

MIT Industrial Liaison Program

DEPARTMENT OF ECONOMICS

5-33-2004

The Speed of the Financial Revolution: Evidence from Hoare's Bank
Peter Temin and Hans-Joachim Voth, 50 pages.



MIT | ILP™

© 2004 Massachusetts Institute of Technology
May NOT be reproduced without permission

Massachusetts Institute of Technology
Department of Economics
Working Paper Series

**THE SPEED OF THE FINANCIAL REVOLUTION:
EVIDENCE FROM HOARE'S BANK**

Peter Temin
Hans-Joachim Voth

Working Paper 04-12
March 2004

Room E52-251
50 Memorial Drive
Cambridge, MA 02142

This paper can be downloaded without charge from the
Social Science Research Network Paper Collection at
<http://ssrn.com/abstract=516142>

The Speed of the Financial Revolution: Evidence from Hoare's Bank

Peter Temin and Hans-Joachim Voth

Abstract

Finance is important for development, yet the onset of modern economic growth in Britain lagged the British financial revolution by over a century. We present evidence from a new West-End London private bank to explain this delay. Hoare's Bank loaned primarily to a highly select and well-born clientele, although it did not discriminate against "unknown" borrowers in the early 18th century. It could not extend credit more generally because of government restrictions (usury limits) and policies (frequent wars). Britain's financial development could have aided growth substantially, had it not been for the rigidities and turmoil introduced by government interference.

Keywords: Financial Revolution, growth, finance, rationing, usury laws, institutional development, eighteenth-century England.

JEL classifications: E44, N23, N13, G21, G18, G28

The Speed of the Financial Revolution:
Evidence from Hoare's Bank

1. Introduction

Many scholars believe that finance is important for economic growth and that the English financial revolution around 1700 set the stage for the Industrial Revolution.¹ The timing and causes of changes in the financial system remain controversial, but there is little doubt that English financial markets were a backwater in seventeenth-century Europe and a leader in the eighteenth century. Yet the beginning of sustained growth in per-capita income was delayed until the middle of the nineteenth century, according to the most recent estimates. The beneficial effects of financial development have been confirmed in cross-section regressions and for the nineteenth century, but the application to early modern England contains an uncomfortable delay.² This paper tries to explain this gap of over a century between the financial revolution and the onset of intensive growth.

We argue that there was a disjunction between the microeconomic and macroeconomic changes taking place in eighteenth-century England. Financial markets and credit intermediaries were operating well at this time, but they were opposed by the macroeconomics of England's military adventures. Specifically, we assert that the London financial market functioned surprisingly well in the early 18th century, but it operated within the constraints imposed on it by the government's actions and policies. These constraints allowed enough room for the financial market to operate efficiently, but apparently not enough scope for it to promote economic growth.

We inquire into this process using a unique data set of individual loan transactions, preserved in the archive of a small goldsmith bank. We proceed by first reviewing the literature on the financial revolution and its link to economic growth. We then describe our data set and inquire into the nature of Hoare's customers. We look in turn at their identities, the terms on which they borrowed, the collateral they borrowed against, and the differential effect of credit rationing. Our case study clearly sacrifices breadth for depth, but this detail is necessary to understand this macroeconomic puzzle.

Our first conclusion is that the English credit system, even early in the 18th century, was relatively open. The accidents of birth and privilege do not appear to affect the terms on which people borrowed from Hoare's. Banking seems to have been surprisingly egalitarian in a still highly structured society. Our second conclusion, however, is that Hoare's Bank was constrained by the usury laws and hampered by government wartime borrowing.³ The result was a financial system that appears to work well if the microeconomics of specific lenders are examined, but one that was unable to provide the open access to credit on as large a scale as a fully-functioning peacetime financial system should do.

2. Literature review

There is agreement in the literature that there was a financial revolution in England around 1700. The particular nature of this revolution and its causes are in dispute, but not its existence. Different causes imply slightly different dates for the revolution, but all scholars date the revolution in a single generation. The canonical source is

Dickson. He located the source of the financial revolution in the British ability to tax effectively in the 18th century. The supply of revenue allowed the government to borrow, and financial development was the result. This line of thought has been amplified in several papers by O'Brien, who added the military ambitions of William to the mix as the deeper cause for the government's fiscal revolution.⁴ He also emphasized the political economy of taxation that underpinned the financial revolution.⁵ Note that while these authors, particularly Dickson, discuss the private financial markets, their primary attention has been to the government.

A more recent literature was initiated by North and Weingast, who argued that the accession of William itself was the stimulus for a financial revolution. Their evidence was a fall in the interest rate at which the government could borrow. According to their interpretation, the reduction in the legal usury interest rate from six to five percent in 1714 reflected a decline market interest rates, a result of lower risk premia. Their claims have been contested by Sussman and Yafeh, who argued that British government rates fell only after 1714 when peace returned to Britain. If there were changes in the financial system in 1688, the effects of this change were obscured by war, not spreading into the economy for another quarter of a century. Clark and Quinn also denied that private interest rates fell at all around 1688. All of the revisionists failed to find any breaks in private interest rates at the time of the Glorious Revolution.⁶ Carruthers, however, argues that the Glorious Revolution enabled the London stock market to grow, providing credit channels for the government and the largest private companies.⁷

This paper builds on these and related studies, although it asks a different question. Much of the recent literature has been negative, denying a historical break in 1688. Our paper is positive, asking how the private financial market operated in the early 18th century. We do not try to date precisely overall institutional changes, and we cannot trace back causes into wholesale governmental reorganizations. Instead, we evaluate how far the financial revolution extended into the British population at large in the years in and about that time, using micro-level evidence. We also ask if smaller changes in government policies affected the development of the domestic financial market.

We explore the details of the London money market through a detailed study of a single bank. Such a case study sacrifices breadth for depth, and there are good reasons to do so at this time. The studies noted above all have great breadth, but they cannot show the way in which people typically operated in the financial market. In addition, there were so few banks in the West End of London in the early 18th century that our single bank represents a larger sample of London private banking at the time than many samples of other populations. In the first years of the 18th century, there may not have been more than a dozen such banks; there were only two dozen or so by the end of our period.⁸

The key factors that affected the operation of the loan market were the usury laws. They limited interest rates to a legal maximum, with higher rates carrying heavy fines – up to three times the capital involved in the transaction.⁹ The extent to which the usury laws were obeyed is itself controversial. Ashton argued that evasion, while not impossible, was rare – penalties were high, and the chances of enforcing usurious

contracts were low. Clapham, on the other hand, argued that enforcement was feeble. Money brokers active in the bill market could charge commissions that raised the effective cost of borrowing, and private bankers found other ways of circumventing the law.¹⁰ There is also a question about the economic harm done by interest rate ceilings. Ashton argued that, especially during times of high credit demand, the demands of trade and industry could be crowded out very quickly as the market rate reached the usury limit.¹¹ Adam Smith, on the other hand, argued that as long as the maximum legal rate was fixed slightly above the market-clearing rate, it did no harm – and actually had beneficial effects, since it kept money out of the hands of “prodigals and projectors, who alone would be willing to give this high interest.”¹² There is therefore no agreement either about the usury laws’ effectiveness nor about their consequences. We require detailed micro-level data to pursue this question further.

3. Context and Background: Hoare's Business

Hoare's Bank was (and is) a private bank in the West End of London. Richard Hoare was a goldsmith who moved his business to Fleet Street in the 1690s and rapidly transformed himself from goldsmith to banker.¹³ The bank's balance sheet grew from some £150,000 in 1700 to £500,000 by the early 1740s. We have been able to examine loan ledgers from the early 18th century. This information can be used to shed light on the lending process at Hoare's, as well as on the nature of the bank's customers.

Lending at Hoare's

We inquire first into the terms on which people borrowed from Hoare's Bank. We have detailed information on individual loans, and each loan is an observation for us. There are, as we will explain, multiple loans to the same individuals. Our convention is to consider a transaction to be more than one loan if the principal is paid off between the transactions. If partial payments are made or additional funds are borrowed before the first loan is repaid, we consider all of these transactions to be one loan, albeit a complicated one. Neither financial practices nor accounting techniques in these seminal years of private banking were as neat as they would become later.

