loan portfolios and customer segmentation. Most of these decisions had to be made in a trial-and-error fashion by the pioneers – even if many of their insights came to be compiled and circulated quite quickly. It would be dangerous to write a ‘Whig history’ of early deposit banking, with all deviations from more familiar practices seen as an unprofessional and uneconomic aberration whose disappearance was an unambiguous sign of progress. Hoffman, Rosenthal and Postel-Vinay’s analysis of French notaries reminds us that even rather peculiar institutional arrangements can last for a long time, and only disappear as a result of idiosyncratic shocks. We try to trace the

evolution of banking practices at Hoare's as an open process, in the way that it must have seemed to the first generations of deposit bankers, a learning process without obvious answers.

Economic theorists call learning 'adequate' when agents experiment enough to maximise their own profits.¹³ This is of course an exaggeration in any given historical situation – neither agents nor anyone else can know with certainty if profits are actually at the maximum that could have been attained. We shall nonetheless use profitability as one of our key indicators of learning, as suggested by the classic contributions in this literature.¹⁴ The economic environment did not exactly facilitate learning for the sector as a whole. In the theoretical literature, optimal experimentation may not lead to adequate learning, depending on how costly experimentation is and how much information it reveals. Low rates of optimal experimentation are in part simply a result of banking's inherent riskiness – if catastrophic discontinuities are one of the main worries on the mind of managers, they will be much less happy to try out new business concepts. Also, the economic environment at large partly determines how much can be learned from any given degree of experimentation. For agents to attain their global maximum, their payoff function has to be analytic – local experimentation around their (myopic) starting point must lead to the global optimum. In the presence of other banks, for example, also trying to decide if they need to offer services like free overdrafts, each bank experimenting on its own may end up with a distinctly sub-optimal answer (equivalent to local maxima in the theoretical learning literature) to the four key questions raised above.¹⁵ Finally, most learning will be inadequate if the level of 'noise' becomes high. Some models, like the classic Aghion et al. one on optimal learning by experimentation, suggest that only very low levels of noise allow agents to approach their first-best solution. At a time of plentiful macroeconomic shocks such as wars and financial instability (in the form of the South Sea Bubble), plus the numerous discontinuities induced by the death of partners and other extraneous events, it must have been very hard for nascent bankers to decide which of the many parameters that they could adjust made a difference, and what was really responsible for the evolution of their profits (of which they only ever had an estimate, based on assumptions about likely default and repayment rates).

We use five indices of learning to chronicle Hoare's progress. One sign of a learning period is a low rate of growth. Firms that continue at the margin of existence are not firmly based; their marginal existence suggests inadequate understanding of the new business or process. The low growth rate is a rough index of the

¹³ Philippe Aghion et al., 'Optimal learning by experimentation', *Review of Economic Studies*, 58.4 (1991).

¹⁴ David Easley and Nicholas M. Kiefer, 'Controlling a stochastic process with unknown parameters', *Econometrica*, 56.5 (1988); David Easley and Nicholas M. Kiefer, 'Optimal learning with endogenous data', *International Economic Review*, 30.4 (1989); Michael Rothschild, 'A two-armed bandit theory of market pricing', *Journal of Economic Theory*, 9.2 (1974).

¹⁵ Aghion et al., 'Optimal learning by experimentation', p. 642.

cost of learning – the investment in human capital. Another index of learning to be a bank is the decline of loans without interest, a practice of the goldsmith trade where goods were held and pawned. These loans are not part of good banking practice, and their presence may be taken as a sign of learning in process. A third index comes from the fact that a well-functioning bank needs to hold enough cash at any one point in time to be liquid, that is, to be able to pay out funds to depositors on demand. A fourth index is the amount of (personal) equity in the business. Banks operate today with a relatively small equity base. This measure demonstrates that the operators understand their business well enough to ensure the solvency of the bank – that losses as a result of default or trading of securities are not greater than the equity base. Many businesses start with personal investments and then progress to a more varied and solid capital structure; in the days of unlimited personal liability partnerships, this was largely a result of retained profits. Finally, the results of all these characteristics show up in regular, satisfactory profits. We presume Richard Hoare was seeking financial gains like his fellow entrepreneurs, and we take declining and low profits for several years as a sign of acquiring the knowledge of a new business the hard way.

Charles Kindleberger dated the transition from goldsmiths to bankers to the middle of the seventeenth century, citing the experience of a few goldsmiths without much information about their banking activities.¹⁶ North and Weingast argued that the Glorious Revolution of 1688 put government finances on a solid footing, providing a base on which the London financial market and the economy as a whole could grow.¹⁷ Several authors have acknowledged the changes in the generation after 1688, while denying that the Glorious Revolution was key.¹⁸ Quinn used the records of another early West End bank, Child's Bank, to test the North and Weingast hypothesis.¹⁹ In contrast to his work, which uses microlevel data to evaluate the financial effects of institutional change, we examine business practice with a view to detailing the learning of successful methods.

¹⁶ Charles P. Kindleberger, *A Financial History of Western Europe*, 2nd edn (Oxford, 1993), pp. 53–4.

¹⁷ Douglas North and Barry Weingast, 'Constitutions and commitment: the evolution of institutions governing public choice in seventeenth-century England', *Journal of Economic History*, 49.4 (1989); Ross Levine and Sara Zervos, 'Stock markets, banks, and economic growth', *American Economic Review*, 88.3 (1998).

¹⁸ Gregory Clark, 'The political foundations of modern economic growth: England, 1540–1800', *Journal of Interdisciplinary History*, 26.4 (1996); Stephen Quinn, 'The Glorious Revolution's effect on English private finance: a microhistory, 1680–1705', *Journal of Economic History*, 61.3 (2001); Nathan Sussman and Yishay Yafeh, 'Constitutions and commitment: evidence on the relation between institutions and the cost of capital', unpublished manuscript, Hebrew University, Jerusalem (2002); Patrick O'Brien, 'Fiscal exceptionalism: Great Britain and its European rivals – from civil war to triumph at Trafalgar and Waterloo', *LSE Economic History Working Paper*, 65 (2001).

¹⁹ Quinn, 'The Glorious Revolution's effect on English private finance'. We thank Stephen Quinn for pointing out that, initially, Hoare's was simply adopting practices pioneered by other goldsmith-banks that had made the switch at an earlier stage.

Thomas Kuhn argued that the process of learning in science is a difficult one. He suggested that what we think of as learning may not be individual learning at all, but simply the replacement of one generation by another. No one learns a new scientific paradigm; the old fogies simply disappear.²⁰ This obviously is too strong an assumption for business, since there are many examples of successful adaptations. We cannot however rule out this possibility in the case of Hoare's Bank. Richard Hoare died in 1718, and it was only under the leadership of his sons, Henry and Benjamin, that the bank began to perform consistently in a way that sustained it over the long haul. Richard undoubtedly learned parts of his new trade, but it was his sons who translated these lessons into commercial success.

II

Until 1701, the bank recorded all transactions in a single ledger, with loans being registered side-by-side with sales coming from the goldsmith side of the business. Repayments of loans were treated similarly to the completion and final delivery of an item of jewellery or plate ordered by a customer – by being struck out in the ledger. After 1701, this practice gave way to the more elaborate accounting techniques that bankers in Europe had developed since the Renaissance.

During the early eighteenth century, the bank kept three types of ledgers. One recorded daily transactions of cashing bills, paying out the money from a new loan, and receiving deposits. The loan register, with separate entries organised by the name of the borrower, provided a sequential record of loans made by the bank, whether for interest or not. The clerks assiduously noted the date of each transaction, the titles and names of the borrowers, the amount of the loan, repayments of principal and interest rate payment, and the type of collateral offered. In cases of defaults, the loans were normally transferred to the partner who approved them – and his capital with the bank was debited for the amount in question. While many of Hoare's customers only used the bank for a few transactions, some customers used its services intensively, with several transactions per year.

The bank balanced its books periodically in the form of balance sheets. Initially, it did so in September of each year. Hoare's balance-sheet ledgers contain annual totals for the bank's assets, liabilities and profits. The bank's total assets fluctuated strongly from year to year, reflecting the short-term nature of many loans and deposits, as well as varying levels of capital committed to banking activities by the partners at Hoare's. While the remaining goldsmith business initially affected both sides of the balance sheet, the borrowing and the lending side show a relatively rapid transition to a banker's business.

Total asset values are shown in Figure 1 up to 1742, with only a few missing balance sheets prior to the South Sea Bubble. In the first year after the 'initial'

²⁰ Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago, 1970).

