# Financial Repression in a Natural Experiment: Loan Allocation and the Change in the Usury Laws in 1714

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ABSTRACT:    If financial deepening aids economic growth, then financial repression should be harmful. We use a natural experiment – the change in the English usury laws in 1714 – to analyze the effects of interest rate restrictions. We use a sample of individual loan transactions to demonstrate how the reduction of the legal maximum rate of interest affected the supply and demand for credit. Average loan size and minimum loan size increased strongly, and access to credit worsened for those with little 'social capital.' While we have no direct evidence that loans were misallocated, the discontinuity in loan receipts makes this highly likely. We conclude that financial repression can undermine the positive effects of financial deepening.

## I.    Introduction

When is financial development good for growth? Over the last ten years, a growing body of literature has argued that deeper, more liquid financial markets, more lending and borrowing, and more transparent accounting standards can raise productivity [Levine (1997); King and Levine (1993) ; Levine and Zervos (1998); Rousseau and Sylla (2003) ]. The rise of England's financial markets after the Glorious Revolution has often been cited as a case in point, most prominently by North and Weingast (1989) who argued that the institutional changes instituted after 1688 lowered risk premia and facilitated the financial deepening. In this paper, we argue that financial development also can be harmful—depending on the exact institutional details. In a bid to keep the rate of interest low, the Hanoverian government imposed a reduction in the usury limit in 1714. We test how this regulation affected the nascent financial sector. Using a unique dataset of individual loan transactions at an eighteenth-century West-End London bank, we show that loan misallocation can be caused by regulatory intervention. While fewer and fewer borrowers of more modest means and without political connections received loans, the standard measures of financial development indicate improvements over the period. Our findings indicate how a regulation can distort the allocation of credit, and they suggest a way of reconciling the "financial revolution" with growing evidence that growth over the period 1700-1850 was disappointing in view of the microeconomic changes taking place.

Macro studies, relying on the sum of liquid liabilities, stock market turnover, and the quality of accounting standards as explanatory variables, rarely offer conclusive evidence of causality. Micro-level evidence therefore increasingly has been used to resolve some of the more fundamental difficulties in establishing the nature of the link between financial development and growth.[1] Rajan and Zingales (1998) showed that industries in greater need of outside financing grow markedly faster in countries with more developed financial markets. Banerjee and Munshi (2001) examined the efficiency of capital allocation in the Indian garment industry. Banerjee and Duflo (2002) used a natural experiment to show that many firms in an Indian sample must have been severely credit-constrained since their profits increased sharply as a result of a directed lending program.

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[1] Wachtel 2003. The methodological background is discussed by Greif 1998.

Shaw (1973) and McKinnon (1973) argued that the quality of financial services was as important as quantity. Stifling regulation, which they called financial repression, could retard economic growth. In their view, governments often take away with one hand what they have given with the other by regulating new financial institutions excessively. Repression can take a variety of forms, such as minimum deposit requirements that serve to finance government borrowing, control of entry into financial services, forced lending, and the regulation of interest rates. While many LDCs liberalized their banking sectors in the 1990s, interest-rate regulation, government ownership, and directed lending remain common. These changes have been discussed in several papers. Demetriades and Luintel (1996), (1997) analyzed financial conditions and aggregate time-series evidence for India, arguing that financial regulations retarded economic growth on the subcontinent. Fry (1997) summarized the experiences with restrictions in several countries, and argued in favor of financial liberalization. These papers are case studies, drawing on the insights of Shaw and McKinnon. They create a presumption that financial repression can alter the relationship of finance and growth, but detailed evidence on the nature of linkages is still sparse.

We use a natural experiment in 1714 to examine how one particular form of financial repression – the regulation of maximum permissible interest rates – can distort loan allocations. We use a unique set of archival records on the lending decisions of a nascent goldsmith bank to describe how credit was allocated in the early eighteenth century. Exploiting a reduction in the usury limit for interest rates charged by banks to achieve identification, we compare lending behavior before and after 1714, when the permitted maximum rate was reduced from 6 to 5 percent per annum.[2] When the government changed the usury rate, Hoare's Bank drastically altered its loan allocation policy. We find that minimum loan size increased sharply after the reduction in the usury limit, in line with the predictions of a model of lending behavior with fixed costs. Discrimination in favor of wealthy and well-connected borrowers increased, suggesting that the bank sharply reduced the risk profile of its lending activity. We use quantile regressions and matching estimators to demonstrate the robustness of our findings. Finally, we document a retreat into collateralized

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[2] "From 29th Sept. 1714 Interest upon Loan of Money, &, at above the Rate of 5l. per Cent per Ann. Not to be taken." 13 Anne c. 15. *The Statutes of the Realm: printed by command of His Majesty King George the Third* (London: Dawson's, 1963), vol. 9, p. 928.

borrowing after the change in the usury law, in line with predictions. In combination, these findings suggest that even relatively small changes in government regulation of credit transactions can have drastic effects on loan allocations, fundamentally undermining the efficiency of the intermediation process.

Our results are important for two other bodies of literature. As Glaeser and Scheinkman (1998) note, usury laws have been common for much of human history. The laws of Hammurabi from the 2nd millennium B.C. regulated interest rates, as did the Old Testament and the Catholic Church. Many developing and Islamic countries and US states still impose limits on private loan contracts to stamp out predatory lending by 'credit sharks' [Glaeser and Scheinkman (1998); Homer and Sylla (1996); Blitz and Long (1965) ]. Glaeser and Scheinkman (1998) argue that the prevalence of usury laws cannot be explained as a result of rent seeking. They model interest rate restrictions as a form of insurance that transfers resources from states of the world where the marginal utility of income is low (when households are well-off) to states when it is high (after negative income shocks, etc.). Hence, usury restrictions can be Pareto-improving if income shocks are mainly temporary and idiosyncratic.[3]

Few studies have examined the effects of usury laws empirically, partly because economic historians traditionally believed that usury laws were rarely obeyed.[4] Yet there is growing evidence that, at least in some countries and periods, usury laws were strictly enforced, and that evasion was difficult and rare [Rockoff (2003); Tan (2001) ]. There also are substantial practical difficulties in tracing the effects of usury laws; conclusive studies require micro-evidence, which is hard to find for most of the historical periods when usury restrictions were in force.[5] And while regulations often remain unchanged, it is conceptually difficult to determine how lending decisions would have been made in the absence of constraints. We avoid these problems by examining one bank in detail during a change in the usury limit.