With few exceptions, Hoare's offered loans at the usury limit, or not at all. Figure 1 plots the distribution of loans by the interest rate charged. The two peaks are at the legal maxima for the period: 6 percent for the years up to 1714, and 5 percent thereafter. There were two exceptions to this general rule. Of those customers paying interest, a few borrowed at interest rates below the legal maximum. Also, some clients

borrowed at zero interest, normally for small amounts (and backed by readily saleable collateral such as candlesticks or jewellery). These exceptions decreased over time.¹⁴

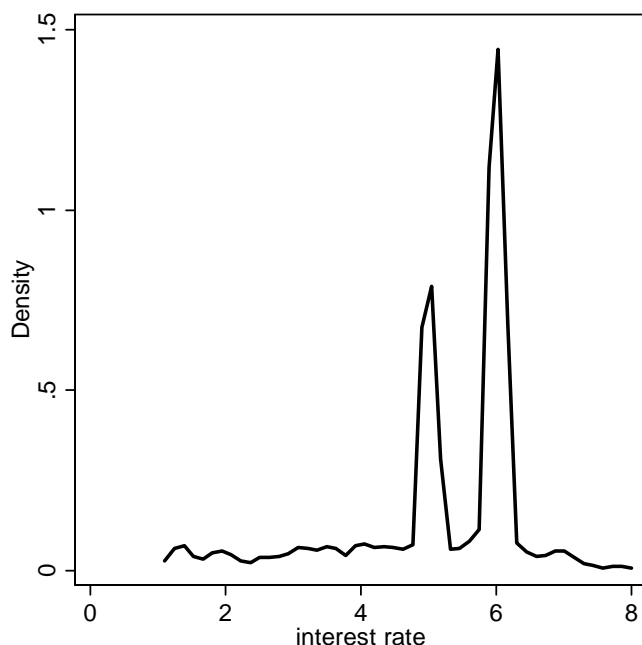


Figure 1: Distribution of interest rates, loans against interest¹⁵

If the interest rate did not vary in general, there had to be some other way to equilibrate this small market. In order to balance the supply of funds with demand for them, the bank had to ration credit. We can test for credit rationing by asking what we would expect if quantity restriction was *not* the key allocation mechanism. The interest rate for each loan then should reflect the scarcity of loanable funds at Hoare's and, in a competitive market, in the credit market more generally. To test this systematically, we regressed the interest rate on each interest-bearing loan from Hoare's Bank on the public interest rate.¹⁶ We included a dummy for the usury rate, which takes the value of one for 1715 and beyond when the usury rate was lowered to

5 percent. If the credit rationing hypothesis is wrong, we would expect a positive, significant coefficient on the public interest rate.

Table 1: Lending rates at Hoare's and public interest rates

	OLS	OLS	OLS	OLS	Median regression
i_{public}	-0.00011 (1.36)	0.000044 (0.55)	0.00005 (0.6)	0.000085 (1.2)	6.7e-3 (2.3)
Usury	-0.8*** (6.0)	-0.84*** (6.5)	-0.82*** (6.2)	-0.7*** (5.9)	-0.99*** (205)
Duration		-0.00025*** (6.6)	-0.00025*** (6.6)	-0.0002*** (6.7)	-0.00015*** (117)
Loanamount			-0.00004 (1.1)	-0.00006*** (2.2)	3.8e-6*** (3.2)
Collateral				0.12 (1.2)	
Adj. R ²	0.05	0.12	0.12	0.12	0.21
N	618	616	616	609	616

Note: Dependent variable is the loan rate on lending transactions at Hoare's, derived from the account ledgers at the bank (Temin and Voth 2003). Loans without interest are excluded. Heteroscedasticity-robust standard errors, clustered at the annual level.

Table 1 summarises the results. There is no evidence that the interest rate on government debt affected the rate at which people borrowed from Hoare's – the coefficient is positive or negative, depending on the specification used.¹⁷ In contrast,

the effect of the change in the usury rate emerges clearly in the regressions. When the rate was lowered by one percentage point, Hoare's lending rates fell by almost exactly that amount. The result is clear under OLS, and even clearer in the median regression. Hoare's rates were determined administratively, not by the market. The lack of a clear correlation between private and public sector lending rates calls the wide-spread practice of letting one proxy for the other into question.¹⁸ More importantly, there is no reason to think that interest rates on private loans were good indicators of overall scarcity in the credit market.

The results in Table 1 reveal a few other details of Hoare's practices. Larger loans were marginally cheaper, and longer loan durations were associated with slightly lower rates. This latter observation however should not be interpreted as a sign of an inverted yield curve, as some scholars have done.¹⁹ The effect is very small; an increase in loan duration by 1000 days was, on average, associated with a 0.2 percent lower interest rate, according to this estimate. Also, the bank did not use compound interest. Thus, the bank's internal rate of return on a loan necessarily was less than the rate it attempted to charge on all loans for more than one year.²⁰ If we use a subset of 151 loans for which we have the bank's intended interest rate (as recorded by the bank clerks in the loan ledger), we find a small, positive, and insignificant coefficient on loan duration.

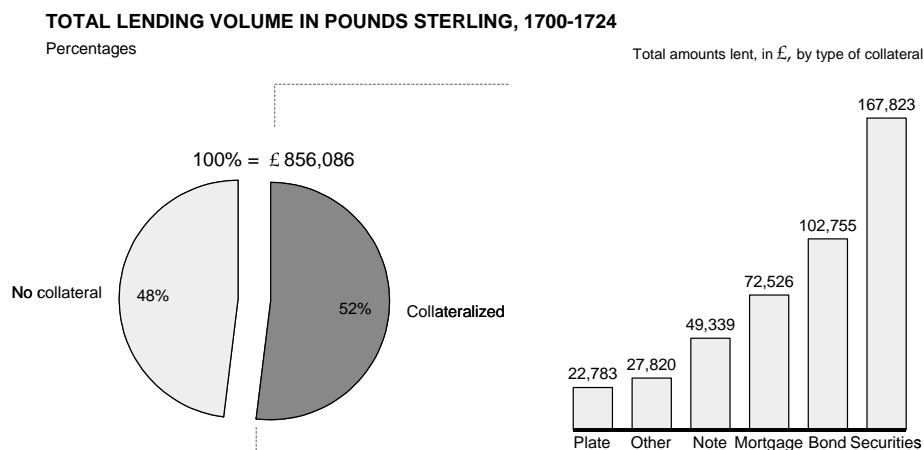


Figure 3

Note: In the case of mixed types of collateral, the loan was assigned to all categories.

Many of Hoare's loans were against collateral. The bank's origins as a goldsmith gave it an edge in assessing the value of plate. Nonetheless, this particular type of collateral quickly lost its dominance. The relative importance of various types of collateral is shown in Figure 3. During the first quarter of the eighteenth century, roughly half of Hoare's loans were against collateral. The total value of loans varied strongly by type of collateral. Unsecured loans were relatively small, but lending against penal bills, plate, notes and a person's bond also recorded low values. Lending against mortgages was very important initially, but quickly was overtaken by lending against securities. While only 12 percent of total lending was in the form of securities-backed loans in 1700-10, the proportion rose to 28 percent in 1711-24. The unusual market conditions during the South Sea bubble contributed to this, but they are not sufficient to explain all of the increase.

The evidence from lending rates and loan contracts shows a market that was kept in balance by quantity rationing. Interest rates were almost entirely invariant, even if some exceptions applied. Part of the rationing was clearly achieved by collateral requirements – many loans required the posting of security. We examine next how lending differed for individual subgroups.

Hoare's customers

Hoare's never had a large number of customers. Since we are looking at a single bank, this low number may be an indication of just how small it was in its early years. Yet our evidence suggests that the bank concentrated its lending deliberately in a small number of transactions, with a few customers. Over the period 1695 to 1724, the account ledgers contain the names of 721 individual borrowers, taking out a total of 1065 loans.²¹ After 1700, Hoare's served between 66 and 206 customers per quinquennial. Only a few of them took out large loans, and fewer obtained multiple loans. For those with access to credit, however, the sums involved could be considerable. In 1705-09, for example, the top twenty clients of the bank received 69 percent of all money lent. While the value of loans per customer was £1,040, lending to the top 20 involved average commitments of £6,009. Figure 2 plots the Lorenz curve for loan amounts, showing highly concentrated lending.²² The Gini coefficient is 0.73 – the bottom three quarters of loans did not even account for 25 percent of all loans. The top borrower, Marc Moses, received loans of £34,296, or almost 20 percent of all loans.