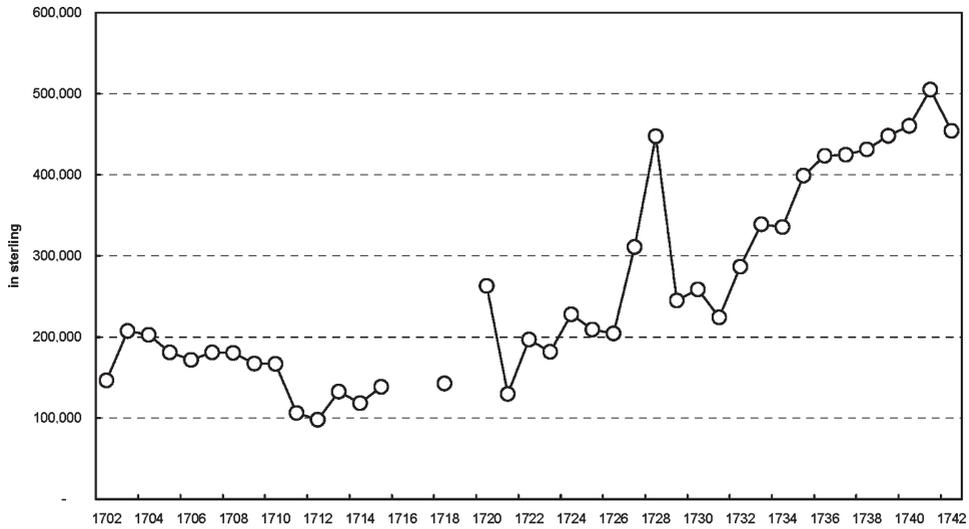


Figure 1. Hoare's total assets, 1702-42

accounts were drawn up, Hoare's assets jumped from £146,000 to £207,000, but then declined. The high point in 1703 was not surpassed until 1720, during the South Sea Bubble, and it was followed by a sharp contraction and wide swings in overall lending activity. Only after surviving the financial chaos of the South Sea Bubble did Hoare's assets begin to grow steadily, except for a temporary windfall in 1727/28. The troubled two decades prior to the South Sea Bubble were indicators of an extended period of learning and exploration. It was only after the bursting of the bubble that Hoare's Bank found a *modus operandi* that generated sustained growth.

Figure 1 therefore suggests that the bank had not mastered the basics of fractional-reserve lending to such a degree that it could grow this business before 1720. On many occasions, Hoare's Bank struggled to maintain itself for the first two decades of the eighteenth century while its partners, Richard and his son, Henry, learned this new business. The contrast between the path of Hoare's total assets before and after 1720 is eloquent testimony to the need to learn a new business.

Hoare's balance sheet was separated into assets and liabilities. Assets were grouped into six broad categories – gold and silver, diamonds and pearls, 'money due as lent upon interest and purchasing stocks', loans without interest, 'several people for plate' and a balance remaining in cash. The composition of Hoare's assets is shown in Figure 2. Initially, some of the assets appear to be the remnants of Hoare's goldsmithing business – such as the £9,489 the firm held in September 1702 in the form of precious metals and stone. Loans to customers for plate fall into the same category. Richard Hoare had financed clients' purchases of jewellery in his days as a goldsmith, with banking operations facilitating the transaction in the same way as

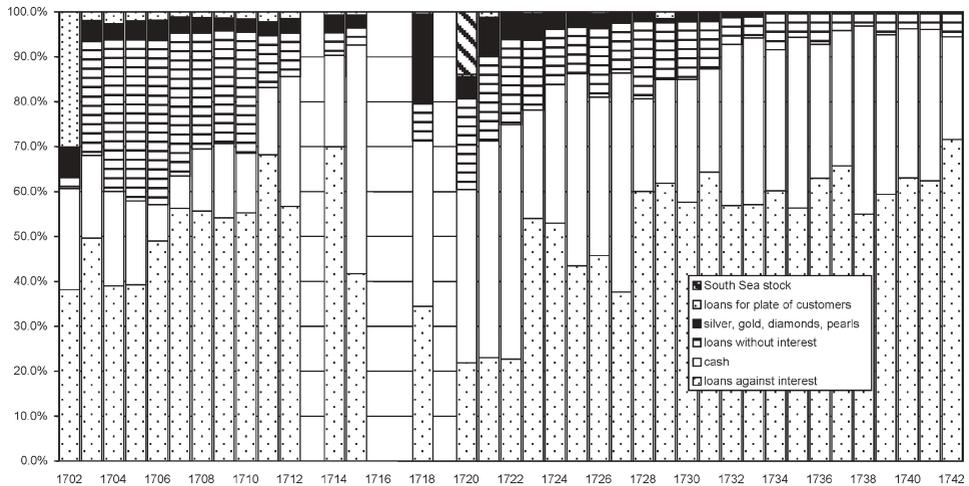


Figure 2. *The composition of Hoare's assets*

the finance divisions of General Motors or Ford today extend loans to customers wishing to buy their cars. The bank also acted as a broker for its customers, executing trades in a variety of securities and financing the purchases via short-term loans.

The initial balance sheet showed about two-fifths of Hoare's assets still were in the goldsmith business when this first surviving balance sheet was drawn up.²¹ Customers borrowing for plate held 30 per cent of all Hoare's assets. Holdings of silver, gold, diamonds and pearls accounted for an additional 8 per cent of assets. These assets quickly declined as a share of Hoare's total; the bank terminated almost all of its goldsmithing activities such as producing silverware, mending plate and crafting jewellery and redirected its activities towards banking. Assets used for goldsmithing initially were replaced by loans without interest, which may be seen as holdovers from the goldsmithing business. They show Hoare's Bank providing liquidity to some of its customers and operating in the fashion of a pawnshop.

The largest individual category of assets throughout the early eighteenth century was loans against interest (as well as money lent for securities purchases), fluctuating around half of the balance sheet. Loans bearing no interest (but not for plate) declined relatively quickly. The firm extended 62 loans without interest in 1704; by 1721, there were only 13 transactions in this category. Richard Hoare appears to have taken longer to reduce the volume of loans without interest than he took with loans against plate, but he clearly was reducing both in the first decades of the eighteenth century. As he learned banking and conceptualised himself as a banker, he moved out of these other activities.

The years before and during the South Sea Bubble showed a rise in the share of cash holdings. As the London financial market entered a period of great turbulence,

²¹ Child's recorded a similar proportion. Quinn (private communication).

Hoare's Bank reverted to some of its older practices to weather the financial storms. There were £28,189 of diamonds, pearls, gold and silver on the balance sheet in 1718, equivalent to one-fifth of its total value. These assets from Hoare's previous profession decreased in importance during the 1720s, but they were not totally abandoned a decade after the bubble. Offsetting this conservative stance, Hoare's also invested in the riskiest of financial instruments: South Sea stock. The 1720 accounts were drawn up on 24 June, and the bank had 14 per cent of its assets invested in South Sea stock.²² The bank continued to trade (and hold positions) in South Sea stock after the bubble deflated, even though these transactions were not captured by successive balance sheets (usually drawn up in September). Some dealing in South Sea stock was recorded as late as 1731.²³

Hoare's bought and sold bonds and shares on behalf of its customers and for its own account, just as other goldsmith-bankers did.²⁴ It held government bonds and Bank of England stock at various points in time, and became a substantial investor in the South Sea Company. Richard Hoare was a Tory, while the government was dominated by Whigs. The Bank of England was their creature, and Hoare's Bank, while opposing the formation and recharter of the Bank of England, owned some of its shares. Child's was a Whig bank and had far more government business.²⁵

Cash balances rose sharply as a percentage of all assets after the end of the South Sea Bubble – where the bank had made do with one-fifth cash before the crisis, it now kept one-third of its assets in liquid funds.²⁶ If withdrawals had followed a normal distribution, the pre-bubble bank would have faced a 3 per cent chance of running out of cash and consequently facing a crisis every 30 years. After the bubble, as a result of becoming very cautious, the bank reduced the risk to once every 1,500 years.²⁷ This is a highly conservative stance, but may have been warranted in a world without a lender of last resort and where all the Hoare's partners were subject to unlimited liability.

We tested the hypothesis that asset allocations changed significantly after 1720, as summarised in Table 1. The share of loans against interest did not change much after 1720. The share of cash increased enormously and significantly, from 20 per cent to

²² The bank put the value of shares (approximately) at their historical cost – 250 per share. The market price on the day before had been 765.

²³ Peter Temin and Hans-Joachim Voth, 'Riding the South Sea Bubble', *American Economic Review*, 95.4 (2004).