Our work also is related to the literature on England's 'financial revolution' during the early eighteenth century, and the causes of relatively slow growth during

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[3] An earlier literature stressed that the effects of usury laws were ambiguous, and depended on institutional detail and actual economic conditions [Blitz and Long 1965].A related study on the economics of consumer lending examine the effects of personal bankruptcy regulations in US states on lending decisions. Contrary to the stated intentions of policymakers, more generous state-level exemptions resulted in greater access to credit for wealthier households, and in tighter limits on borrowing by the less well-off [Gropp, Scholz and White 1997].
[4] One exception is Alessie, Hochguertel and Weber 2001.
[5] Existing historical studies do not analyse the economic impact in any detail (Shatzmiller 1990).

the classic period of the Industrial Revolution.[6] The usury laws may partly explain why English growth was so slow in the eighteenth century, despite a massive rise in financial depth. In England after 1714 at least, the usury laws did not offer a form of social insurance, and few loans went to the poor or to entrepreneurs. Instead, the primary beneficiaries were the English state and the political and economic elite, which received more liberal access to credit on more favorable terms.

We proceed as follows. The next section places the change in the English usury law in 1714 in its historical context and describes how our dataset was constructed. Section III derives testable implications from a basic model of lending behavior, and Section IV presents our main empirical results. Finally, we discuss the impact that the usury laws had on the institutional development of English credit markets by contrasting lending behavior between eighteenth century banks and those in LDCs today.

## II.    Data and Background

In this section, we give a brief overview of the legal context of the natural experiment that we exploit. We explain the origin of our data and the way it was collected, and provide a summary of some key characteristics.

*Usury laws in England*

Before 1545, lending at interest was outlawed, although the restriction did not apply to Jews and other marginalized groups. Henry III set a maximum rate of two pence per pound per week, equivalent to 54 percent per year, for transactions involving a Jew. From 1545 to 1552, a maximum rate of 10 percent applied to all transactions. Under Queen Mary, the taking of interest was once more outlawed in 1552. It was reinstituted in 1571 at a maximum permissible rate of 10 percent. This was lowered in three consecutive steps, to 8 percent under James I, to 6 percent in 1660, and to 5 percent in 1714. Throughout the period, punishment for transgressions was severe; the standard penalty for usurious contracts was forfeiture of three times the principal and interest [Rockoff (2003) ]. The change in the law applied from the end of September of the year. It was not driven by a general decline in market interest rates.[7] While

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[6] See North and Weingast 1989, Neal 1990, Crafts and Harley 1992, Clark 2001, Quinn 2001, Antràs and Voth 2003.

[7] This is the argument in North and Weingast 1989.

Sussman and Yafeh (2002) find that their measure of interest rates fell from 6.1 percent in 1708 to 4.2 percent in 1713, this was not different from earlier fluctuations – the rate also fell from 6.1 percent in 1702 to 4.5 percent in 1705. The most likely interpretation is that the Hanoverian government used the coming of peace after the Treaty of Utrecht to force through permanently lower borrowing rates for the government, allowing it privileged access to the 'sinews of power'.[8]

The final period of usury laws in England began with the publication of Jeremy Bentham's *Defense of Usury*, an eloquent plea for the abolition of limitations. It argued that no restrictions should be placed on mutually beneficial transactions between adults, and that the usury laws often forced borrowers into the arms of loan-sharks whose rates were even higher than unregulated interest rates would be.[9] Adam Smith, on the other hand, saw the usury laws as a potential blessing in general, and as an actual one in England in the late eighteenth century. He felt that reductions in maximum rates had in general followed trends in market rates. Anticipating arguments about adverse selection [Stiglitz and Weiss (1981) ], he argued that limits on maximum permissible interest rates in private loan transactions ensured that honest borrowers could obtain loans, and that those planning to default would be kept out of the credit market:

> "The legal rate, it is to be observed, though it ought to be somewhat above, ought not to be much above the lowest market rate. If the legal rate of interest … was fixed so high as eight or ten per cent, the greater part of the money which was to be lent, would be lent to prodigals and projectors, who alone would be willing to give this high interest. Sober people, who will give for the use of money no more than a part of what they are likely to make by the use of it, would not venture into the competition. A great part of the capital of the country would thus be kept out of the hands which were most likely to make a profitable and advantageous use of it, and thrown into those which were most likely to waste and destroy it. Where the legal rate of interest, on the contrary, is fixed but a very little above the lowest market rate, sober people are universally preferred, as borrowers, to prodigals and projectors."[10]

Eventually, the liberal argument in favor of reducing state intervention in private loan transactions won. In 1833, usury limits were lifted for bills of exchange; they were finally abolished for all transactions in 1854.

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[8] Brewer 1989.
[9] Rockoff 2003.
[10] Smith 1982 [1776].

*Hoare's Bank and transactions data*

Our data come from Hoare's Bank, founded by Sir Richard Hoare in the late seventeenth century. Originally a goldsmith, he shed this side of the business in the 1690s, and Hoare's remains a private bank in Fleet Street to the present day. In the early 1700s, it was part of a small pioneering group of institutions that acted as credit intermediaries, taking deposits and making loans to a larger group of clients than earlier merchant banks.[11] It has been estimated that there were 24 banks in the London West End in 1725. The bank started with a balance sheet of £146,000 in 1702 (lending out £59,000). By the end of the period that we analyze here, in 1725, its balance sheet had grown to £230,000, with lending of £150,000. We cannot determine how typical Hoare's was, even if many of its practices were also used at Child's, another West End bank.[12] The very fact that its ledgers have survived and that the business is still in the hands of the family may imply that it was atypical. The available information suggests that Hoare's was not particularly profitable during its early years and took some time to lay the foundations of a thriving business, possibly reducing any potential 'survivorship bias.'[13]

We use data on 877 loan transactions, involving 542 clients. For each loan, we can determine the total amount lent, the duration of the loan, the interest paid, the type and value of collateral offered, as well as the name of the client. Hoare's Bank kept loan registers in the form of double entry ledgers. Against the date of the transaction, debits were entered on the left and credits on the right. The register also contains the title of the borrower, and tracks relevant changes in status closely. In most cases, the clerk noted the collateral offered for a new loan. He occasionally put down the contracted loan rate, but we need to calculate the interest rate from the payment streams in most cases. Hoare's bank did not use compound interest, in line with contemporary handbooks on how to calculate interest for loans.[14]

Names of Hoare's customers were checked against a variety of sources to establish their identity and to analyze their position in Hanoverian England. A substantial proportion of large borrowers can be matched against entries in the *Dictionary of National Biography* (DNB) and *Cokayne's Complete Peerage.*

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[11] The synergies are explored in Kashyap, Rajan and Stein 2002.
[12] Quinn 2001.
[13] Temin and Voth 2003.
[14] Cooper 1740.