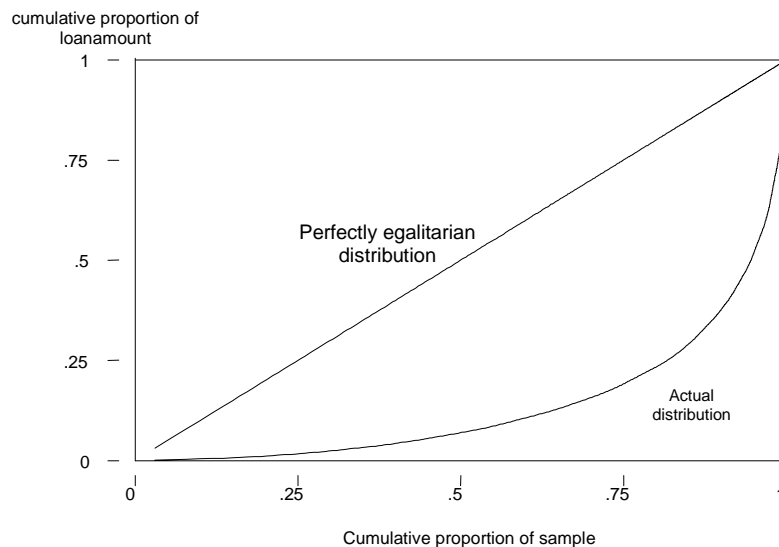


Figure 2: Lorenz Curve: Inequality of amounts lent

Loans to large borrowers were substantial relative to the size of the loan book. They also represented a significant concentration of risk. In most years, the largest 20 borrowers owed more money to the bank than the partners had in equity. When Hoare's made a loan of £22,865 to Marcus Moses in 1707, it was still owed £4,650 from a loan in 1706. Without having been repaid, the bank loaned Marcus Moses another £6,780 in 1708. Total equity in the firm amounted to £66,034 in 1708. All of these loans were offered without collateral, except for the last transaction, which involved a note. Had the bank's biggest client defaulted, the bank would have lost half of its capital. Clearly, Hoare's decided that lending to a small group of select, well-known customers made good business sense.

Who were the borrowers that obtained access to credit at Hoare's bank in the early eighteenth century? At first glance, the loan ledgers at the bank read like a *Who was Who* of the period. Earls and Dukes, Viscounts, Lords and Ladies appear with the same frequency as they would have done at the first ball of the season. Yet in the loan

ledgers – and in the list of largest borrowers – they appear side-by-side with commoners, down to the proverbial Mr. John Smith. To examine the background of Hoare's borrowers more systematically, we collected biographical information on the largest borrowers at Hoare's. To qualify, individuals had to be amongst the twenty largest borrowers in any five-year period. The resulting list of 103 names was checked against a number of standard sources; we identified 18 in Cokayne's *Complete Peerage*, 12 in the Dictionary of National Biography, 5 in Dickson's monograph on the financial revolution, and 1 from Carswell's account of the South Sea bubble. All of these people are considered "known" in the following regressions. The 67 borrowers not identifiable in standard biographical directories of the period received large loans. We surmise that they must have formed part of England's commercial and financial elite – borrowers whose wealth and earnings were above suspicion in the eyes of Hoare's, but whose standing in the country's class structure was not sufficiently elevated to gain access to the DNB or Cokayne's. This, in its own right, suggests that Hoare's did not only offer consumption loans to the sons of the nobility, or temporary liquidity for a few courtiers. Lists of the largest borrowers by decade are given in the Appendix. Of the top 20 borrowers in any five-year period, 6 on average borrowed in the following five year period, with a maximum of 10 – but they rarely remained on the list of Hoare's largest customers.

The impressions from the Appendix are investigated more systematically in Table 2, which offers a more detailed look at Hoare's lending to several non-exclusive groups of customers. Women received markedly smaller loans than men, and many of them appear to have been at zero interest. There are few women in our database – fewer than one in every ten borrowers was female. Clients listed in Cokayne's *Complete*

Peerage received the largest loans on average. At the same time, the proportion of loans against collateral was also unusually high. A more detailed analysis shows that the aristocracy's easier access to credit reflected the kind of collateral offered, not an inherent bias in Hoare's lending decisions. Repeat customers only received an average amount of credit, and they could borrow at zero interest with the same frequency as everybody else. They have one of the shortest average durations in our dataset, suggesting that the repeated use of Hoare's credit facilities was necessary to manage liquidity short-term. The one clear benefit that repeat customers received was a reduced need to post collateral – less than thirty percent did, compared to half for the aristocracy and one third in the sample overall.

Table 2: Basic statistics on loan characteristics, by borrower's characteristics

	All	Women	DNB	Titled	Cokayne	Repeat
Loan amount (in £)	848	187	1,655	919	2,193	876
Proportion zero loans	23%	27%	18%	24%	21%	20%
Duration (in days)	896	936	755	1,262	1,192	663
Proportion collateralised	36%	35%	36%	42%	50%	29%
N	1,065	104	120	144	52	432

Despite the relatively normal average loan amount, total exposure to repeat customers was substantial. The characteristics of loans are shown in Table 3 by the number of loans taken out by the same persons. Hoare's lent large amounts to customers that borrowed regularly. Five customers took out nine or more loans during our sample

period – less than one percent of the number of customers on which we have reliable information. Yet they received over nine percent of total lending volume. Fully two-thirds of Hoare’s lending was to repeat customers, defined as clients taking out more than one loan during the years 1690-1724. Since some of them probably had a business relationship before or after the end of our sample period (and since we did not consider loans to family members as repeat loans), this is a lower bound on the true importance of repeat customers.

Table 3: Lending to customers, by frequency of borrowing

Maximum of loan number	Number of customers	% of Total	Value per customer	Total loans	% of Total
1	431	68.3%	741	319,295	35.5%
2	109	17.3%	1,446	157,583	17.5%
3	40	6.3%	3,527	141,087	15.7%
4	17	2.7%	2,400	40,801	4.5%
5	17	2.7%	5,144	87,453	9.7%
6-8	12	1.9%	11,846	70,752	7.9%
9+	5	0.8%	16,429	82,143	9.1%
Total	631	100.0%		899,114	100.0%

Some of Hoare’s loans – 22 percent – apparently were at zero percent interest.²³ To the modern eye, this may appear puzzling. Child’s, another bank operating in London during the period, also made numerous loans without apparently charging interest.²⁴ Similarly, one quarter of the loans in rural India a century and a half later that were analysed by development economists were zero-interest loans.²⁵

We report in Table 4 a few regressions designed to understand the probability of borrowing at zero interest, the interest rate obtained if one was charged, and the length of loans. There is some evidence of Hoare's offering free credit more readily for first-time borrowers, but statistical results are not conclusive at standard levels of confidence (column 1). People who borrowed more than once were less likely to get loans without interest, and the drop in the usury rate decreased the prevalence of interest-free loans as well.

Table 4: Hoare's lending rate and its correlates

	1	2	3
Dependent variable	Zeroloan	Interest rate	Loan duration
Estimation method	Probit	OLS	OLS
Female	0.104 (0.66)	-0.13 (0.8)	-70 (0.9)
Aristocracy	0.06 (0.4)	-0.21 (1.25)	537*** (3.1)
New Customer	0.174* (1.72)	-0.17 (1.6)	331*** (2.9)
Multiple	-0.83*** (7.3)	-0.06 (0.5)	872*** (7.8)
Known	-0.003 (0.02)	-0.09 (0.6)	-334* (2.1)
Usury	-0.57*** (4.3)	-0.8*** (6.4)	-203* (2.0)
Collateral	-0.14 (1.4)	-0.07 (0.6)	600 (5.2)
Adj. R ²	0.09	0.06	0.16
N	935	671	666

*, **, *** indicate significance at the 90%, 95% and 99% level of confidence.

Dependent variable: in column 1, a dummy variable that takes the value of 1 if a loan at zero interest was made, and 0 otherwise; in column 2: interest rate ; in column 3, loan duration in days.

Interest rates did not vary much for customers that paid interest (column 2). Nor was the variation systematic. Members of the aristocracy were not particularly privileged in terms of borrowing cost, paying some 0.2 percent less than average – but the effect is imprecisely estimated, and might well be zero. The median interest rate paid did not differ for any group.²⁶ According to our OLS estimates, new customers paid a little

less, but the difference was minimal. Adding controls for loan amount and duration does not change these findings. The chances of obtaining a loan at no interest were also not directly influenced by the socio-economic characteristics of the borrowers.²⁷ While the clerks at Hoare's Bank were assiduous in noting the titles and social standing of their clients, credit appears to have been given on much the same basis to privileged and ordinary members of society, as shown in both Tables 2 and 4. The only firm conclusion from the second column of Table 4 is that interest rates fell sharply after the lowering of the usury limit in 1714 – as did the chances of obtaining an interest-free loan.