²⁴ Carlos, Key and Dupree, 'Learning and the creation of stock-market institutions'.

²⁵ Henry Peregrine Hoare, *Hoare's Bank. A Record 1673–1932* (London, 1932), p. 18; Quinn, 'The Glorious Revolution's effect on English private finance'.

²⁶ See Table 1.

²⁷ We calculated the average cash balance and the standard deviations, and derived the probability of the reserve ratio falling below zero. There is good reason to think that deposit withdrawals follow a lognormal distribution, which would mean that the bank's risk of running out of reserves was markedly higher before and after 1720 – and that the relative difference is probably somewhat smaller. Cf. Roger Chen and Dale Osborne, 'Random deposits, liquidation discount and deposit insurance pricing', *University of Texas Working Paper* (2002).

Table 1. *Asset shares at Hoare's – before and after the South Sea Bubble*

	<i>pre-1720</i>	<i>1720–42</i>	<i>difference</i>	<i>t-statistic</i> ⁺
interest-bearing loans	51.8	52.8	1	0.22
Cash	19.6	33.8	14.2	4.13 [*]
non-interest bearing loans	19.8	9.9	-9.9	3.2 [*]
loans for plate purchases	3.5	0.24	-3.26	2.2 [*]
Plate	4.7	1.9	-2.8	0.74

Note: * indicates significance at the 1% level

⁺ assuming equal variances

34 per cent of assets. Hoare's must have been scared enough by the turmoil of the bubble years to want a more secure cushion against a recurrence of financial turbulence. The rise in cash was accomplished by an almost equally large fall in the share of non-interest-bearing loans after 1720, and Hoare's did not lose much revenue when it increased its cash reserves. This finding documents our assertion that Hoare's was learning how to operate a bank. It increasingly charged interest for its loans, as bankers do, and it kept ample cash reserves to preserve its liquidity. These are the second and third of our indexes of learning, and the gradual process, accelerating after 1720, confirms our view that the learning period for this new activity was a long one.²⁸ Given the novelty of deposit-based lending, there was no general agreement on the required size of the cash ratio, and Hoare's appears to have stayed well inside the risk frontier.²⁹

To see how Hoare's Bank completed the transition to the banking business by the early eighteenth century, we need to examine its liabilities as well as its assets. Their liabilities were recorded as deposits by individuals of cash, money owed for plate and jewels, debts to goldsmiths and jewellers (as well as employees, in some years), the capital of the partner(s), plus profits for the past year.³⁰ In 1702, for example, Richard Hoare held £31,788 of the bank's capital.³¹ The bank also owed £113,997 to depositors, as well as £537 for plate and £42 to 'several plate workers and other workmen'. From 1703 onwards, Henry Hoare was in partnership with his father, Richard Hoare, and profits were divided according to a two-thirds/one-third

²⁸ We experimented with our sample selection, excluding the somewhat unusual year of 1718 – the results were almost identical. They are available from the authors upon request.

²⁹ J. K. Horsefield, 'The cash ratio in English banks before 1800', *Journal of Political Economy*, 57 (February 1949), pp. 70–74.

³⁰ This practice changed in later years, when the partners' capital is subsumed under the category of amounts due to others.

³¹ Note that, with unlimited liability partnerships, this concept of equity in the family firm is somewhat artificial. Yet Hoare's used this as a distinct category of liability, and it is not identical with cash-on-hand at the time of drawing up balance sheets.

allocation formula. Both Hoares appear to have kept substantial fractions of their fortune invested in the bank. By 1706, for example, we see them dividing profits of £1,839. Henry Hoare also received £241 for interest on the £4,029 he had invested in the firm by then (for an interest rate of exactly 6 per cent). In the same year, his father's investment stood at £52,934. Interestingly, while notionally liable for their businesses' debts to the full value of their personal assets, the partners designated some of their personal wealth as bank capital, on which interest was paid at the maximum allowable rate.

Equity in the firm fluctuated considerably from year to year, as the Hoares invested in the bank in some years and took money out in others. By 1710, Richard and Henry Hoare together had investments worth £74,939 in the bank, equivalent to 44 per cent of all liabilities. In 1720, Henry Hoare was in business with Benjamin Hoare, his younger brother, yet their combined equity in the bank only amounted to £39,608, approximately half the partner's capital in 1710. Family events such as the death of an individual partner were important determinants of the amount of business the firm could undertake, and of its financing structure. The Hoare family did not attain the favourable upward trend of joint equity until after the initial learning period. They clearly were invested (financially and materially) in the bank for the long term, although Richard Hoare did not live to see his sons create a steadily growing business.

The partners at Hoare's leveraged their own investment in the bank via the money kept in the cash accounts of their clients. Since their move to Fleet Street, the bank as a general rule no longer paid interest on the deposits of its clients.³²

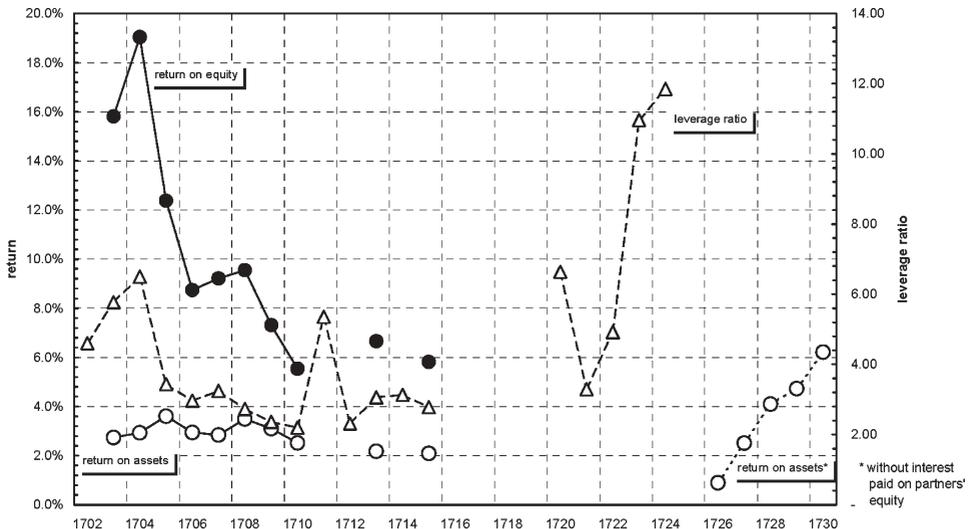


Figure 3. Hoare's return on assets and equity, leverage ratio

³² Richard Hoare to Madam Jane Hursey, dated 9 Oct. 1703, cited in Hoare, *Hoare's Bank*, p. 16.

Before the South Sea Bubble, the size of the balance sheets tended to be between two and six times larger than the equity of the Hoare family. This meant that the family had a large personal stake in the bank, the fourth index of its learning process. Only after Richard and Henry Hoare understood the new business could they expand their banking business beyond the scope of their family assets. The Hoare family became more aggressive after the South Sea Bubble, with a leverage ratio that rose rapidly to 12 by 1725. At its most extreme, Hoare's had approximately £11 in assets for every pound of partners' equity. This is a remarkably high figure for a bank that ultimately survived for centuries – the Basle I accords required modern banks to maintain a similar equity ratio to fulfill capital adequacy requirements, despite access to a lender of last resort.³³ Unsurprisingly, the year of peak profitability before 1710 also coincided with a relatively high leverage ratio.

Some accounts are missing for the crucial years around 1710, and we cannot say with certainty how difficult the position of the bank became. It is clear that the initially high rates of profitability proved unsustainable. The return on equity declined alongside the leverage ratio. Richard and Henry Hoare may well have tided over the bank with their personal assets in the hard years after 1710. They certainly derived little or no income from the bank in those years over and above the 6 per cent that they paid themselves as interest. When the bank began to grow after 1720, it made many fewer loans without interest and increased the partners' leverage.

These signs of successful learning should have increased the bank's profits, but only limited information on profits has survived. The bank calculated 'excess profits', after paying interest on partners' capital. We calculate the overall return, including interest payments. The average return on assets fluctuated between 2 and 4 per cent. But while Hoare's bank showed a gain of 2.7 per cent on assets in 1703, this translated into a return on equity of 15.8 per cent. By 1710, gearing had declined to 1:2.2, and the existing assets generated a low return of only 2.5 per cent. This translated into a return on equity of 5.5 per cent for this year. While 'excess' profits had averaged £2,775 in prior years, they dropped to £216, leaving Henry Hoare, as the junior partner, with £72 for his efforts in 1710. Between 1702 and 1715, the partners earned 10 per cent on average, and probably less. The Hoares received a return over and above the interest that they could have earned if they had put their money into (relatively safe) government bonds, but the margin was at times very small. In the second decade of the eighteenth century, profits were even lower and sometimes negative. In 1710 and thereafter, the partners might have been close to abandoning the business, but Hoare's Bank did not close its doors.