Borrowers were frequently noblemen, officers, church officials, and wealthy traders; Hoare's clients clearly were not representative of the English population as a whole.

We plot the median interest rate on loans made by Hoare's over this period in Figure 1. The graph suggests that Hoare's bank strictly adhered to the usury limits. We checked if there were offsetting deposits for customers that might have yielded higher effective interest rates; there is no evidence that borrowers were required to deposit a proportion of loaned funds or that they paid an up-front fee.[15] The median interest rate on new loan transactions against interest dropped from almost exactly 6 percent before 1714 to 5 percent after the change in the limit. The overall degree of compliance is impressive – if the bank did evade the usury laws, it left no traces of such wrong-doing in its account ledgers.[16] As Sydney Homer argued for usury restrictions more generally, the enforcement of interest rate limits in eighteenth-century England was probably effective and wide-spread.[17] Figure 1 also shows that the loan market did not balance through interest rate changes; 92 percent of loans were made at the usury limit. Instead, credit rationing must have been the primary allocation mechanism.

Table 1 provides summary statistics for the loan dataset. Median loan value was just over £200, but differences between small and large transactions could be considerable – the Gini coefficient on loan size is 0.72. The maximum loan was for a massive £27,290. Average loan duration was quite short (a median of 281 days). This means that the change in the permitted interest rate affected the bank's loan book quickly. Loan duration could be as short as one day and as long as 38 years. Almost half of all loans were against collateral, of which 4 percent were against mortgages and another 7 percent against securities. Members of the aristocracy accounted for 13 percent of all transactions, and those of minor nobility for another 15 percent. In 15 percent of transactions, we can identify 'lesser' borrowers in the standard bibliographical sources of the period.

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[15] The bank's annual profit calculation also strongly suggests that Hoare's complied with the usury laws.

[16] We looked for offsetting deposits in Hoare's customer (deposit) ledgers but there were no simultaneous loan and deposit transactions.

[17] Homer and Sylla 1996.

### III.  Hypotheses

We focus on changes in lending behavior after 1714. The traditional view, embodied in the writings of Shaw and McKinnon, sees interest rate restrictions as an impediment to the functioning of the financial system. If this interpretation is correct, then we should find large shifts in credit allocation after 1714 – and in a direction that makes it less likely that bank lending financed economically useful activity. Glaeser and Scheinkman see usury rates a policy of social engineering that may be Pareto improving for society as a whole. Lower interest rates should have provided social insurance – access to credit should have widened. A final view, specific to English history but in sympathy with other observations, sees the change in the usury limit as a non-event. It was simply a reflection of a change in the market rate of interest. We use the data from Hoare's Bank to choose between these views.

The three competing interpretations of usury limits have implications that can be tested easily. The market for loans, as reflected in the records at Hoare's bank, did not balance through changes in the price of credit. Instead, as Figure 1 illustrates, credit was habitually rationed at the maximum permitted interest rate. If the usury laws acted as social insurance – in line with the Glaeser and Scheinkman model – we should expect to find a continuous supply of credit to less advantaged households. Changes in the total supply of credit should not be sufficient to compensate for this reallocation, lest the purpose of this institution be self-defeating. In equilibrium, those that found it relatively harder to borrow (and to show ability to repay interest and principal) before 1714 should receive greater access to credit. Second, the minimum loan size should drop, as wider groups of creditors can now make claims on 'insurance.'

If, on the other hand, the rent-seeking models of usury regulations are correct, we should expect the opposite – minimum loan size should increase, and privileged groups should borrow even more on the new, favorable terms. Suppose that the bank faces a fixed cost for setting up and administering a loan F, as well as a variable cost that reflects the cost of funds b. Profits will then be:

$$\pi = rL-F-bL-fL=(r-b-d)L-F \qquad\qquad (1)$$

where L is the size of the loan, r is the lending rate, and d is the proportion of defaults. Lower lending rates r translate directly into lower revenue per loan made, and commensurately lower profits. In order to break even and recoup its fixed costs, the bank will need to make loans of minimum size $L^*=F/(r-b-d)$. Since Hoare's bank did not pay its depositors, we use $b=0$. Assume for simplicity that all loans are made at the legal maximum: $r=r^{max}$. As we have seen, this describes the situation at Hoare's relatively accurately. For any decrease in $r^{max}$, $L^*$ rises, assuming that there is no compensating change in b, d or F: $\delta F^*/\delta r=-F/r^2$. This is the first empirical prediction – as the usury laws are tightened, minimum loan sizes increases.[18]

A related argument can be made with respect to the bank's credit allocation and the risk of default. Clearly, the extent to which a bank can take on risk depends on r, and the maximum d it is willing to tolerate will be less the lower the interest rate it is permitted to charge. This yields the second empirical implication – borrowers regarded as relatively more attractive before the change in the usury laws should continue to receive liberal access to credit, while those with less desirable characteristics are (partly or fully) shut out of the market. Finally, we should expect that the importance of collateral increases as the maximum loan rate is reduced. This allows the bank to reduce its risk in yet another way, effectively closing off access to credit by borrowers who do not own assets equivalent to the value of the loans they seek. Jointly, hypotheses one and two suggest an implicit test of loan misallocation that is similar in spirit to the method employed by Glaeser and Luttmer (2003) . Glaeser and Luttmer examine if families with similar characteristics live in the same type of housing, comparing cities with and without rent controls. We compare loan allocation across time, and indirectly assume that any abrupt change in allocation is the result of regulatory intervention, holding borrower characteristics constant.

If the third, historical, hypothesis is valid, then none of these effects should be visible. If the change in the usury rate was simply a reflection of market changes or was honored only in the breach, then Hoare's Bank would not have changed its operations at all in 1714.[19] The effects predicted by the other theories would be absent because there was no stimulus for a change; the change in the usury law was neither good social policy nor financial repression.

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[18] The bank needed to do more than break even, of course, and equation (1) provides a lower bound on the change. If the reduction in the usury rate increased the bank's market power, changes also would be larger.

[19] We already argued that Hoare's adhered to the usury laws based on the available archival evidence.