We examined the determinants of loan duration in the final column of table 5. Customers with multiple loans borrowed for longer, as did the aristocracy and new customers. The significance of the aristocracy coefficient is fragile – if we include controls for loan amount and the type of collateral offered, we obtain a t-statistic of 1.2 and a much smaller coefficient. The results for other variables are unaffected. Posting collateral was associated with loans that were repaid markedly later, but not consistently. It is possible that some of these loans were defaults, terminated after a suitable interval by sale of the collateral. Only some such loans can be identified clearly in our data, and the interaction of collateral and loan duration appears complex. These findings suggest that Hoare's offered remarkably broad access to credit and did not differentiate rates very much by the social standing of its borrowers in the chances of obtaining interest-free loans, the interest rates charged for loans, or the duration of loans.

Since interest rates were largely fixed, the main dimension in which the bank's trust of its customers could express itself was the value of a loan. We examine the impact of individual characteristics on loan amounts in Table 5. We report ordinary least squares regressions and median regressions, using the loan amount and the natural logarithm of the loan amount as dependent variables. In general, the log specification performs better – since our data are highly skewed, this is hardly surprising.

Table 5: Lending volume and individual characteristics

column	1	2	3	4	5	6
Dependent variable	Loan amount	Loan amount	Loan amount	Log (loan amount)	Log (loan amount)	Log (loan amount)
Estimation	OLS	OLS	Median regression	OLS	OLS	Median regression
Female	-661*** (3.3)	-474** (2.4)	-146*** (3.2)	-1.2*** (7.7)	-0.99*** (6.7)	-1.3*** (4.6)
Aristocracy	-259 (1.4)	-206 (1.1)	46 (1.1)	0.15 (1.1)	0.24* (1.7)	0.28 (1.1)
Minor	-225 (1.3)	-343* (1.98)	-50* (1.9)	0.15 (1.1)	0.06 (0.5)	0.28 (1.1)
Multiple	874*** (7.2)	775*** (6.5)	260*** (9.5)	1.1*** (11.6)	0.99*** (11.1)	0.99*** (5.9)
Known	999*** (5.4)	980*** (5.4)	250*** (40.1)	0.65*** (4.6)	0.6*** (4.5)	0.61** (2.5)
Mortgage		1178*** (3.8)			1.12*** (4.93)	
Plate		-311 (1.5)			-0.56*** (3.7)	
Note		117 (0.5)			-0.5** (2.8)	
Bond		180 (0.9)			0.05 (0.4)	
Penal bill		-300 (0.9)			-0.73** (2.2)	
Securities		1535*** (6.7)			1.35*** (7.9)	
Other		-260 (1.1)			-0.16 (0.9)	
Adj. R ²	0.08	0.13	0.04	0.18	0.26	0.1
N	1,059	1,059	1,059	1,059	1,059	1,059

Note: *, **, *** indicate significance at the 10, 5 and 1% level
R² in the case of median regressions is the Pseudo-R² statistic.

Hoare's Bank systematically lent less to women, it showed no significant favours to the aristocracy, lent the same amounts to new customers and old ones, and offered significantly more in the context of multiple stage loans.²⁸ The sign on the aristocracy dummy changes depending on the way the dependent variable is transformed, and it is not significant in the majority of specifications. Nor do these relationships simply proxy for the type of collateral offered by different groups of borrowers, as columns 2 and 5 demonstrate. Observable characteristics of the borrowers explain about as much as the posting of collateral by type does – between 5 and 8 percent of the total variation. Hoare's handed out greater amounts of money to persons of high social standing – those that we have been able to track down in the DNB and similar sources. We cannot claim that our results capture the attractiveness of customers for the bank completely, but we can trace some important differences. Lending volumes for individual sub-groups differed considerably, "known" customers borrowed 2.7 times as much as the average client, and multiple customers borrowed about as much. We also know that the impact of being a member of the aristocracy (or of the minor nobility) was small and uncertain. Overall, we are able to explain up to a quarter of the variation in loan value. By the standards of most historical work on lending decisions, this is a respectable number.²⁹

5. The impact of the usury laws

The English financial system, as reflected in the loan books of Richard Hoare and his descendants, was surprisingly open. There may have been few borrowers, and entire classes of citizens clearly had no access to credit. Yet the accidents of birth, of noble titles and royal connection were but a small factor in lending decisions. In the ledgers and even on the list of top borrowers, the likes of Marc Moses, a Jewish diamond

dealer from Hamburg, mingled freely with Dukes and Earls. In the few cases where we know the uses of the loans – such as for Marc Moses’s diamond business – there is also no apparent reluctance to lend for commercial purposes. What stood in the way of using the powerful machinery of deposit banking for industrial expansion?

We argue that the usury laws acted as one of the key constraints on the financial revolution’s effectiveness. The influence of the institution as such is hard to trace – it remained in force in England until 1854.³⁰ We can, however, use a policy change and its repercussions to get a better sense of the institution’s consequences. The legal maximum interest rate was lowered from 6 to 5 percent in 1714. North and Weingast argued that this change reflected a general decline in interest rates after the Glorious Revolution.³¹ We argue that this change had a major impact on Britain’s emerging banking system, and that the consequences were almost entirely negative. It led to a retreat into collateralised lending, reducing the efficiency of intermediation. Also, credit once again became more concentrated in the hands of a few wealthy borrowers. The same groups that had received loans on favorable terms continued to do so, but a much wider group of aspiring lenders that did not fulfill all of the criteria of an ideal borrower were at least partly cut off. What strides Hoare’s had made in widening access to credit were largely reversed after the lowering of the interest rate ceiling. Given the impact of a relatively small change in the maximum legal lending rate, the institution itself must have had much larger adverse consequences.

How would we expect a private bank to react to a forced reduction in the maximum interest rate it can charge? We already saw that this market balanced through changes in volume, and that the interest rate was identical for most transactions. Consider

Figure 4 as a highly stylized summary of the situation. The bank can earn interest of r on its lending of volume V , and has to incur a fixed cost F to set up the loan – getting to know the potential client, learning about his or her trustworthiness, assessing collateral etc. The bank will clearly try to avoid lending less than M , since it cannot recoup its fixed cost through the revenue of rV . If r is now constrained to 5 instead of 6 percent, this will rotate the profit schedule downwards, keeping F fixed. Minimum lending to break even is now M' . The larger the fixed cost factor in early lending was, the larger the rightward shift of the minimum lending volume will be. In other words, since lending is essentially a fixed-cost business, serving customers below a certain minimum size is only worthwhile if the interest rate is high enough. The decline in the maximum permissible rate should have pushed borrowers at the margin out of the market that banks like Hoare's could profitably have served.

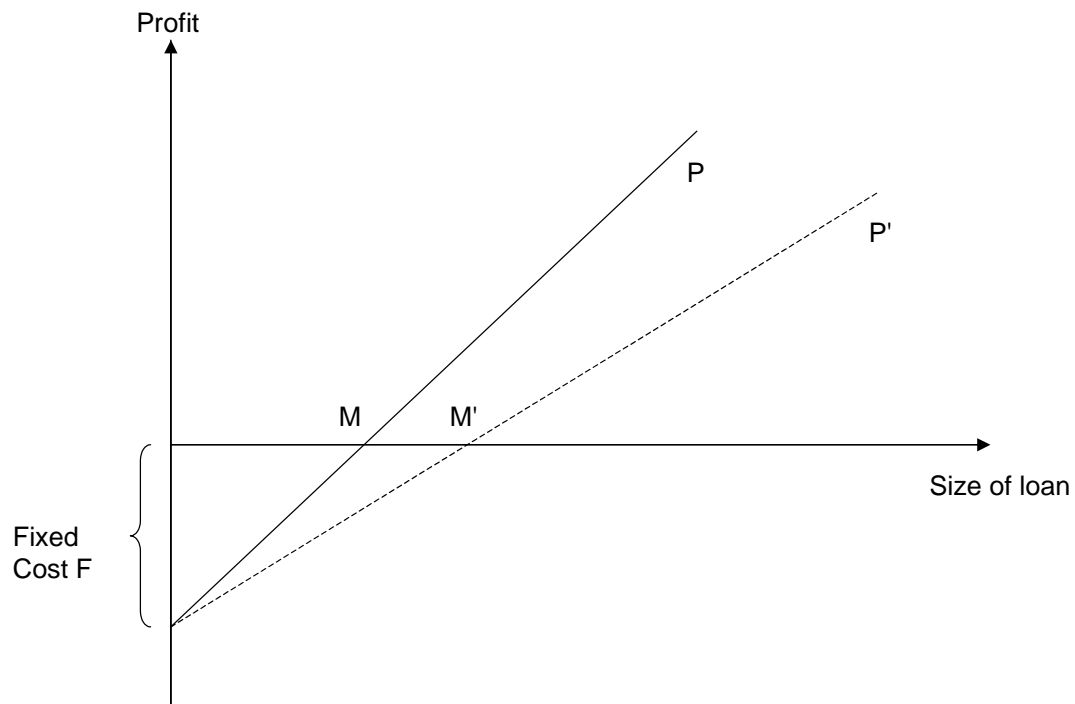


Figure 4

We first document the rise in average loan values, as predicted by our simple model in Figure 4. We then extend the same logic slightly to take account of additional borrower characteristics.