Information on actual profits is very rare for the years after 1720. When we find it recorded, however, profitability appears to have been high – 'excess' profits averaged £9,492 after 1726, or nearly twice as much as for the years 1703–15. At its

³³ Mathias Dewatripont and Jean Tirole, *The Prudential Regulation of Banks*, translation, Walras-Pareto Lectures, vol. 1 (Cambridge and London, 1994).

high point in 1730, the bank managed a return of 6.2 per cent on assets, which implies that the return on equity must have easily been in the double digits, and possibly higher than 20 per cent. For the years 1702–12, when we have information on both total lending against interest and on profits for the partners, interest income constituted 84 per cent of overall earnings.³⁴ This index of learning shows how Richard and Henry Hoare learned to extract a steady stream of profit from lending at interest.

An additional source of profitability for Hoare's was proprietary trading. In the run-up to the South Sea Bubble, the partners earned ample profits. They also were wise enough to sell while prices were still high. After the bubble burst, in November 1721, they took some of their trading profits out of the bank (amounting to over £27,000). High profits were the result of high leverage and a positive rate of growth. It is the final index that the period of learning the business had given way to a period of sustained profitability. Henry Hoare celebrated this transition by purchasing and building the country house Stourhead in 1720, which is now the property of the National Trust.

Joslin argued that 1710 was a bad year for London banks in general and that many private banks disappeared.³⁵ Hoare's suffered, but Richard Hoare stuck it out. The tumultuous years of the South Sea Bubble also witnessed high bank mortality. Hoare's was involved in the asset inflation and profited from it, but emerged intact from this crisis as well. Even though the rate of return earned by the Hoare's does not look impressive in many of the bank's early years, their continuation in business while others were exiting shows great determination and considerable skill. While recording a good return on capital in some years, the partners were also making an investment in the intellectual capital needed to operate in this new business.

III

The evolution of Hoare's banking activities shows a particular form of learning-by-doing. To be sure, we need to verify that these changes were not due to other forces. The annual balance sheets reflected the influence of three factors – the demand for banking services, the supply of capital and deposits, and the managerial decisions by the partners at Hoare's on how to run their business. Having decided to exit the goldsmith's business around 1700, the scale and scope of Hoare's banking activities evolved rapidly over time, only to shift in a very significant fashion after the South Sea Bubble. If our interpretation emphasising learning is correct, we should be able to show that the bank's changing fortunes were not driven by differences in the external environment.

³⁴ We assume that Hoare's earned 5 per cent on the amount labelled 'as lent with interest' in the balance sheet.

³⁵ Joslin, 'London private bankers, 1720–85'.

The bank's difficult years before 1720, for example, could have been the result of a more uncertain or depressed business environment. Aggregate evidence on business conditions before 1750 is not abundant, but there is little evidence that business conditions improved after 1720. True, 1710 appears to have been a year with a severe financial panic, but the bank's fortunes had been declining before this date, and the crisis of 1720 brought no similar drop in profitability. Ashton classified eight years as periods of depression in the two decades before 1720 – exactly the same number as during the period 1720–42.³⁶ The number of bankruptcies also does not suggest that low and highly variable returns were the result of an unusually unstable macroeconomic environment. Hoppit's time series shows that the average number of individuals going bankrupt was higher before 1720 than thereafter. The year-to-year variability was lower after the South Sea Bubble, but the difference is not large.³⁷ Since defaults were never key to Hoare's profitability, any link to Hoare's would have to be very indirect.

Political events also cannot provide a ready explanation for the swings in Hoare's fortunes. The War of the Spanish Succession raged for most of the initial period that we describe as a period of learning. According to the calculations by Yafeh and Sussman, the government faced particularly high borrowing rates in 1702/3 and 1710. Strong competition from the government for deposits could be the kind of shock that may have undermined bank profitability, but it should have had similar effects in 1702/3 as it did in 1710. Yet profits were relatively good at the beginning of the period, and much lower in the years before and including 1710. The decline in deposits in 1710 was small – a mere 4.7 per cent. We therefore conclude that exogenous shocks cannot account for the evolution of lending behaviour and profits over time, and that changes in business practice reflect deliberate decisions made by the staff at Hoare's.

The bank reduced loans without interest, and increased cash reserves instead. This added flexibility and safety, which eventually proved useful; the growth of profits from 1702 to 1742 reflected this change. Providing liquidity short-term to current or prospective customers clearly made sense to the partners at the start of the century, given business practices at the time. Nonetheless, they apparently were aware of the negative impact that this particular activity had on their bottom line and strove to reduce it over the medium term. The partners experimented with the degree to which they needed to offer interest-free loans, the type of collateral required for each group of customers, and the appropriate terms for loans. How do we know that the changes in the allocation of assets were not simply random, or the result of market forces pointing in one direction? We have already demonstrated that the differences in balance-sheet composition are statistically significant. The crucial shift

³⁶ T. S. Ashton, *Economic Fluctuations in England, 1700–1800* (Oxford, 1959), pp. 116–21, 172–3.

³⁷ The t-test shows a significant increase from an average of 227 in 1704–19 compared to 289 bankruptcies in 1720–43. Based on Julian Hoppit, *Risk and Failure in English Business, 1700–1800* (Cambridge, 1987); adjusted series.

out of non-interest-bearing loans into those against interest and cash was a gradual process, but it was accelerated by the events of 1720. Learning appears a valid interpretation because any given reduction in lending without interest in 1705 would have been as useful, *ceteris paribus*, as a reduction in 1725. Yet, earlier, Hoare's had probably not developed a good sense of which kind of customers merited this kind of service, either in terms of probability to repay or in terms of possible future business.

A key event in the evolution of banking practices at Hoare's was the South Sea Bubble of 1720. The main impact of the South Sea Bubble on the financial sector had been in the form of a scramble for liquidity.³⁸ Neal argues that the third subscription of stock led to a general tightness in the money market, with lenders calling in loans in many cases. We do not know exactly how many early banks went out of business in 1720 and 1721. The total number of bankruptcies in all sectors of the economy did not reach particularly high levels in these years.³⁹ At the same time, there is some evidence to suggest that partnerships engaged in banking were dissolved or went bankrupt at an unusually high rate in 1720/1, as a result of problems remaining liquid. At least five distinguished houses stopped payment in October alone.⁴⁰

After 1720, Hoare's partners apparently decided that illiquidity – not insolvency – was the greatest risk they faced. We do not know if the bank itself had come close to running out of cash in September 1720. Yet as goldsmiths they had not been subject to the same risks as bankers, and may have needed the spur of crisis to embrace safer practices. Anderson, writing two generations after the bubble burst, described the situation as follows:

The stock ... had fallen to one hundred and seventy-five per cent. . . whereupon there appeared great uneasiness and clamour amongst the monied men, which produced a great run or demand for cash at the Bank, and a greater one on the private bankers who had generally lent out much of their cash on South Sea stock and subscriptions, in consequence of which several very substantial ones were obliged to stop payment for some time.⁴¹

Since only a small part of Hoare's balance sheet was actually exposed to adverse price movements when the bubble burst (the bank had sold most of its substantial holdings in time), the partners probably felt that more equity – ready to absorb losses arising from defaults and losses on investments – was not crucial.⁴² This apparently

³⁸ Neal, *The Rise of Financial Capitalism*.

³⁹ Hoppit, *Risk and Failure in English Business, 1700–1800*, p. 132.

⁴⁰ Joslin, 'London private bankers, 1720–85', p. 174; John Carswell, *The South Sea Bubble* (London, 1960), p. 163. Others experienced great difficulty in meeting their obligations.

⁴¹ Adam Anderson, *An Historical and Chronological Deduction of the Origin of Commerce*, vol. 3 (London, 1801), p. 114.

⁴² It may also be that their growing overall wealth allowed them to devote less capital to the banking business, since the distinction between total net private wealth and partners' equity is more of a theoretical one with unlimited liability.

led to a key change in the bank's way of managing risks. While the early years showed a combination of low cash reserves and relatively healthy equity cushions, the partners reversed this policy after 1720, holding enough cash to satisfy depositors' demands even in extreme circumstances. Before 1720, the bank had on average kept one pound sterling in cash for every £3.3 in deposits; after the bubble, it increased this to one pound for every £2.5 in deposits. This implies that, after approximately two decades of experience, they realised that defaults were not a major concern, at least for the kind of clientele they were serving. Bank runs and other forms of liquidity crunches, however, were a distinct possibility. The bank's highly conservative stance here may actually help us to identify one factor that contributed to its longevity.