## IV.    Empirical results

In this section, we examine the evidence from Hoare's loan ledgers, contrasting the period before 1714 with the years after the change in the usury limit. Before we can analyze the impact of the change in the usury laws, we need to describe what determined lending volumes at the bank. Table 2, eq. 1 and 2 are OLS regressions of lending volume, for the period before and after the change in the usury law. Column 1 summarizes eight bivariate regressions, and hence does not report constants. Before 1714, the pattern is clear: Being traceable in either the DNB or the lists of aristocrats ('known') yielded large returns – an additional £722 to £852. Members of the English political and commercial elite that were important enough to be traceable via entries in the DNB or Cokayne's received much more liberal access to credit – either because they were wealthier than their peers, or because their political and other connections made it sensible for Hoare's to lend to them. Being listed in the DNB was more valuable than being a peer before 1713; afterwards, aristocrats received easier access to credit.[20] Women were offered less credit, on average, than men. Somewhat surprisingly, after controlling for traceability in the main biographical dictionaries, those of noble birth (aristocracy, minor nobility, or those with any title recorded in the ledger) did not consistently receive larger loan allocations.[21] Repeat customers also did not receive more credit. As is often the case in studies attempting to explain loan allocation, the overall explanatory power is not high. We use the results in Table 2 to determine how desirable a customer was for the bank, based on observable characteristics such as traceability, gender, repeat customer status etc.[22]

Since loan sizes were highly unequal, and results could have easily been influenced by outliers, we also estimate median regressions (Table 3, eq. 1-3).[23] The results are broadly similar. In the bivariate case, we now find a slight positive effect of being a member of the aristocracy and of having a title, but the negative coefficient

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[20] We should note that the coefficients are not significantly different from each other.

[21] The positive coefficient for the aristocracy in the median regression suggests that outliers are responsible for the large standard error under OLS.

[22] The first principal component of the set of dummies will be used in subsequent analysis as summary variables of how attractive customers were for the bank. In addition, we will focus on the "known" dummy variable, which is a key determinant of customer desirability.

[23] Koenker and Hallock 2001.

for women remains significant.[24] There are also considerable gains for those 'known' to modern-day historians.

*Changes in average loan size and borrower characteristics*

Loan allocations changed abruptly after 1714. Average loan size increased markedly after the change in the usury laws – from £640 before the lowering of the maximum permissible interest rate, to £1,259 thereafter. There is no obvious reason why loan demand should have changed to strongly and abruptly; changes in supply are a much more likely explanation, even if we cannot disentangle effects perfectly. Figure 2 compares the two distributions. The lower tail of lending volumes appears to be missing after 1714 – the median value for loan amounts after the change in the law is only marginally above the 25th percentile before it. In addition to the missing small loans, the distribution overall has shifted to the right, highlighting the fact that the bank was reacting not just as a result of fixed costs, but also changing the risk profile of its lending in a way that led to larger loans. The increase in average loan size is not simply the result of changes in observable customer characteristics. Table 2, eq. 3-4 and Table 3, eq. 4-5 are OLS and median regressions of loan amounts on a set of individual characteristics for the period after the change in the usury law, first bivariate and then multivariate as before. In all specifications, the intercept increases between the period before 1714 and the years thereafter. This suggests that the bank simply refused smaller loan requests, and only dealt with customers that were sufficiently wealthy (or well-connected enough) to be able to service markedly larger loans. To sidestep potential ex post bias (with wealthy families being more easily traceable for the modern historian), we estimated the effect of being listed in the DNB (which could be driven by ex post considerations such as a family's wealth) separately from inclusion in Cokayne's *Complete Peerage* (which should be independent). For both variables, we find the same pattern – the effects become much larger after the reduction in the usury rates.

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[24] Galassi and Newton 2003.

The periods 1702-1713 and 1714-1725 are broadly comparable in macroeconomic terms. We can rule out the possibility that differences in business cycle conditions are responsible for the changes we find. While the War of the Spanish Succession lasted until 1713, Ashton's classification of business cycles suggests no systematic pattern. He found that the first period from 1702-1713 contained two peaks, while the second registered three. Periods of crisis also occurred twice during the first period and three times in the second.[25] The end of war may have led to higher private borrowing, but there is no reason to believe that it affected the size distribution of loan demand. The growth of public debt was also almost identical during the two periods – the first period saw an increase by £1.7 million, the second registered a rise of £1.5 million.[26] Therefore, even if 'crowding out' of private investment was an important determinant of loan supply, as some authors have argued, the differences between the two periods are too small to account for the changes we observe.[27] We also examined if the year of the South Sea bubble is partly responsible for the results. Re-estimating equations (3) and (4) in Table 2 without 1720 yields virtually identical results.

So far, we have examined how the conditional mean and median of the distribution of loan sizes changed with the tightening of the usury laws. The underlying assumption for both OLS and quantile regressions is that the estimated relationship between loan size and borrower characteristics is linear. Matching estimators can be used to relax the linearity assumptions of OLS. Arguably, there is little reason to expect the effect of being female on lending volume to be constant in our sample. For aristocratic women, the effect may be small, since their family's wealth is generally well-known. For women without a title, the consequences could be much greater. The effects may also not be linear. Matching estimators from groups of 'comparable' individuals give greater weight in calculating coefficients to comparisons of people that are relatively similar. Borrowers receive a propensity score based on a set of observable characteristics.

We use nearest-neighbor matching, comparing borrowers before 1714 with someone who had highly similar characteristics after that date. The difference in loan amount received is then used as an estimate of the average treatment effect of the

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[25] Ashton 1959, p. 172-3.
[26] Mitchell 1971, p. 600.
[27] Williamson 1984.

usury laws. As the number of matches, we use either 1 or 4.[28] In addition, we also use the kernel estimator that offers an efficient combination of the nearest-neighbor and group-estimation [Heckman et al. (1998) ]. We match loans on the characteristics of borrowers, using the same set of explanatory variables as in Table 2 as well as the attractiveness indicator and the dummy for repeat customer status.[29] The propensity scores are derived from probit estimation.

We find that the size of the treatment effect is large with all estimators as shown in Table 4. The unconditional difference of loan amounts before and after 1714 was £623. Using the matched estimates, we find differences between £490 and £630. The effect is significant in all cases. The sharp increase in loan sizes offers support for our first empirical hypothesis.  OLS, quantile regressions and matching estimators all show that the bank reacted to the restriction on the interest it could charge by increasing the size of loans it made.