While those from noble backgrounds and with considerable wealth maintained easy access to credit, while smaller borrowers were cut off. This can be seen by a comparison of the amount of credit provided before and after 1714. Figure 5 shows the distributions, with the log amount lent on the horizontal axis. Two features stand out. First, the overall distribution markedly shifted to the right after the usury rate was lowered. Typical loan amounts rose markedly. Second, the distribution appears truncated on the left. After 1714, virtually nobody received loans for £20 or less, while plenty of borrowers had done so during the preceding decades.

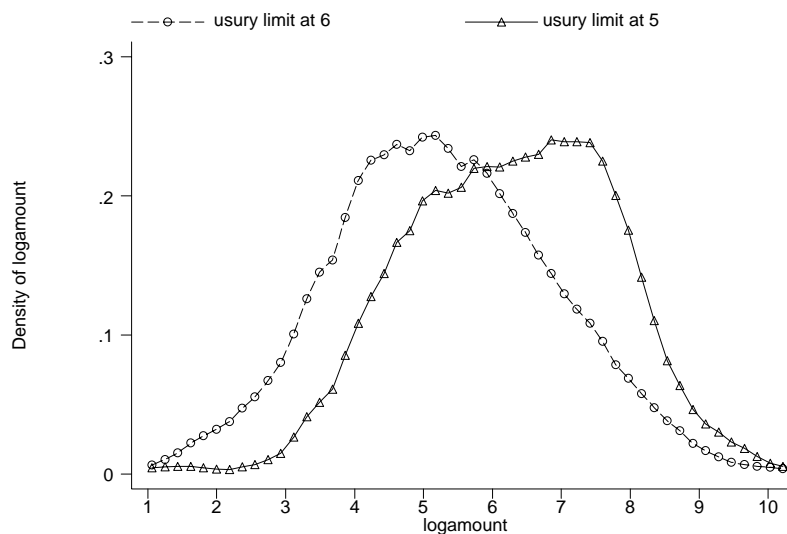


Figure 5: Distribution of loan size (in logs) before and after the 1714³²

If some borrowers received much bigger loans after 1714, who were they? And who lost out in terms of access to credit? The number and concentration of Hoare's

borrowers is shown by quinquennia in Table 2. There were only a few borrowers in the first five years of the bank’s existence, and this period is not illuminating. In the period 1695-1714, however, lending was becoming less concentrated. The share of the top 20 borrowers declined steadily from above 90 percent of the total loans to less than 40 percent. The same broad trend emerges if we examine the share going to the top ten percent of borrowers (to adjust for changes in total number of clients served). After 1714, however, the earlier trend towards a more “egalitarian” loan allocation suffered an abrupt reversal according to both measures of concentration. The concentration on top borrowers returned to the high levels not seen since the 1690s. In the years 1720-24, four pounds sterling out of five lent by Hoare’s went to one of the twenty largest borrowers.

Table 6: Lending to top borrowers, 1690-1724

		1690-94	1695-99	1700-04	1705-09	1710-14	1715-19	1720-24
Total lending		8,173	52,893	247,399	174,882	190,578	160,199	119,058
Number of borrowers		25	114	206	168	84	83	66
Top 20	lending	8,142	48,163	115,007	113,057	74,436	115,385	95,810
	in % of total	100%	91%	46%	65%	39%	72%	80%
Top 10%	lending	6,177	41,496	139,097	115,310	57,244	75,306	62,348
of borrowers	in % of total	76%	78%	56%	66%	30%	47%	52%

The same logic also drove the bank back towards discriminating in favor of the more privileged groups of borrowers. During the period 1695-1714, Hoare’s lent relatively freely across social groups. Yet overall, its customers continued to be much more blue-blooded than the English population at large. The reason is obvious enough – some of the costs conceptualized as part of the fixed cost element in figure 4 were

markedly smaller for groups whose wealth (in directly observed assets like land, for example) was common knowledge, and whose standing and financial position was the talk of town. With an artificial constraint on the maximum interest rate to be charged, those of lesser social standing would be the first to lose out in the credit market, for the essentially the same reasons as before – the upside in terms of interest was now too limited to serve them.

We used the patterns in table 5 to construct an index of customer attractiveness. Based on the observable characteristics and the extent to which they co-vary, we calculated a single score using principal components analysis. We then tested if the advantage of being a favoured customer – in terms of the amount of money lent – differed before and after the reduction of the usury limit. Table 7 shows the results of OLS and quantile regressions for a variety of subperiods. Columns 1-3 and 7-9 show conditions before the change in the usury rate; the other columns reveal conditions after the usury rate reduction.

The return to “desirable” characteristics went up dramatically after the reduction of the interest rate ceiling. One “unit” on our attractiveness scale was worth £230 before 1714, and £866 thereafter. Someone at the 90th percentile of the attractiveness distribution would have received 240 pounds more than someone at the median before 1714; after the change in the usury laws, the difference was 904 pounds. A similar result becomes apparent if we simply look at the returns to being “known” – be it through an entry in the DNB, in the *Complete Peerage*, or in one of the standard histories of the period. Before the lowering of the interest rate ceiling, those of elevated social status received an average of £652 extra, or roughly double the

average amount. After 1714, the additional credit made available amounted to £1,846, giving borrowers loans almost three times the average size. These results also hold if we use quantile regressions, estimated at the 75th percentile, to examine how access to the larger amounts of credit changed before and after 1714.

Table 7: Lending volume, by borrower characteristic and subperiod

	OLS						Quantile Regression*					
	1	2	3	4	5	6	7	8	9	10	11	12
	1700- 1713	1700- 1713	1709- 1713	1714- 1730	1714- 1730	1714- 1721	1700- 1713	1700- 1713	1709- 1713	1714- 1730	1714- 1730	1714- 1721
Attractive	230 (2.1)			866 (3.7)			256 (3.4)			454 (1.1)		
Known		652 (3.4)	1064 (2.74)		1846 (4.7)	2152 (4.6)		515 (4.5)	788 (2.8)		1500 (2.3)	2100 (3.2)
C	705 (10.7)	613 (8.7)	508 (3.4)	1304 (9.2)	1049 (6.9)	1033	556 (12.1)	500 (12.0)	500 (4.6)	1628 (7.1)	1500 (6.3)	1400 (5.6)
Adj. R ²	0.0042	0.013	0.05	0.05	0.08	0.09	0.011	0.02	0.02	0.007	0.03	0.05
N	813	813	813	246	246	202	813	813	130	246	246	202

Note: *quantile regression estimated at the 75th percentile.

A difficulty of inference arises from the general trend towards higher loan amounts over the period. We might confuse the effects of the usury laws with broader changes, but the empirical evidence allows us to discriminate between them. In a regression of loan amount on a time trend and a dummy variable that takes the value of one after 1714, and zero before, both are significant – and the jump at the time of the usury limit reduction is 77 times larger than the time trend. More importantly, if we restrict our comparison to a handful of years either side of the change in the law in 1714, there is no longer a significant time trend – yet we find very similar effects, with the returns to being “known” rising markedly after 1713.

Access to credit became harder for those borrowers who did not belong to England’s social elite. Yet even for those lucky enough to obtain a loan, they became less useful. There is one further dimension in which the lowering of the interest rate ceiling made life harder on borrowers – average maturities declined sharply. While loans lasted for 964 days before 1714, average duration fell to 672 days afterwards.³³ Again, the change was much smaller for the more privileged groups. For those “known” in our dataset, the average duration only declined from 851 to 732 days.³⁴ This decline in loan length can be observed over the entire range of the distribution, and is not driven by a few outliers. Investments in England’s nascent industries would have required much longer commitments than two or three years. The change in the usury limit, and the contemporaneous decline in loan maturities suggest that banks found it much harder to provide long-term financing when they were operating under increasingly stringent interest rate controls.