We should note that Hoare's earlier practice easily qualified as relatively prudent already, at least by the standards of eighteenth-century manuals on banking and commerce. Richard Cantillon, who knew the partners at Hoare's bank, advised in his *Essai sur la nature du commerce en général*:

It is easy to understand . . . that the sums of money which a Goldsmith or a Banker can lend at interest or divert from his cash are naturally proportionable [sic] to the practice and conduct of his clients; that while we have seen Bankers who were safe with a cash-reserve of one-tenth, others can hardly keep less than one half or two-thirds, though their credit be as high as that of the first. . . The most fortunate is the Banker who has for clients rich gentlemen who are always looking for safe employment for their money without wishing to invest it at interest while they wait.⁴³

Cantillon argued that 10 per cent was an adequate cash ratio for this group, while wealthy individuals, such as landowners, who deposited working capital with a bank, normally required a cash ratio of up to 50 per cent. In the case of merchants and traders, 66 per cent would have been necessary, as withdrawals could be highly irregular and rapid. Given Hoare's client base, it must have resembled the ideal-type of the 'most fortunate banker' relatively closely. Relative to the standard of 10 per cent described by Cantillon as normal for a bank in this group, Hoare's pre-bubble lending already looked highly cautious, and its cash ratios afterwards were very conservative. By shortening the average maturity of its loans, as we document below, the bank also was increasing the extent to which it could rely on repayments of loans to add to its cash reserves at any point in time.⁴⁴

The opportunity costs were substantial. In 1724, the balance sheet recorded £70,286 in cash. At an average effective rate of interest of 4 per cent, this would have been tantamount to £2,811 in potential revenue lost. Had the bank maintained the cash-liability ratio of the pre-1720 period, it could have earned some additional

⁴³ Richard Cantillon, *Essai sur la nature du commerce en général* (New York, 1755 [1964]), pp. 299–303 [spelling and capitalisation as per the original]. See J. K. Horsefield, 'The cash ratio in English banks before 1899', *Journal of Political Economy*, 57 (February 1949), pp. 70–4, for more debate.

⁴⁴ For the shorter duration of loans to help in explaining the change in cash holdings, some repayments have to be unanticipated, which is a plausible assumption.

£1,022.⁴⁵ Whether from direct difficulty or through observing the general distress, Hoare's had learned during the turbulent years 1710–20 that banking requires ample liquidity. After the bubble, the bank decided to accept lower earnings by keeping more reserves so as to deal with fluctuations in demand.

The change in behaviour documented in the cash registers of Hoare's is certainly compatible with the realisation that a sudden liquidity crunch was a much more likely event than defaults on loans. The rise in cash reserves is probably best interpreted in the context of the simultaneous decline in partners' equity in the firm. The latter was not the result of capital losses during the South Sea Bubble, for the bank's dealings during the bubble period were highly profitable.⁴⁶ Richard Hoare died in 1718, and only part of his capital remained in the bank. Yet the bank decided not to reduce the size of its assets to the same extent as the death of Richard Hoare had reduced its equity. In only one year did the leverage ratio drop below its pre-bubble average. Another way of describing the change post-1720 is to argue that while individual bankers such as the founder, Richard Hoare, did not change their business practices markedly, the bank itself 'learned' in the form of new partners changing key variables such as the cash/deposit ratio and the leverage ratio – compatible with Thomas Kuhn's view of how paradigm shifts occur in the sciences.

An early eighteenth-century banker had to manage a number of risks, most of them familiar to bank managers today. Default of loan customers was a constant threat, albeit small in the case of Hoare's, and sudden withdrawals of cash deposits could raise the spectre of illiquidity. Investment securities could sharply decline in value, and counterparties might not live up to their obligations – especially in bill and stock exchange transactions. Economists normally conceive of these risks as the spread of a distribution around an expected mean. In a classic book, Frank Knight proposed a distinction between 'risk' and 'uncertainty'.⁴⁷ In the case of risk, a probability distribution can be calculated. Uncertainty, however, refers to a situation when information is insufficient even to calculate probabilities.⁴⁸ Eventually, as certain types of business become more common, uncertainty is reduced to mere risk. Yet banks at the time of Richard and Henry Hoare faced substantial 'Knightian uncertainty'. They could not know much about their customers' expectations, and the extent to which customers were likely to switch accounts if some services such as occasional interest-free loans were not forthcoming. While individuals can always act 'as if' they could assign probabilities, their freedom for experimentation is severely constrained. Only when faced with a severe crisis of profitability did the firm take drastic steps to curtail interest-free lending.

⁴⁵ Hoare's had a cash-liability ratio of 30.8% in 1724, similar to the post-bubble sample average. The pre-crash average was 19.6%. $2,811 * ((30.8 - 19.6) / 100) = 1,022$. This would have been equivalent to more than one-third of the average annual pre-bubble profit.

⁴⁶ Temin and Voth, 'Riding the South Sea Bubble'.

⁴⁷ Frank Knight, *Risk, Uncertainty, and Profit* (Boston, 1921).

⁴⁸ Larry Epstein and Tan Wang, 'Intertemporal asset pricing under Knightian uncertainty', *Econometrica*, 62.3 (1994).

In addition, the evolving financial system of eighteenth-century Britain was subject to infrequent but very considerable shocks brought on by financial crises, wars and individual bankruptcies.⁴⁹ For bankers who had only been taking deposits for a few years (or decades at most), the crises of 1710 and 1720 must have appeared like the ‘perfect storm’ that sank the hedge fund LTCM in 1998.⁵⁰ This implies that, *ex ante*, finding the right responses to the dangers of illiquidity and insolvency arising from sharp asset price changes and a general scramble for liquidity was next to impossible. The survival of individual firms would then be the result of idiosyncratic factors that, *ex post*, turned out to have provided a sufficient safety margin. Indeed, generalised Knightian uncertainty – amongst investors, depositors and bankers – at a time when traded joint stock companies and deposit banking were new and as yet untested in their effects, may well have contributed to the very wide swings in asset prices and in the demand for cash themselves.⁵¹ It also is likely to have kept the number of entrants in the new business of deposit banking lower than it otherwise would have been – most individuals have a strong preference to avoid Knightian uncertainty, a regularity known as the ‘Ellsberg paradox’.⁵²

IV

Having documented that the bank finally began to grow in a relatively steady fashion after 1720, we need to understand how this happened. The partners made loans as banks do, but in a particular eighteenth-century way. They kept cash reserves to preserve liquidity, and they had to extend loans in a way that preserved their solvency. The years between the Glorious Revolution and the South Sea Bubble contain enough loans to detail Hoare’s learning process. Since Hoare’s Bank moved to Fleet Street in 1690 and the surviving loan records start later in that decade, we have slightly more than two decades of banking activities. As we count them, Hoare’s Bank made about 800 loans in this time.

The bank reported loans in its register using two pages at a time. Credits were listed on the left-hand page and debits on the right-hand page. Each page was ruled in advance into several sections, where a customer’s transactions were recorded. Only the simplest transactions, however, consisted of a single loan and repayment. The fixed space often contains records of multiple payments and receipts that were organised by the bank as part of a single transaction. The modern experience where

⁴⁹ Julian Hoppit, ‘Financial crises in eighteenth-century England’, *Economic History Review*, 39 (1986); Hoppit, *Risk and Failure in English Business, 1700–1800*; Isabel Schnabel and Hyun Song Shin, ‘Liquidity and contagion – the crisis of 1763’, *Journal of the European Economic Association*, 6.2 (2004).

⁵⁰ Roger Lowenstein, *When Genius Failed* (London, 2001).

⁵¹ Epstein and Wang show that Knightian uncertainty can lead to multiple equilibria in asset prices, opening up the possibility of substantial volatility as a result of ‘animal spirits’ (Epstein and Wang, ‘Intertemporal asset pricing under Knightian uncertainty’).

⁵² Daniel Ellsberg, ‘Risk, ambiguity, and the savage axioms’, in *The Economics of Uncertainty*, vol. 2: *Uncertainty and Dynamics*, ed. John D. Hey (1997).

interest is paid either regularly or at the end of a loan, signified by a single repayment of principal, describes some, but by no means all, of the bank's loan activities.