The second striking observation concerns the change in the returns to being well-connected in English society, as documented in Table 2 and Table 3. Before the tightening of the usury laws, being sufficiently high-born or influential to be traceable for modern-day historians yielded a median (mean) return of £132 (£722) in additional credit, using the bivariate estimates; after 1714, the gain was £800 (£1520), at least double what a borrower without an entry in the DNB or Cokayne's received. The difference is statistically significant at the 95 percent level in the case of median effect, but insignificant under OLS.[30] The smaller the loan amount, the larger the (relative) benefit of being well-connected. Table 5 summarizes the evidence. At the 25th percentile of loan sizes before 1714, the advantage of those 'known' was £50. After the tightening of usury regulations, the gain was £360. At the 75th percentile, the advantage only increased from £500 to £1,500. A similar pattern is revealed when we use the attractiveness indicator, derived from principal components analysis, as an explanatory variable. A one standard deviation increase yields an increase of £24 before 1714, and £102 thereafter at the 25th percentile. At the 50th and the 75th

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[28] As suggested by Abadie, Drukker, Leber Herr and Imbens 2002.

[29] We use the psmatch2 routine by Sianesi and Leuven for kernel matching, using the bootstrap routine with 100 repetitions to estimate the standard error. For nearest-neighbor matching, we use the match estimator by Ibid..

[30] If we use the natural log of loan amounts as the dependent variable, the difference is significant in both specifications.

percentile, however, the effect is markedly smaller in relative terms and no longer significant.[31]

Those who received large amounts of credit before the change in the usury law continued to receive loans – and while they paid a lower interest rate, they also received larger credits. How valuable was the subsidy received by borrowers after 1714? The median (mean) loan value was £500 (£1,356), and the average duration was 252 (736) days. The median (mean) interest rate was 1 percent (0.8 percent) lower, suggesting a saving of £4.3 (£21.9) for each typical loan.

The underlying assumption for all the statistical methods used so far is conditional independence – that the error term in a regression of loan amount on borrower characteristics is not correlated with the characteristics themselves. Yet we know that the composition of borrowers changed. The implicit assumption – that the assignment of borrower to the period before or after the change in the usury law was random – may well not hold. If the bank began to discriminate more strongly against certain types of borrowers (not just by reducing their loan allocation, but by excluding them altogether), the true effect may well be higher than our results so far suggest.

To test the robustness of our results, we compare loans to the same individuals before and after the change in the usury limit. If the change in loan sizes can principally be explained by selecting different clients, we should expect these transactions to be unaffected. In addition, we should find that customers that the bank continued to serve after 1714 received larger loan amounts than other customers before the change, but approximately equal amounts thereafter. This is because they constituted what the bank saw as a more desirable group before the change in the usury limit – and while other customers were cut off from credit, Hoare's continued to serve these clients.[32]

Our data are compatible with such an explanation. We analyze all the customers that the bank served in the period 1705-1714, and then identify those with whom the bank continued a lending relationship after the tightening of the law. Customers who continued to receive loans ranked markedly higher on the attractiveness scale (0.27 vs. –0.029). They were twice as likely to belong to the aristocracy and to qualify as 'known' in our dataset. The number of women who

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[31] Even more extreme results obtain if we focus on the 10th and the 90th percentiles.
[32] Some clients will have stopped dealing with Hoare's for other reasons, reducing the contrast between both groups.

remain as customers is markedly lower than in the pre-1714 sample as a whole, and the number of gentry is higher (Table 6). We can also analyze how particular characteristics changed the probability of remaining a customer of the bank. Here, we assume that customers who took out loans over the period 1705-15 constituted the pool of clients potentially eligible for new loans. We can then ask how those whose relationship actually endured across the divide in 1714 differed from the rest. We use a probit model to address this question, where the dependent variable is equal to unity if the borrower continued to receive loans from Hoare's after 1715, and zero otherwise.[33] More attractive borrowers had significantly higher chances to maintain their relationship with Hoare's, according to our results. A one standard deviation increase in attractiveness raised the chances of being on the list of actual borrowers by almost 20 percent.

These results clearly show that the change in the usury limit had important effects, but not in the direction of making credit more available to disadvantaged groups. Before the change in the usury limit, customers who continued to be served by the bank after 1714 had significantly larger than average loans – more than twice as large. After the change, the difference is very small, negative, and insignificant (Table 7). This suggests that the bank actively changed its customer profile, and made an effort to attract a particular type of customer after 1714, borrowers that resembled its preferred customers before then. The bank managed to grow its loan portfolio despite the usury laws. Adapting to a new environment required drastic changes in lending practices, but it did not thwart the business plans of Hoare's bank.[34]

*Use of collateral*

If the bank decided to lower its risk-taking, it could have done so by selecting different customers, as described above, or by tightening collateral requirements. Table 8 shows the trend in the use of collateral before the change in the usury law and changes thereafter. In every five-year period before 1714, fewer transactions (for lower values) involved the posting of security by the borrower. This means that the bank did not just contribute liquidity, but genuinely facilitated access to new funds for borrowers – those who received credit did not necessarily already own assets of

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[33] Results available from the authors upon request.
[34] We also examined if aggregate lending volume (or growth) had a systematic effect on the distribution of lending, and found no evidence for this hypothesis.

similar value. During the last quinquennial before the lowering of usury limits, only 1 out of 10 pounds lent was secured by collateral. After 1714, the figure jumped to 67 percent -- as high as it had been in the 1690s when the bank had just opened. Thus, the need to minimize risk led to a retreat from genuine credit intermediation; the bank partly returned to its origins as a goldsmith and pawnshop.[35]

This conclusion is reinforced by the kind of collateral used. The one kind of transactions that remained unaffected by the tightening of usury restrictions was mortgage lending. Loans secured by mortgages continued to be much larger than ordinary credits. Mortgages increased by 42 percent in value after 1714, but this change is not statistically significant. In the eyes of contemporaries, the economic implications were not benign. As Adam Smith put it "[t]he only people to whom stock is commonly lent, without their being expected to make any very profitable use of it, are country gentlemen, who borrow upon mortgage."[36]

## V.    The impact of the usury laws

The previous section sought to demonstrate that the tightening of usury restrictions led to fundamentally altered lending decisions after 1714. Since credit was allocated with fewer restraints before that date, the allocation decisions thereafter reveal a sharp response to a relatively small change in maximum permissible interest rates. We argue that, extrapolating from this response, the usury laws as an institution must have led to massive credit misallocation. The failure to develop unfettered financial intermediation may partly explain England's disappointing growth record during the Industrial Revolution.

A simple comparison of lending in England in the eighteenth century and in the Third World today gives some support to this argument. It suggests that the development of the English financial system was severely constrained by the usury laws. Table 9 gives an overview. We contrast credit conditions in developing countries in the 1980s and 1990s, as summarized by Abhijit Banerjee (2004) . Banerjee's evidence is primarily taken from the Indian subcontinent and from Africa.