The move from collateralised lending to unsecured intermediation is a key step in the evolution of a financial system. Its economic importance should be obvious – in the case of collateralised lending, banks only increase the liquidity of borrowers. Once unsecured loans can be obtained, the system provides true intermediation services, and allows borrowers access to capital that they did not yet own – the financial system begins to provide true transfers of funds across people and time. Hoare's origins as a goldsmith facilitated its transition to being a bank because it had an edge in appraising the value of collateral – plate in the majority of cases. As time went by, the bank learned to make unsecured loans, as shown in Table 8. In the 1690s, the majority of loans was against collateral – in 6 out of every 10 transactions, the bank asked (and received) legal title to or the physical delivery of some item of value, normally equivalent to the total amount of the loan. The proportion fell as the eighteenth century wore on. In the first five years after 1700, the bank made over half of all loans without collateral, rising to three quarters in the second half of the first decade, and to 88 percent in the quinquennial immediately preceding the change in the usury law.

Once the usury limit had been lowered to 5 percent, however, uncollateralised lending as a proportion of the whole dropped sharply, to 60 percent. Relative to trend, the drop is even more dramatic, since there was a significant trend away from collateralised lending before 1714. If we analyse the value of loans instead of the number of transactions, a very similar story emerges. Hoare's initially lent more against collateral than without it, but by the third quinquennial of the eighteenth century, 90 percent of loan value was not secured

by assets that Hoare's held or could lay claim to. The imposition of lower lending limits quickly threw the process into reverse. Before 1714, 61 percent of Hoare's lending by value was uncollateralised, and 39 percent was secured against assets; after 1714, the proportions were almost exactly reversed. Over the years 1715-24, collateral was almost as important in Hoare's lending as it had been in the first decade of the family's transition from goldsmith to banker.

Table 8: Collateralised and uncollateralised lending

		1690-99	1700-04	1705-09	1710-14	1715-24
By number	No	43	161	174	102	118
	collateral	26.7%	54.8%	72.2%	87.9%	57.0%
of loans	Collateralised	118	133	67	14	89
		73.3%	45.2%	27.8%	12.1%	43.0%
By value	No	17,326	135,086	101,447	85,684	90,822
	collateral	25.1%	54.6%	58.0%	89.5%	32.5%
	Collateralised	51,739	112,312	73,434	10,054	188,435
		74.9%	45.4%	42.0%	10.5%	67.5%

The lowering of the usury limit not only hindered progress; it led to a “roll-back” of earlier accomplishments. It is hard to know how this affected the bank, as opposed to putative borrowers. Hoare's Bank was still learning the craft of banking in the early decades of the 18th century. In the years just prior to the reduction in the usury rate, profits were often low. It must have been difficult for the partners to carry on in this new

business.³⁵ While we know about the bank's loans immediately after the change, balance sheets are missing and we cannot know the bank's profitability.

The importance of collateralised lending in the early decades of the eighteenth century should affect our assessment of the government's role in the evolution of securities markets. In the standard accounts of the financial revolution, the government's willingness and ability to honour its debts led to the rise of a large, liquid market in public securities. Individuals could now invest without having to worry about possible future liquidity shocks. Yet our evidence suggests that the role of the state in the rise of liquid secondary markets has been overstated. Hoare's loaned against securities long before consols became the benchmark security in English capital markets, and it did so with increasing frequency. Of the 140 collateralised loan transactions between 1700 and 1710, 22 (16%) were against securities. Between 1711 and 1724, this proportion rose to 38 out of 96 (40%). By lending volume, the shift was even more dramatic, as can be calculated from Table 6. In the first decade of the eighteenth century, securities were used to back 23 percent of the value of all loans against collateral. By the second decade, this proportion had risen to 62 percent.³⁶ Virtually none of these transactions involved government debt directly. Of the 72 transactions with securities as collateral in our dataset, only 11 involved annuities, lottery tickets (from the 1710 lottery), Exchequer bills, or Army debentures.³⁷ The rest consisted entirely of Bank of England stock, East India stock and bonds, or South Sea stock. By value, government collateral accounted for only 4.7 percent of total secured lending.

Hoare's practices therefore show that during the early stages of Britain's financial revolution, the availability of private securities was key. The rise of a liquid market in government debt became important only later in the eighteenth century. This strengthens the similarities of Britain's early financial development with the Netherlands.³⁸ At the same time, we need to acknowledge that the main purpose of the Bank of England and of the South Sea Company was to channel funds to the government – the South Sea bubble was principally an equity-for-public-debt-swap.³⁹ Even the shares used as collateral by Hoare's were mainly a form of government debt. Yet what matters for institutional development is the fact that shares made good collateral, and were used in much the same way as consols were from the 1750s onwards. Early eighteenth-century practices therefore suggest that equities would have been perfectly adequate for the development of a liquid secondary market. More fundamentally, the need for collateral itself was the result of the state's intervention in the loan market. Without ceilings on interest rates, collateralized lending would have probably continued to decline, in line with earlier trends. It is only because of the English state's desire to lower its own borrowing rate that private banks were prevented from charging a sizeable risk premium for loans, thus reinforcing the importance of collateral. This limited the ability of the financial revolution to truly raise funds, rather than to just add enhance liquidity. The introduction of consols only enhanced the efficiency of the latter, and even this gain must have been small, given how easy it was to borrow against shares.

The composition of borrowers, changes in the distribution of loan sizes and the re-emerging importance of collateral after 1714 all suggest that tightening of the usury laws

severely constrained the operation of England's financial sector. Their existence is probably one of the key reasons why the financial revolution had such a small impact on economic growth.

6. Eighteenth-century lending in a Third World Mirror

We traced the individual effects of regulations in the microeconomic evidence taken from Hoare's bank. An alternative approach is to compare industrialising Britain with cases where neither usury laws nor wartime borrowing interrupt intermediation. This of course requires an examination of a far different time period, the very recent past. Abhijit Banerjee emphasised six key features of credit markets in today's third world: large spreads between borrowing and lending rates, large variability of loan rates for different clients, large loans cost less, few defaults, wealthy creditors receive larger loans and borrow at lower interest rates, and production and trade are the main uses of credit. His data came largely from the Indian subcontinent in the 1980s and 1990s, as well as from some African and Asian countries.⁴⁰ Clearly, the institutions in these countries, their state of development, and the relevant technology all differ from eighteenth-century England. A comparison nonetheless can tell us something about the kind of financial system that could have existed three hundred years ago. Hoare's lending practices were remarkably similar in some respects, and dramatically different in others. Both money lenders on the Indian subcontinent and Richard Hoare and his heirs managed to keep defaults very low. In both cases, this is probably the outcome of active screening and monitoring. They both offered more generous access to capital for those from wealthier backgrounds. Amongst

the similarities, one could also add the importance of lending to borrowers who are well-known to the bank.⁴¹

The main differences all involve the pricing of loans – the size of spreads, the differentiation of interest rates by borrower characteristics and by loan amount. The key parameter used by lenders in the Third World today were not within Hoare's reach; the usury laws ensured that maximum interest rates were very low. Differentiating rates would have required lending at less than 5% (6%), and very few loans apparently were worth offering at such low rates. Missing from our 18th-century data is the bulk of the distribution of loans in poorer countries today – loans that are predominantly used for trade and production, at interest rates of 10-120%. The usury laws appears to have biased lending away from such uses and ensured that poorer groups of society (as well as those seeking funds for riskier, but potentially more productive investments) were excluded from the credit market. Those who received credit from England's emerging banks in the eighteenth century borrowed cheaply indeed; higher inflation in emerging markets cannot account for the differences between the interest rates paid by Hoare's clients and those in India and Africa.

While the state was the main beneficiary of the usury laws, the merchants and aristocrats to whom Hoare's lent in peacetime also benefited from low interest rates. Yet the hidden macroeconomic costs of such a system probably were large. Interest rates were restricted to very low levels, the length of a loan was uncertain, and a bank's deposits were prone to be withdrawn during frequent wars.⁴² Extending credit to illiquid entrepreneurs was

unlikely to be profitable. Small borrowers were not worth the efforts of banks since the high fixed administrative costs could not be recouped through interest charges. The same is true of almost all investments in riskier ventures.