The clerks at Hoare's were meticulous in recording the titles and positions of their clients, although all classes were entered sequentially in the same register. Whether in the case of Lady Charlotte de Roye (borrowing £50 on a 'yellow brilliant diamond ring') or the Hon. Brigadier Hastings, the exact position was recorded. In the years before the South Sea Bubble, clients included *inter alia* Sir Samuel Barnadiston, governor of the East India Company, John Beaumont, geologist and Fellow of the Royal Society, Brooke Bridges, chancellor of the exchequer, Sir William Booth, commissioner of the navy, a bishop of Chichester, a director of the Bank of England, Sir Thomas Davies, Lord Mayor of London, the Countess of Dorchester and Edmund Dunch, the master of the royal household.

Bank clerks appear to have recorded loans in the following order. First, the loan itself as a credit, then repayments as debits. Finally, there is sometimes an entry on the credit side for the interest, seen as a claim by the bank on the borrower, which enabled the debits and credits to agree. The rate of interest was almost never recorded, nor was the term of the loan. Occasionally, the clerk would enter the agreed interest rate along with interest payments. In most cases, we can only infer the *ex post* rate of interest based on the payments recorded. This mode of record keeping makes it hard for the twenty-first-century economic historian to recover the interest rate being charged. It is an open question whether it made it hard for the early seventeenth-century banker to know what he was charging. One possible reason for this mode of record keeping may have been to avoid prosecution under the usury law that restricted interest to 6 per cent before 1714 and 5 per cent thereafter. We will see later, however, that Hoare's Bank generally was in compliance with the usury laws. This mode of record keeping instead may have been a holdover from Hoare's days as a goldsmith where making, pawning and selling jewellery were all part of a day's work. In that business, the interest received was of secondary importance and not recorded or often even charged.

The bank made a distinction between loans at interest and loans without interest in its balance sheets, but they were all entered sequentially in the loan register. We do not know with certainty if the bank decided that the interest rate would be zero at the time that the loan was made. It does, however, appear that the bank provided financing as part of its goldsmithing business, and that the granting of small, interest-free loans was an echo of this earlier practice. Other loans at zero (or negligible) interest are what we would call defaults, that is, loans of long duration which were paid finally by selling the collateral (typically jewellery) or by transferring the loan to a partner.

Many, but by no means all, loans were made against collateral assets. The collateral typically was jewellery at the start of the century, but increasingly it was stocks or bonds in the 1710s. Aristocratic borrowers were identified as such in the loan register, but they were recorded sequentially with other loans. Aristocrats may possibly have had easier access to credit in general, but they did not get segregated

into a separate account. London had become sufficiently egalitarian by 1700 for aristocrat and commoner to use the same bank in the same way.

The bank loaned against a wide range of collateral, ranging from a sword hilt to diamonds and plate, from mortgages to bonds, and from Westphalian ham to Tuscan wine. Depending on its assessment of a client's trustworthiness, it pressed for assets to back up the loan. Thus Richard Hoare wrote to Thomas Povey, Esq., who had asked for a loan:

The respect I always had for you makes me willing to comply with what you desire in your letter, but I hope that in my Patience & Civilitie will not doe me prejudice that if it shall please God to take you to himself . . . , you will now give me the satisfaction of one line to lett me know how I shall be paid.⁵³

If a client defaulted, the security deposited in exchange for the loan was often sold. Overall, the vast majority of clearly identifiable defaults in our dataset (12 out of 15) involved lending against jewellery, gold, silver or plate. This underlines the declining role of pawns in the activities of Hoare's Bank.⁵⁴

Collateralised lending constituted approximately half of total lending against interest for the firm. Table 2 shows the number of loans and their value, by type of security offered. The size and duration of most loans is similar to those at Child's, although the Whig Child loaned to the government far more than the Tory Hoare.⁵⁵ Transactions without collateral typically were relatively small, with an average value of £676. Secured loans were almost twice as large: £1,147. Loans without collateral also were relatively short; they were repaid after an average of 461 days, whereas some kinds of secured loans had substantially longer duration.

Table 2. *Loan values by type of collateral, 1692–1724*

<i>Collateral offered</i>	<i>Median value</i>	<i>Mean value</i>	<i>N</i>	<i>% of total</i>	<i>Value</i>	<i>% of total</i>	<i>duration (days)</i>
securities	1,000	2,214	53	8	117,342	20	497
mortgage	1,279	2,432	31	5	75,392	13	2013
plate	200	454	52	8	23,608	4	1411
bond	300	727	73	11	53,071	9	1121
note	100	610	26	4	15,860	3	594
penal bill	65	478	10	2	4,780	1	1667
other	170	883	34	5	30,022	5	444
none	200	676	378	58	255,528	44	461
total			657		575,603		

⁵³ Hoare, *Hoare's Bank*, p. 16.

⁵⁴ Since the collateral could be readily sold, it was also easier to identify the defaults.

⁵⁵ Quinn, 'The Glorious Revolution's effect on English private finance', table 4, p. 608.

Mortgages recorded an average duration of 2,013 days, comparable to some modern mortgages. The Marquis of Winchester, for example, borrowed £3,000, and only repaid after some 14 years. Legally speaking, however, mortgages had a six-month term, and could be recalled by the lender after that.⁵⁶

The composition of lending by security offered as summarised in Table 2 does not reveal the striking changes that occurred in the first decades of the eighteenth century. Loans against plate declined from 14 per cent of the total before 1700 to 3 per cent in the first decade of the new century to 1 per cent thereafter as Hoare's Bank became ever more distinct from Richard Hoare's previous enterprise. Mortgages were the single most important security offered in the years before 1710, accounting for approximately one-third of collateralised lending. Securities were also popular, and their importance grew significantly after 1710. Over half of all lending secured through assets held by the bank was in the form of securities in the years 1710–21, a period which contains the South Sea Bubble.

Loans without interest appeared alongside all other transactions, as part of the continuous records of transactions with all customers. In some cases, these loans were clearly designed to help overcome a temporary cash shortage. While the mean duration of 502 days suggests long-term lending, it is heavily influenced by a few outliers. The maximum length recorded was in the case of William Dobbs, who borrowed £40 in 1707 and only repaid in 1715. In a more typical case, on 14 April 1699, Madam Elizabeth Gough received £10, leaving candlesticks as collateral. According to the loan ledger, she returned the next day to repay the loan. The median duration of an interest-free loan was 84 days (versus 334 days for non-zero loans). The typical zero-interest loan lasted less than three months, while the median interest-bearing loan lasted almost a year.

Some transactions seem puzzling to the modern historian's eye. Ann and Catherine Goare borrowed £20 in August 1698, and repaid £20 8s in December (equivalent to an APR of 6.3 per cent – Hoare's evidently aimed to charge them 6 per cent interest). In February of the next year, the two Goares borrowed again, for the same amount, leaving the same type of collateral – a bond – and repaid some nine months later. This time, however, there was no charge for interest. The evolution and the payment details of non-interest-bearing loans at Hoare's casts doubt on Quinn's interpretation of them at Child's, a rival London bank.⁵⁷ He argued that these loans contained hidden interest charges, in an effort to circumvent the usury laws that limited the maximum interest rates that could be paid. In effect, according to this interpretation, the Goares would have actually only received a fraction of the £20, and then had to repay in full. We find no evidence to support this hypothesis in the case of Hoare's. Given that the bank had just completed a successful transaction with the Goares, receiving its money back on time and with interest, what

⁵⁶ John Brewer, *The Sinews of Power: War, Money and the English State, 1688–1783*, 1st US edn (New York: Alfred A. Knopf, 1989).

⁵⁷ Quinn, 'The Glorious Revolution's effect on English private finance'.

possible reason could there have been to charge a higher interest rate? Also, the bank recorded loans with interest separately from other loans on its annual balance sheet, again suggesting that the other loans were not interest-bearing. Average yields of 4–5 per cent on this portion of the balance sheet can account for almost all of the recorded profits.⁵⁸ Finally, in those years when the annual balance sheets recorded interest received separately, these must refer to ‘loans against interest’ – otherwise, the ratio of interest received to loans outstanding suggests that loans were charged interest below the usury rate.