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[35] The South Sea bubble is not responsible for the increase in lending against securities. The bank acted very cautiously in lending against shares in 1720, imposing a hefty "haircut" compared to market value, and not lending at all against South Sea shares during the height of the bubble. The proportion of collateralized loans drops to 40.4 percent if we exclude 1720 from our sample – still much higher than during the preceding decade.

[36] Smith 1982 [1776].

Both Hoare's Bank and Third-World lenders offered larger loans to wealthier groups of borrowers and managed to keep defaults low. The key differences relate to the interest rates charged. Spreads between deposit and lending rates are much higher in developing countries today than they were in industrializing Britain. Lenders on the subcontinent differentiate lending rates to a considerable extent, charging higher rates for more risky loans. Since this would have required charging interest rates below 6 or 5 percent in the case of Hoare's, it is no surprise that we mainly see only one class of borrowers obtaining access to credit – the most privileged groups in society. They received credit on terms that appear unusually favorable, with interest rates far below even the cheapest rates for loans in developing countries today.

We argue that the main differences apparent in Table 9 are the result of financial repression. Specifically, the usury limit for bank loans sharply restricted the ability of banks to act as an engine of economic growth. The bulk of transactions that Banerjee describes – small and medium-sized loans used to finance trade and production, at interest rates between 10 and 120 percent – were outlawed in Britain. Britain grew and had an Industrial Revolution despite this financial repression, but it is possible that the rate of economic growth suffered as a result.

The contrast between industrializing Britain and India in the recent past is all the more striking since, even in a credit system with fewer restrictions such as India's today, credit constraints seem to be wide-spread. For example, Indian firms that received additional funds through directed lending programs showed very large increases in production and profits [Banerjee (2004); Banerjee and Duflo (2002) ]. Financial liberalization in India still has some way to go. This suggests that comparisons with the Third World today provide a lower bound of the true stimulus that Britain could have received from repealing the usury laws, and from liberalizing credit markets more generally.[37] We also note, without analyzing this in detail, that British growth only started to take off after 1830, when credit rate restrictions began to be dismantled.[38]

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[37] Britain undoubtedly also could have gained by permitting the formation of joint-stock banks in the 18th century, but that is not our topic here.
[38] Crafts 1985.

## VI.    Conclusions

Financial repression in the form of interest rate limits can lead to considerable loan misallocation. That is the conclusion we draw from a natural experimental in eighteenth-century Britain. Only if the change in the usury law in 1714 was an important change would Hoare's Bank have rearranged its loans as we have observed. The micro evidence collected from archives at Hoare's Bank can thus help us pin down the link between finance and growth – a task that has remained elusive on the basis of aggregate data, as Levine (1997) has noted.

The key reason for the change in behavior was that banks could not engage in any but the safest transactions after the maximum lending rate had been cut. Making profits while lending at 6 percent interest was no easy matter; it became harder still with a maximum rate of 5 percent. Hoare's bank had to leverage the partner's capital substantially – and also to pay very little for the funds with which it financed loans. Depositors received no interest, and leverage ratios fluctuated between 6 and 12. As the high mortalilty of banks shows, this balancing act was beyond the ability of many aspiring bankers.[39] Defaults also had to be kept to a minimum, and administrative costs managed tightly. The ceiling on permitted interest rates should have kept the bank from lending to all but the most attractive borrowers, who presented minimal risks and could take on large loans. We find that lowering the usury limit reinforced these tendencies, leading to higher average loan values, a larger role of secured lending, and a greater bias towards those of high birth or with important connections in the political elite. The change in the usury law therefore had redistributive effects.

Controversy about the effects of the usury laws has continued partly because their consequences depend on the exact economic and institutional circumstances at the time. What was harmful in 1714 may have been beneficial in 1776 or 1552. Accurate assessments require detailed evidence, preferably at the micro level. These have been hard to obtain for most historical episodes. Our analysis fills some of the gap by using detailed micro data on lending transactions at an eighteenth-century London bank.

We find little direct evidence to support the Glaeser and Scheinkman explanation for the persistence of usury laws. In eighteenth-century England, lower limits on the maximum permissible interest rate did not enhance the usury laws'

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[39] Pressnell 1960.

possible function as a form of social insurance. Evidence from the single bank analyzed in this paper also suggests that the change in the usury laws in 1714 had a negative impact on the development of Britain's financial system. The duration of loans fell abruptly after 1714. Borrowers could therefore only use the proceeds of loans for relatively short-term projects. Hoare's retreated into collateralized lending to minimize risks, thus reducing the extent to which it provided intermediated financing – and not just liquidity services. The change in the maximum interest rate was not simply a reflection of falling market rates, as North and Weingast (1989) proposed.

The English financial revolution seems to have mattered surprisingly little for financing economic development, despite improvements in the markets for public debt. Most private projects proceeded without intermediated financing [Mokyr (1999) ]. Our results suggest one possible reason for this striking disconnect. The same factors that enabled the market for public debt to become more efficient also created major constraints on private finance. The English state's regulation of maximum permissible interest rates effectively excluded the vast majority of industrial projects – given the risk involved, no bank could have profitably financed new cotton spinning ventures. The effects that we have traced as the result of a relatively small change in the maximum borrowing rate suggest that the institution of the usury laws reduced the efficiency of private intermediation. In the repercussions caused by the change of the law in 1714, we can see the potential for a much more developed credit system. If a small change in the maximum permissible rate – a reduction by a mere 100 basis points – had such grave consequences, the general use of interest rate limits must have had considerable negative consequences.

Adam Smith ranked usury restrictions by their relationship with the market rate that would have prevailed in the absence of intervention. The worst outcome was a rate that was set too low, so that most transactions were clandestine and actual rates paid much too high. The second-worst scenario was a limit that was set too high, so that those intent on default could borrow and honest creditors were shut out of the loan market. The optimum was a small spread between the shadow market rate and the legal maximum. Smith believed that, in late-eighteenth century England, the usury limit of five percent was close the optimum. Our evidence suggests that the same was not true for the years following the reduction in the usury limit after 1714. Smith warned that, if the rate was fixed too low, "it ruins, with honest people who respect the laws of their country, the credit of all those who cannot give the very best

security…"[40] This may describe the situation in the first half of the eighteenth century. It must also have been close to the truth during those periods when the English state borrowed heavily in Adam Smith's day, such as during the War of American Independence and the Napoleonic Wars. The available evidence therefore suggests that, instead of facilitating the development of private financial markets in eighteenth-century England, the state may have actually undermined it. If the patterns apparent at Hoare's after the change in the usury law in 1714 were typical, unusually slow growth during the period 1750-1850 could well have been partly caused by the joint effects of wartime borrowing and the usury laws, as well as the knock-on effects of government intervention.