7. Conclusions

Why didn't finance matter more for the Industrial Revolution? Why are there so few examples of intermediated finance that helped to start new businesses or the adoption of new techniques? Seventy years ago, Michael Postan argued that in England, "the reservoirs of savings were full enough, but conduits to connect them with the wheels of industry were few and meagre... surprisingly little of her wealth found its way into the new industrial enterprises..."⁴³ At first glance, the mystery deepens – most of the techniques that are necessary to run an efficient financial system were widely known (and used) in eighteenth-century Britain. Yet despite apparent demand for the banking services, the domestic banking sector as a whole stayed small. Borrowing remained the privilege of the few. It also did relatively little to facilitate long-term investment. Its main function seems to have been the financing of building and (possibly) agricultural improvements through mortgages, of consumption smoothing for the upper classes, and of trade for merchants.

The basic "technology" of deposit banking is old, and was well-known long before the eighteenth century. It was used increasingly after 1700. Yet the financial revolution that has attracted considerable attention was principally an improvement in the market for government debt. What would English private credit markets have looked like without

persistent state intervention in the lending process, and without the disruptive effects of wartime borrowing? The microeconomic evidence from Hoare's lending decisions as well as comparison with credit markets in developing countries today suggest that government interference hindered the growth of Britain's nascent financial system. First, the usury laws made it very hard to lend to any but the most privileged groups. It also delayed the move from collateralised to unsecured lending. Because of the usury laws, credit was rationed at the maximum legal rate. The lowering of the usury limit was designed consciously to reduce the state's cost of finance. It led to a re-feudalisation of the credit market. Before 1714, Hoare's had offered small and large loans, to borrowers of privileged and of relatively obscure background. After 1714, the returns on lending were lowered by government fiat, and hence, the bank lowered the risk profile of its lending. It retreated from uncollateralised lending, and concentrated on a small group of high-net worth customers that it knew well. At the same time, the average duration of loans also fell markedly, making it much harder to finance long-term projects with credits. One of our key conclusions is that the reduction in the usury ceiling in 1714 was not a reflection of the Glorious Revolution's benign consequences, as argued by North and Weingast. It was rather an institutionalized way in which the English state secured its own favorable access to credit. Combined with the restrictions on joint-stock companies enacted during the South Sea bubble, the state's regulations and economic actions did much to stifle the financing of private enterprise in eighteenth-century Britain.⁴⁴

Second, Britain's frequent wars hit the process of credit intermediation with great force. The development of the market for public debt, the key achievement of Britain's

“financial revolution,” was a double-edged sword. While greater liquidity of debt securities had its benefits, the wider context of the revolution in government finance proved harmful for private credit intermediation. Wars siphoned off funds that could have been used more productively elsewhere – an argument familiar from the literature on “crowding out.”⁴⁵ At Hoare’s, lending regularly fell below trend when war broke out.⁴⁶ Credit restrictions during wartime meant that the shadow cost of capital increased tremendously – at some points in time, funds could not be had for any money in the world.⁴⁷ More importantly, the continuing danger of war-induced liquidity crunches made the development of true long-term contracts much harder. These would have been necessary for financing capital formation. Banks, threatened with illiquidity every time wars broke out, sensibly decided not to offer them. Yet for the borrowers, this particular aspect made it almost impossible to use credit for the financing of long-term projects. Most investment is irreversible. The danger of loans being called in hung like Damocles’ sword over loan-financed projects. As noted in the standard economic histories of the period since Ashton, few of the Industrial Revolution’s defining projects were funded by outside sources of finance; none involved institutionally intermediated financing. This is much less of a puzzle once we analyse the contractual detail and the actual lending practices that evolved under the continuous threat of wartime financing and its implications for private lending. What the development of a liquid market in state debt gave with one hand, it took away with the other. Borrowers faced greater risks of illiquidity, while rentiers did markedly better.

One swallow does not a summer make, and one case study cannot refute a theory of economic growth. A case study however can show us how a financial revolution affected the economy. The early history of Hoare's Bank suggests that this kind of revolution is contained within a larger context. It can benefit economic growth if other factors do not get in the way, but not all by itself. Nor should we over-emphasise the importance of secure property rights after the Glorious Revolution. The financial revolution almost exclusively benefited the Hanoverian military state; a different kind of one might have benefited England's industrial transformation. The English government became a more reliable borrower, but its liberal access to credit retarded economic development. Progress that had been made in the financial sector in the years right after 1700 came to standstill or went into reverse. The disconnect between the pool of savings and the wheels of industry, noted by Postan and generations of economic historians, was mainly the result of heavy-handed state intervention.

References:

- Antràs, P. and H.-J. Voth (2003). "Productivity Growth and Factor Prices during the British Industrial Revolution." Explorations in Economic History **40**(1): 52-77.
- Ashton, T. S. (1959). Economic Fluctuations in England, 1700-1800. Oxford, Clarendon Press.
- Banerjee, A. (2001). "Contracting Constraints, Credit Markets and Economic Development." 47.
- Brewer, J. (1989). The Sinews of Power : War, Money and the English State, 1688-1783. New York, Alfred A. Knopf.
- Carruthers, B. G. (1996). City of Capital : Politics and Markets in the English Financial Revolution. Princeton, N.J., Princeton University Press.
- Carswell, J. (1960). The South Sea Bubble. London, Cresset Press.
- Clapham, J. (1944). The Bank of England: A History. Volume I: 1694-1796. Cambridge.
- Clark, G. (1996). "The Political Foundations of Modern Economic Growth: England, 1540-1800." Journal of Interdisciplinary History **26**(4): 563-588.

___ (2001). "Debt, Deficits, and Crowding Out: England, 1727-1840." European Review of Economic History 5(3): 403-36.

Dickson, P. G. M. (1967). The Financial Revolution in England: a Study in the Development of Public Credit, 1688-1756. New York.

Ferguson, N. (2001). The Cash Nexus : Money and Power in the Modern World, 1700-2000. New York, Basic Books.

Galassi, F. and L. Newton (2003). "My Word is my Bond -- Reputation as Collateral." University of Warwick working paper.

Gelderblom, O. and J. Jonker (2004). "Completing a Financial Revolution: The Finance of the Dutch East India Trade and the Rise of the Amsterdam Capital Market, 1595-1612." Journal of Economic History(forthcoming).

Ghatak, S. (1976). Rural Money Markets in India. Delhi, Macmillan.

Homer, S. and R. E. Sylla (1996). A History of Interest Rates. New Brunswick, N.J., Rutgers University Press.

Joslin, D. M. (1954). "London Private Bankers, 1720-85." Economic History Review 7: 167-86.

Levine, R. and S. Zervos (1998). "Stock Markets, Banks, and Economic Growth."

American Economic Review **88**: 537-558.

McMillan, J. and C. Woodruff (1999). "Interfirm Relationships and Informal Credit in

Vietnam." Quarterly Journal of Economics **114**(4): 1285-1320.

Mirowski, P. (1981). "The Rise (and Retreat) of a Market: English Joint Stock Shares in

the Eighteenth Century." Journal of Economic History **41**(3): 559-577.

Neal, L. (1990). The Rise of Financial Capitalism. Cambridge, Cambridge University

Press.

North, D. and B. Weingast (1989). "Constitutions and Commitment: The Evolution of

Institutions Governing Public Choice in Seventeenth-Century England." Journal

of Economic History **49**(4): 803-32.

O'Brien, P. (1988). "The Political Economy of British Taxation, 1660-1815." Economic

History Review **41**(1): 1-32.

____ (2001). "Fiscal Exceptionalism: Great Britain and its European Rivals -- From Civil

War to Triumph at Trafalgar and Waterloo." LSE Economic History Working

Paper **65**.

Postan, M. (1935). "Recent Trends in the Accumulation of Capital." Economic History Review **6**(1935).

Quinn, S. (2001). "The Glorious Revolution's Effect on English Private Finance: A Microhistory, 1680-1705." Journal of Economic History **61**(3): 593-615.

Rousseau, P. L. and R. Sylla (2001). "Financial Systems, Economic Growth, and Globalization." National Bureau of Economic Research Working Paper **8323**.

Smith, A. (1982 [1776]). An Enquiry into the Nature and Causes of the Wealth of Nations. London.

Sussman, N. and Y. Yafeh (2002). "Constitutions and Commitment: Evidence on the Relation between Institutions and the Cost of Capital." unpublished manuscript, Hebrew University, Jerusalem.