The bank faced almost no problem with defaults. This was not the result of a diversified loan portfolio. Instead, low default rates were key. Over the period 1692–1724, there are only 15 cases that were clear defaults. The average value of these defaulted loans was £387, for a total loss of £5,817. There may have been other non-performing loans, not marked clearly as such in the loan ledger and so identified by us only as interest-free loans. We should note that our method of constructing a database of loan transactions may lead us to lose some cases. Whenever we could not match loans and repayments, we marked the loan transaction as incomplete. Cases in this category may contain some defaults. In general, however, we have clear indication whether a loan was in default or not – clerks would clearly mark the state of the loan if it was transferred to one of the partners, or if collateral was sold. Also, it may be the case that a few of the zero-interest rate loans of long duration were in partial default. Most long-term zero loans terminated with a clerk’s entry of ‘paid in full as lent’ or were followed by another loan, which rules out default. We obviously cannot know how many bad loans we missed, but we suspect the number is not large. Most interest-free loans were short, as we have noted, and there were only a few longer loans that may have been long by virtue of not being repaid as anticipated. Counting the length distribution of interest-free loans as defaults changes only the details of our conclusions. The bank’s strategy of selecting high-net-worth customers of impeccable social standing, instead of spreading its credit risk over a larger number of borrowers, apparently made good business sense. We do not know with certainty if bank failures were often caused by competitors having greater difficulty in identifying the right kind of customers, but Hoare’s did not appear to face this problem to any significant extent.

Lists of customers compiled at Hoare’s do not differentiate between those from the goldsmith’s business and those from the lending side. Overall, the acquisition of new clients seems to have been relatively rapid in the early eighteenth century. In the first decade, the bank was adding close to 100 customers per year. It slowed down markedly in the following decades, dropping to less than half the earlier rate. In addition to aristocrats, the bank also had extensive business with minor noblemen. In contrast to commoners, the number of new clients from the aristocracy, as

⁵⁸ This does not rule out that the bank could have made additional profits, and hidden them in annual balance sheets, too. Yet this would have been a highly complicated undertaking at a time when balance sheets were not published or audited and there were no taxes on profits.

well as minor noblemen, grew at a broadly steady rate. While the annual growth in the bank's client base slowed down, it also became increasingly blue-blooded.

V

We initially inferred the interest rate charged by Hoare's by solving

$$0 = \sum_{j=1}^N \frac{P_j}{(1+r)^{(d_j-d_0)/365}}, \quad (1)$$

where d_j = the j th, or last, payment date, d_0 is the first payment date, P_j is the j th, or last, payment, and r is the rate of return in question. This provides a good measure of a loan's profitability for the bank, and has been used by earlier authors.⁵⁹ However, we found that this method yielded many fractional interest rates that were hard to understand. Deviations in payment dates due to holidays, calculation errors, rounding of payments or time periods, as well as defaults, affected the calculated rate of return. But the calculated rates still did not fall into a pattern that would explain its complexity.

For a subset of loans, we know the intended interest rate from entries in the ledger. For example, Mrs Mary Kerwood took out a loan of £60 on 24 June 1692. On 16 January 1697, the clerk received a payment of £16.2, and entered '4.5 years interest on £60 to 24 Dec. last.' This suggests that the intended interest rate was exactly 6 per cent. The cash-flow method, however, implies that when Mary Kerwood repaid £61.3 of principal and additional interest on 4 May 1697, the internal rate of return (calculated by solving equation 1) for the bank was merely 5.5 per cent. The bank did not charge more, even though the borrower made the first interest payment after 4.5 years, instead of annually. Hoare's appears to have lacked the concept of compounding at this point in time. The bank, while learning other lessons of banking, did not abandon its reliance on simple interest.

Cases such as Mrs Kerwood are simple – we have direct evidence on the rate of interest. In column 1 of Table 3, we refer to cases such as this as 'direct information'.

Table 3. *Interest rates on simple loans by Hoare's Bank*

<i>Interest rate</i>	<i>Direct information on interest rate</i>		<i>Straight interest method on simple loans</i>		<i>Cash-flow method +/-0.5%</i>	
	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>
0%	28	21	163	29	197	23
5%	22	17	106	19	192	23
6%	74	56	175	31	272	32
Loans at 0, 5, and 6%	132	94	444	79	661	78

⁵⁹ Quinn, 'The Glorious Revolution's effect on English private finance'.

Where it is missing, we use two alternative techniques. For the subset of loans with a simple repayment (and no interim interest payments), we calculate the amount due under the assumption that an integer interest rate had been charged. The difference between actual and expected repayment in almost all cases is minimal; the vast majority of cases shows lending at 5 or 6 per cent (column 2 of Table 3, 'straight interest method').⁶⁰ Some of the smaller deviations are easily explained: the bank never accepted payment on Sunday, and we infer that they were not scrupulous about the day of the week on which they were paid, or perhaps on which they recorded a payment.

For all loans, including the more complex ones, we also report the results of internal rate-of-return calculations using equation 1 (referred to as the 'cash-flow method'). Since the latter is subject to various errors, such as the erroneous assumption of compounding, we give the distribution of loans within a ± 0.5 per cent error band. The sample size differs between columns since not all methods can be used for all loans, and the percentage of loans with missing data is far larger with the two constructed methods than with direct information.

The vast majority of simple loans (444 out of 563 simple loans in our sample) were made at zero, 5 or 6 per cent. The most common interest rate was 6 per cent – by all methods. Changes over time are not recorded in Table 3, and we need to recall that most loans without interest were made earlier in the period and anticipate that most loans at 5 per cent were made after the reduction in the usury rate in 1714. The results from the straight interest-rate calculations reinforce the impression from the other two methods – loans at 6 per cent are more common than loans at 5 per cent, and zero-interest-rate loans are an important component of simple loan transactions.

It is instructive to compare the interest rates calculated by the three methods directly. When we have information on the *ex ante* interest rate recorded by the clerks, we can also calculate the inferred rate of interest via cash flows. The mean difference between the two is -0.16 per cent, and the median difference is precisely zero. In addition, the 'straight interest method' and the directly observed interest rate agree in every one of the ten cases where the two samples overlap. This strongly suggests that most deviations from 5 or 6 per cent are the result of spurious influences like clerks' errors, lack of compounding and rounding. Initially, Hoare's simply lent at 6 per cent in almost all cases where interest was charged. When the usury rate was reduced to 5 per cent in September 1714, the bank followed immediately and entered the evidence for this in its ledger books.

The lack of compounding benefited the bank for loans of less than a year's length, and it cost the bank money on credit extended for a longer period. Additional rounding errors and the like sometimes cost the bank money and sometimes benefited it. A typical case is Simon Harcourt, borrowing £500 on 20 February 1711. He repaid £503.61 in April, 43 days later. The cash-flow method suggests that the interest rate charged was equivalent to 6.3 per cent. Based on the legal maximum

⁶⁰ We also added the single-transaction loans where repayment amount was equal to loan value.

and with continuous compounding, the bank should have charged him £3.44 in interest instead of £3.61. Without compounding, the correct charge would have been £3.53. Rounding errors and the like therefore contributed nine pence to the bank's excess charges, and the compounding effect contributed another eight pence. The results, aggregated for all simple loans for which we reconstructed (non-zero) interest rates, are summarised in Table 4.

A positive value indicates that the bank should have collected a higher amount. The table shows that the bank initially did lose money on even the most basic loans, and did so on a non-negligible scale in its early years. For the first five-year period, the £40.86 lost were equivalent to 8 per cent of the value of all loans. In the next quinquennial, when our sample size is much larger, the bank lost more in absolute terms, but the total value is equivalent to only 0.55 per cent of the sum loaned. By the 1710s, losses were at negligible levels, and after 1715, the bank started to make money on its 'errors'.

The changes over time are largely the result of two factors. First, lack of compounding mattered most for very long loans; as the average duration of transactions fell, the bank lost less. Second, the bank improved its accuracy in rounding and calculating. By the end of the period, it often managed to 'err' in its own favour, that is, it would charge customers more than should have been the case had they calculated interest exactly. This change was driven by rounding in the case of relatively short loans – when customers borrowed for less than a year, they would sometimes pay rates that were very high. Overall, however, the peculiarities of its system never made a large difference to the bank's profitability. There does not seem to have been a strong incentive for the bank to adopt compound interest.