Financial repression probably vitiated many of the benefits of the 'financial revolution' for the Industrial Revolution. The usury laws were harmful, and their impact overall must have been considerable if a relatively minor change had clear, negative effects. Combined with massive public borrowing and existing restrictions on the formation of joint-stock companies as a result of the Bubble Act of 1720, the Hanoverian regime effectively cut the private sector off from most forms of external financing. The benefits of financial development may be every bit as important as recent work on finance and growth has shown. Our historical evidence suggests that, for these benefits to be realized, the quality of financial regulations can matter as much as the quantity of external financing that is made available.

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[40] Smith 1982 [1776].

**FIGURES**

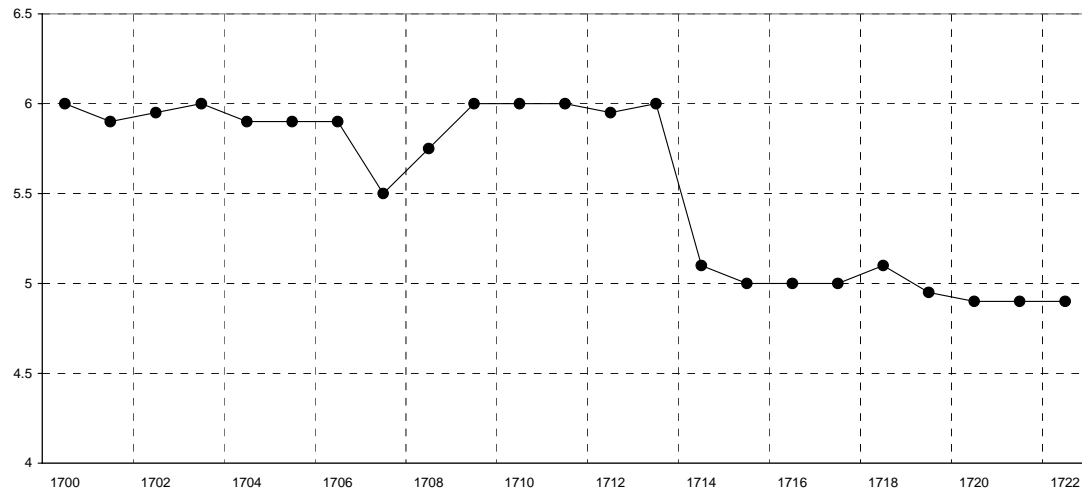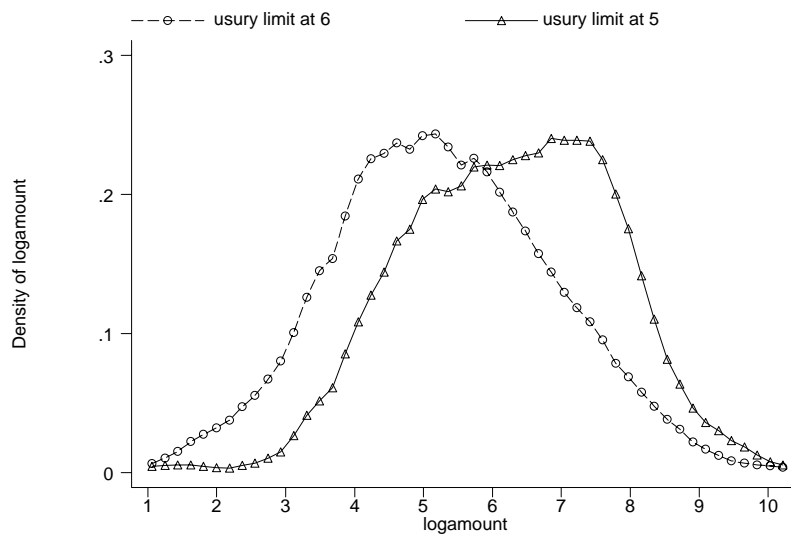**Median Interest Rate on Loans against Interest, Hoare's 1702-1725**



**Figure 1**



**Figure 2**

**TABLES**

**Table 1: Descriptive statistics**

|  | Mean | Median | Standard deviation | Minimum | Maximum | N |
|---|---|---|---|---|---|---|
| *loan characteristics* | | | | | | |
| loan amount | 775.01 | 201.7 | 1741.72 | 5 | 27290 | 877 |
| duration | 884.06 | 281 | 1511.89 | 1 | 14007 | 853 |
| interest rate | 3.85 | 5 | 2.49 | 0 | 7 | 877 |
| | | | | | | |
| *type of collateral* | | | | | | |
| any | 0.42 | 0 | 0.50 | 0 | 1 | 877 |
| mortgage | 0.04 | 0 | 0.20 | 0 | 1 | 877 |
| securities | 0.07 | 0 | 0.25 | 0 | 1 | 877 |
| | | | | | | |
| *borrower characteristics* | | | | | | |
| aristocracy | 0.13 | 0 | 0.34 | 0 | 1 | 876 |
| minor | 0.15 | 0 | 0.36 | 0 | 1 | 876 |
| known | 0.15 | 0 | 0.35 | 0 | 1 | 877 |
| female | 0.11 | 0 | 0.31 | 0 | 1 | 877 |

**Table 2: Determinants of lending volume (dependent variable: loan size in £ sterling)**

| Regression | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Sample period | 1690-1713 | 1690-1713 | 1714-25 | 1714-25 |
| Estimation method | OLS, bivariate | OLS, multivariate | OLS, bivariate | OLS, multivariate |
| Female | -538 | -447 | -997 | -896 |
| | (2.85) | (4.65) | (4.4) | (1.4) |
| Aristocracy | -110 | -356 | 357 | -323 |
| | (0.6) | (1.6) | (0.5) | (0.6) |
| Minor | 130 | -171 | 30 | -152 |
| | (0.7) | (0.7) | (0.1) | (0.3) |
| Repeat | -107 | -146 | -272 | -467 |
| | (0.8) | (1.3) | (0.9) | (1.6) |
| Known | 722 | 852 | 1520 | 1635 |
| | (4.1) | (1.8) | (2.0) | (3.8) |
| Title | 23 | 46 | 194 | 19 |
| | (0.2) | (0.4) | (0.5) | (0.04) |
| Cokayne's | 397.9 | | 2996 | |
| | (1.63) | | (1.67) | |
| DNB | 726.9 | | 1493 | |
| | (1.7) | | (1.65) | |
| Constant | | 681 | | 1331 |
| | | (6.3) | | (5.4) |
| Adj. $R^2$ | | 0.04 | | 0.06 |
| N | 685 | 685 | 191 | 191 |