Temin, P. and H.-J. Voth (2003). "Banking as an Emerging Technology: Hoare's Bank 1702-1742." MIT Economics Department working paper.

____ (2004). "Credit Rationing and Crowding Out During the Industrial Revolution: Evidence from Hoare's Bank, 1702-1862." MIT Economics Department working paper.

Williamson, J. G. (1984). "Why Was British Growth So Slow during the Industrial Revolution?" Journal of Economic History **44**(3): 687-712.

Appendix

Table A1: Largest borrowers (in top 20 in a five-year sub-period)

Rank	1695-99		1700-04		1705-09	
		Sum of loans		Sum of loans		Sum of loans
			(Richard Hoare*)	27,290		
1	William Waterson	7,250	Richard Bull	12,377	Marcus Moses	38,676
2	Sir Thomas Doleman	6,764	Thomas Cooke & Samuel Dashwood	13,939	Richard Bull	18,732
3	William Benson*	6,156	George Wright	8,268	Gibbons Bagnall	6,240
4	William Sydenham	4,500	Nathaniel Herne	7,500	William Benson	5,655
5	Thomas and Lady Alington*	3,232	Charles Hedges*	6,500	John & Walter Plumer	5,400
6	Earl of Feversham*	3,153	Sir Richard Onslow*	6,124	(Richard Hoare* & Gibbons Bagnall)	5,396
7	James Selby	3,100	Earl of Burlington	6,093	Henry Bellasyse	5,300
8	Duke of St. Albans*	2,600	Earl of Radner*	5,050	John Meres	5,000
9	Francis Clarke	2,181	Thomas Powell	5,000	Simon Harcourt	4,587
10	John Austin	1,360	Abraham Beake	5,000	John Lund	4,500
11	John Parkhurst	1,200	Sir Gilbert Keate	5,000	Edward Colston*	3,283
12	Lord Brooke*	1,050	John Mendez de Costa*	4,860	John Goggs	3,200
13	Henry Johnson	1,000	Smitt Berzenj	4,190	Jeremy Gough	3,000
14	Francis Bosfright	900	Earl of Abington*	4,000	William Gardner	2,100
15	Lord Russell	800	Francis Clarke	3,800	Samuel Waters*	2,000
16	Wragg & Co	729	Whitlock Bulstrode*	3,600	Francis Annefley	2,000
17	Lady Nevile	600	William Jolliffe	3,506	George Planeton	1,770
18	Thomas Wharton*	550	John Cartlitch	3,500	William Stocker	1,754
19	Thomas Foley*	538	Ralph Freeman	3,500	Francis Gailer	1,600
20	Tregonelle Frampton*	500	Master Streynsham	3,200	John Cartlitch	1,500
21	Henry Lyell	500			John Cumberlige	1,500
					Robert & Madam Cecill	1,500
					Edward Haistnell	1,500
					John Cartlitch	1,500

Note: * identified.

Rank	1710-14		1715-19		1720-24	
		Sum of loans		Sum of loans		Sum of loans
1	Samuel Clarke*	16,000	Lord Bingley*	19,327	Earl of Burlington	17,741
2	William Burslem	8,350	Ferdinand Humerz	10,000	Lord Carlton*	17,000
3	Charles Casar	8,011	Gregory Page*	10,000	Samual Clarke*	8,500
4	Jeremey Gough	7,800	Martin Killigren	8,300	Richard Groire	6,005
5	Samual Hayes	5,850	Elias Paz*	7,860	Anthony Duncombe*	5,000
6	Nathaniel Castleton	4,900	Mire Bolock	7,000	Dennis Kelley	4,480
7	(Richard Hoare)	3,333	Thomas Pearce	6,919	Lord Ashburnham	3,622
8	Sir William Benton	3,000	Samual Clarke	5,900	John Foster	3,533
9	Edward Jennings	3,000	Duke of Newcastle*	5,000	Thomas Pritchard	3,200
10	William Harvart	3,000	Thomas Pritchard	4,830	Lord Percival*	3,000
11	Simon Harcourt*	2,200	Anthony Meeke	4,500	Thomas Sidney	2,900
12	John Rooper	2,200	Robert Chester*	4,000	Richard Ellis	2,700
13	James Marie	2,070	Guide & Company	3,800	William Rea	2,525
14	John Lund	1,500	Edmond Dunch and Sam Hayes*	3,000	John Finch	2,504
15	Edward Colston	1,288	John Eliston	3,000	Henry Heron	2,500
16	Duke of Kingston*	1,200	Thomas Beare	2,719	Francis Groyne	2,100
17	Thomas Cooke	1,067	John Smith	2,600	Thomas Foley*	2,500
18	Richard Bull	1,000	Thomas Gritehand	2,370	John Ward*	2,000
19	Allen Brodrick*	1,000	Lord Ashburnham*	2,260	Duke of Kingston*	2,000
20	Mary Rome	1,000	Brigadeer Windsor	2,000	John Poole	2,000
21	Hollis Gilham	771	Samual Benson	2,000	Stuart & Robert Pitt*	2,000
22			Edward Sheppard	2,000		
23			William Rea	2,000		

Note: * identified.

¹ Dickson 1967; North and Weingast 1989; Neal 1990.

² Levine and Zervos 1998; Rousseau and Sylla 2001.

³ For an analysis of the macroeconomic implications, see Temin and Voth 2004.

⁴ Dickson 1967; Ferguson 2001; O'Brien 2001.

⁵ O'Brien 1988.

⁶ North and Weingast 1989; Sussman and Yafeh 2002; Clark 1996; Quinn 2001.

⁷ Carruthers 1996.

⁸ Joslin 1954.

⁹ Ashton 1959.

¹⁰ Clapham 1944; Ashton 1959.

¹¹ Ashton 1959.

¹² Smith 1982 [1776].

¹³ Temin and Voth 2003.

¹⁴ Temin and Voth 2003.

¹⁵ Epanechnikov kernel estimation with width 0.2.

¹⁶ This is derived by combining the interest rates from Sussman and Yafeh 2002 and consol rates (see below for details).

¹⁷ Even when positive, it is very low – a rise of 10 percent in the interest rate on government debt would have raised the median lending rate by 0.000067 percent, according to the quantile regression in table 1.

¹⁸ Antràs and Voth 2003.

¹⁹ Quinn 2001.

²⁰ Where possible, we corrected this by calculating simple interest. In the case of some of the more complex transactions involving multiple, unequal repayments at irregular intervals, this was not always possible.

²¹ Not all of these can be used for our subsequent analysis because of missing observations for individual variables.

²² As we explain below, this is a lower bound on the inequality of loans by borrower – the big borrowers were also more likely to be repeat customers.

²³ This is equivalent to 12 percent of lending volume.

²⁴ Quinn 2001.

²⁵ Ghatak 1976.

²⁶ We ran a median regression, but all coefficients except for the usury rate dummy were insignificant.

²⁷ This is similar to findings for nineteenth-century English banks – Galassi and Newton 2003.

²⁸ We ran the regression for alternative subperiods, and found essentially unchanged results. In particular, for the period before the lowering of the usury limit, we found comparable (if smaller) effects.

²⁹ Galassi and Newton 2003.

³⁰ They were effectively repealed in 1833, when short bills were exempted. Cf. Homer and Sylla 1996.

³¹ North and Weingast 1989.

³² Epanechnikov kernel estimation with width 0.5.

³³ Loans against interest fell in duration from 1099 days to 717 (means), and from 393 to 332 (medians).

³⁴ We assume that the decline in length is driven by Hoare's decisions, not borrower preferences. It may well be the case that Hoare's preferred to lend to customers whose borrowing needs were temporary, and that it increasingly discriminated in their favor after 1714.

³⁵ Temin and Voth 2003.

³⁶ If we exclude 1720, the year of the South Sea bubble, the proportion is 55 percent.

³⁷ In the earlier analysis, we excluded loan transactions before 1700 and after 1725 since our coverage is spotty.

³⁸ Gelderblom and Jonker 2004.

³⁹ Carswell 1960.

⁴⁰ Banerjee 2001.

⁴¹ McMillan and Woodruff 1999; Banerjee 2001.

⁴² Temin and Voth 2004.

⁴³ Postan 1935.

⁴⁴ Mirowski 1981.

⁴⁵ Williamson 1984; Clark 2001.

⁴⁶ Temin and Voth 2004.

⁴⁷ Brewer 1989.