As Table 3 shows, there were a substantial number of loans without interest. If they are included, the average interest rate at which people received loans was always less than 6 per cent. In fact, most of the fluctuations in the 'average' are a

Table 4. *Accounting practices and their cost, 1690–1725*

Quin- quennial	Number of loans	Average duration	Average loss to Hoare's (in £) due to lack of compounding	due to other errors	total loss in £	in % of the balance sheet
1690	3	1,912.00	13.61	0.01	40.86	8.17
1695	28	891.64	1.57	0.05	45.45	0.55
1700	77	261.77	0.10	0.21	23.93	0.04
1705	68	290.47	0.05	0.11	10.88	0.05
1710	30	257.97	0.00	0.01	0.35	0.00
1715	47	199.02	-0.07	0.10	1.42	0.00
1720	25	263.64	-0.03	0.17	3.35	0.01
1725	3	219.00	-0.37	0.05	-0.96	-0.02

result of changing proportions of interest-bearing and non-interest-bearing loans. If the non-interest loans are excluded, then the meaning of an average interest rate becomes less clear; yet we capture the ‘typical’ cost of loans against interest (to the customers) much more adequately, showing the mode rather than the mean. We show the median interest rate on two types of loan in Figure 4. The top line refers to the median interest rate for all loans contracted by Hoare’s against interest; the bottom is the average for all loans. Including the zero-interest-rate loans markedly increases the volatility of the series. It also obscures the downward shift in interest rates that occurred after 1714, when the legal maximum was lowered from 6 to 5 per cent – which is clearly apparent in the first series.⁶¹ Hoare’s Bank’s increased profitability after 1720 was the result of better banking practices, not a rise in the interest rate it charged.

The frequent use of standardised interest rates also suggests that the loan market did not balance through changes in the interest rate. Contracted rates certainly did not adjust smoothly in response to demand and supply. Instead, times of greater or lower loan demand must have led to a tightening or loosening of borrowing criteria. The first kind of loans to be recalled were probably zero-interest loans. This is similar to what has been observed in modern credit markets, where there is also

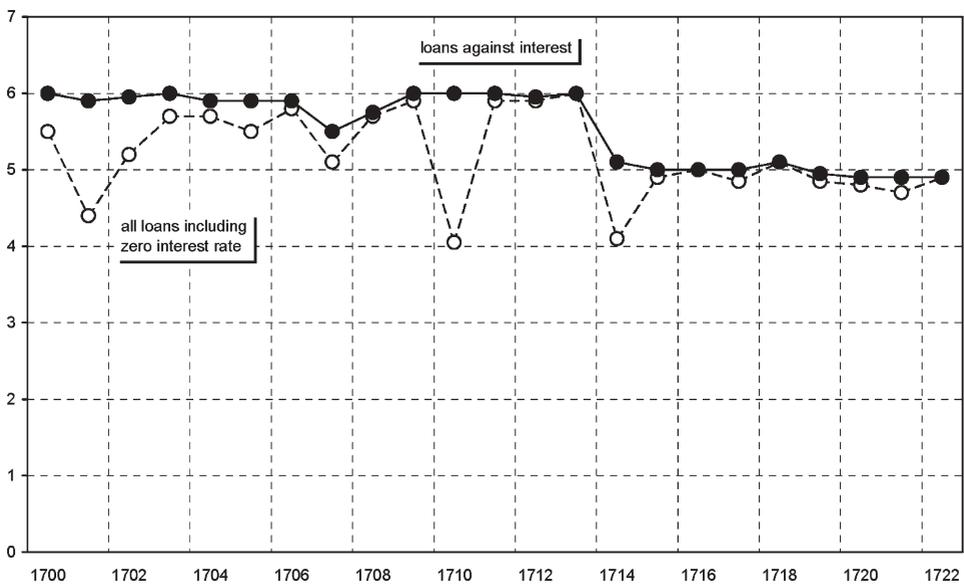


Figure 4. Two ‘average’ interest rates, Hoare’s 1702–25

⁶¹ When we estimate a median regression for the whole period, with the average interest rate on loans against interest as the dependent variable and a dummy for the ‘new’ usury ceiling from 1714 onwards, we obtain a coefficient of -0.9 , significant at the 0.1% level. This strongly suggests that the bank followed the new legal requirements rather closely, and that lending before and after 1714 was almost always at the legal maximum. For methodological background, cf. Roger Koenker and Kevin F. Hallock, ‘Quantile regression’, *Journal of Economic Perspectives*, 15.4 (2001).

abundant evidence of credit rationing.⁶² Thus, the average interest rate at any one point in time is unlikely to be a good indicator of scarcity in the market for private loans.

VI

We have been able to observe in detail the transformation of a goldsmith into a banker. While others made the transition earlier, the case of Hoare's is one of a first wave of goldsmiths that became successful providers of intermediation services to the public. Several aspects of this transition are important. First, it was not quick. It took two decades for Hoare's Bank to find a way to expand its banking business on any kind of regular basis. Second, it was not easy. There were crises in 1710/11 and 1720 that doomed other nascent bankers, and it was only through the skill and determination of Richard Hoare and his descendants that failure was avoided. Third, the process was one of learning a new business. The low profits before 1720 are best seen as foregone earnings in goldsmithing, invested in the knowledge needed to succeed in banking.

During the early eighteenth century, Hoare's did not differentiate the interest rate at which it was lending; it is possible that their competitors were also using standard rates. Using modern cash-flow based methods to back out interest rates is at variance with the simple interest calculations without compounding that we have documented for Hoare's. It is likely therefore that the argument made that other banks from the same period, such as Child's Bank, differentiated their interest rates based on the risk profile of borrowers and the duration of its loans is not accurate.⁶³ If our finding is correct and broadly applicable, then England in the eighteenth century – just like France – had a 'priceless' market for credit; it balanced through a process of rationing. In addition, the typical (median) private interest rate hovered around the usury maximum. This suggests that North and Weingast may have been wrong to use relatively small changes in the interest rate for government borrowing as an indicator of financial ease and constitutional change. Hoffman et al. may have exaggerated the contrast between Paris and London, at least at the start of the eighteenth century.⁶⁴ None of the new techniques applied by Richard Hoare and his partners and successors necessarily required any of the institutional innovations emphasised by North and Weingast.⁶⁵

Finally, the records at Hoare's provide us with a striking image of how business practices were adapted to use a new business model. Deposit banking is not an easy

⁶² Joseph E. Stiglitz and Andrew Weiss, 'Credit rationing in markets with imperfect information', *American Economic Review*, 71.3 (1981).

⁶³ Quinn, 'The Glorious Revolution's effect on English private finance'.

⁶⁴ Philip T. Hoffman, Gilles Postel-Vinay and Jean-Laurent Rosenthal, *Priceless Markets: The Political Economy of Credit in Paris, 1660–1870* (Chicago, 2000); Philip T. Hoffman, Jean-Laurent Rosenthal and Gilles Postel-Vinay, 'Private credit markets in Paris, 1690–1840', *The Journal of Economic History*, 52.2 (1992); North and Weingast, 'Constitutions and commitment'.

⁶⁵ The only possible exception is the use of government debt as collateral in loan transactions. We thank Stephen Quinn for this observation.

technique to master – profitability is often low, and risks can be high. We know that bank mortality in the early years of England's financial revolution was significant. Hoare's increased its cash reserves dramatically after 1720, suggesting that, while the bank was probably more cautious than some of its competitors, it anticipated runs on its deposits. Hoare's was cautious in its choice of loans as well as in its aggregate balance sheets. Default rates were very low – fewer than 1.4 per cent of loans were not repaid. Hoare's policy of knowing its (selected) customers well turned out to be more important than the potential benefits of risk diversification through a large portfolio of small loans.

This suggests that one key lesson learned by this nascent bank had to do with the nature of the potential crises it was facing – thus transforming 'Knightian uncertainty', when an activity is so new that entrants have no sense of the distribution of possible outcomes, into (calculable) risks. Before 1720, Hoare's wanted to protect itself from insolvency by devoting considerable amounts of equity. After 1720, the partners decided that their biggest risk was not insolvency – partly since they had changed the nature of their lending operations – but rather illiquidity.⁶⁶ They therefore reduced equity and increased cash reserves. Since loans are equal to equity plus deposits less cash reserves, ignoring other balance-sheet items, this change decreased the amount of loans the bank could offer for a given volume of deposits. They must have thought this was worth the opportunity cost. To be sure, Hoare's continued to use simple, not compound, interest, probably did not fix the duration of loans, and did not establish regular payment dates for its clients. As we have shown, its earnings did not suffer greatly from these elementary deficits, partly because the bank had changed the maturity profile of its lending. Learning and the evolution of England's financial system therefore operated through two channels – the successful adaptation of techniques at the level of the individual financial institution such as Hoare's, possibly as a result of old-style partners dying at a convenient time, and by 'Darwinian' learning at the aggregate level through the elimination of unsuccessful entrants.

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⁶⁶ The change in the composition of customers is documented in Peter Temin and Hans-Joachim Voth, 'Financial repression in a natural experiment: the change in the usury laws in 1714', *MIT Economics Department working paper* (2004).