**Note:** standard errors clustered at the level of borrowers

**Table 3: Median regressions (dependent variable: loan size in £ sterling)**

| Regression | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Sample period | 1690-1713 | 1690-1713 | 1705-1713 | 1714-25 | 1714-25 |
| Estimation method | Median regression, bivariate | Median regression, multivariate | Median regression, multivariate | Median regression, bivariate | Median regression, multivariate |
| Female | -110 | -121 | -95 | -360 | -210 |
| | (3.8) | (3.3) | (0.6) | (1.7) | (0.7) |
| Aristocracy | 100 | 30 | -50 | 0 | 50 |
| | (2.7) | (0.7) | (0.3) | (0) | (0.2) |
| Minor | 50 | 21 | -35 | 300 | 400 |
| | (1.2) | (0.6) | (0.2) | (1.6) | (1.9) |
| Repeat | 38 | 21 | 145 | -200 | -200 |
| | (1.4) | (0.9) | (1.3) | (1.9) | (1.5) |
| Known | 132 | 100 | 450 | 800 | 650 |
| | (3.7) | (2.7) | (2.6) | (4.6) | (3.4) |
| Title | 50 | 21 | -55 | 0 | -300 |
| | (1.8) | (0.8) | (0.3) | (0) | (1.5) |
| Cokayne's | 300 | | | 1500 | |
| | (4.61) | | | (4.93) | |
| DNB | 100 | | | 938 | |
| | (2.56) | | | (3.8) | |
| Constant | | 180 | 155 | | 600 |
| | | (9.6) | (1.7) | | (5.4) |
| Adj. $R^2$ | | 0.02 | 0.03 | | 0.05 |
| N | 685 | 685 | 75 | 191 | 191 |

Note: standard errors clustered at the level of borrowers

**Table 4: Average treatment effects, matching estimator (dependent variable: loan size in £ sterling)**

| Matching estimator | Number of neighbors | Propensity score calculated based on: | Woman, aristocracy, minor, known, title | Attractiveness, repeat |
|---|---|---|---|---|
| Neighbor | 1 | | 490 | 608 |
| | | | (197; 805) | (324; 891) |
| | 4 | | 496 | 708 |
| | | | (188; 805) | (407; 1010) |
| Kernel | | | 608 | 630 |
| | | | (332; 884) | (344; 916) |

Note: 95 percent confidence interval in parentheses; estimated from bootstrap with 100 repetitions.

**Table 5: Quantile regressions (dependent variable: loan size in £ sterling)**

| Explanatory variable | Percentile | 1690-1713 | 1714-1725 |
|---|---|---|---|
| 'known' | $25^{th}$ | 50 | 360 |
| | | (1.95) | (4.9) |
| | $50^{th}$ | 132 | 800 |
| | | (3.7) | (4.6) |
| | $75^{th}$ | 500 | 1500 |
| | | (4.1) | (2.5) |
| | | | |
| Attractiveness | $25^{th}$ | 41 | 170 |
| | | (4.3) | (4.97) |
| | $50^{th}$ | 84 | 121 |
| | | (2.5) | (0.9) |
| | $75^{th}$ | 140 | 274 |
| | | (1.7) | (0.7) |

**Table 6: Lending to select customers, before and after 1714**

| | Aristocracy | Minor | Female | 'Known' | repeat customers | N |
|---|---|---|---|---|---|---|
| **proportion of number of loans** | | | | | | |
| pre-1714 | 0.13 | 0.13 | 0.12 | 0.14 | 0.37 | 686 |
| post-1714 | 0.13 | 0.21 | 0.05 | 0.16 | 0.48 | 191 |
| retained customers | 0.21 | 0.19 | 0.02 | 0.26 | | 85 |
| | | | | | | |
| **proportion of total lending** | | | | | | |
| pre-1714 | 0.11 | 0.16 | 0.03 | 0.28 | 0.33 | 686 |
| post-1714 | 0.16 | 0.21 | 0.01 | 0.33 | 0.43 | 191 |
| retained customers | 0.28 | 0.14 | 0.005 | 0.59 | | 85 |

**Table 7: Retained customers (dependent variable: loan size in £ sterling)**

| Regression | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Sample period | 1705-1714 | 1715-1724 | 1705-1714 | 1715-1724 |
| Estimation method | OLS | OLS | Median regression | Median regression |
| | | | | |
| Retained | 847 | -225 | 282 | -100 |
| | (3.23) | (0.7) | (3.6) | (0.8) |
| Constant | 514 | 1393 | 217 | 600 |
| | (9.66) | (0.7) | (7.7) | (5.9) |
| | | | | |
| Adj. $R^2$ | 0.04 | 0.003 | 0.01 | 0.004 |
| N | 237 | 191 | 237 | 191 |

Note: Retained is a dummy variable that takes the value 1 if a customer did business with Hoare's during the period 1705-1714, and again after that date, and 0 otherwise.

**Table 8: Collateralized and uncollateralized lending**

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

**Table 9: Lending in the Third World and in Eighteenth-Century London**

| Third World | | | Hoare's | |
| Characteristic | Details | *Similarity* | Characteristic | Details |
| --- | --- | --- | --- | --- |
| Large spreads between borrowing and lending rates | Gaps of 15-68 percent | X | Tight spreads | No interest on deposits (since the 1690s) Maximum lending rate of 6 percent Average effective spread 4-5 percent |
| Considerable variation of lending rates, by type of client | Interest rates finely graduated by subgroup (differences range from 1:2 to 1:11) | X | No differentiation of interest rates | Rate on loans with interest identical in almost all cases |
| Large loans cost less | Smallest loans often very expensive (44 to 88 percent) Interest rates for asset-rich individuals are 16-24 percent For the poor, they range from 45 percent to 120 percent | X | Negligible effect of loan size | Interest rates did not vary systematically with loan size; probability of zero-interest loans declined with loan size |
| Few defaults | Typical default rates of 0.5 percent to 2 percent | ✓ | Few defaults | 15 out of 1065 transactions (1.41 percent) losses minimal relative to lending volume (most defaults were fully collateralized ) |
| Wealthy creditors receive larger and cheaper loans | Loan-to-wealth ratios rise with total net worth | ✓ | Wealthy individuals probably received larger loans; interest rates did not vary | Direct measures of wealth are not available. After 1714, those of high social status received favored access to credit |
| Credit mainly finances production and trade | 48 percent to 100 percent of loans are production loans | (x) | Unknown, but probably low | About half of large loans went to clients that were not of aristocratic background or well-connected |

Source: Banerjee (2004) . See text.

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