

Competition, Terms of Credit, and Collateral in Early American Banking

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Abstract

Access to external finance is crucial for economic growth. However, borrowers in developing economies often faced credit rationing due to asymmetric information. Thus the expansion of credit access becomes crucial for economic growth. This paper uses historical data from early America to investigate the effect of banking competition on credit access. The results show that the introduction of competition did broaden the clientele of banks, albeit at a cost. After competition was introduced, banks focused more on short-term, collateralized loans. In other words, banks used collateral as a substitute for reputation to screen borrowers.

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1. Introduction

Financial historians have long argued that an advanced financial system in America has promoted economic development. Alexander Hamilton's financial revolution established the framework for a banking system and securities markets (Sylla (1998)). Due to the limited scope of securities markets, banks became the only source of institutional credit for many entrepreneurs. Literature on economic development and growth often views a sound banking system as a factor in promoting economic growth (King and Levine (1993), Levine, Loayza, and Beck (2000), Beck and Levine (2004)).

Antebellum United States provides a good example to explore the relationship between finance and growth. The Antebellum period saw the beginning of American industrialization. In the meantime, the number of banks in the United States also proliferated. In 1800, there were only 25 banks in the United States; this number grew to 1,364 in 1860 (Weber (2006)). Upon closer examination, the pace of bank expansion varied significantly across states. For example, New York and Pennsylvania had 4 and 2 banks, respectively in 1800. In 1860, New York had 299 banks and Pennsylvania 80. While the economic conditions in these states may account for such a discrepancy, the banks' regulatory environment also played a crucial role. As states controlled the entry of banks, the growth in the number of banks depended heavily upon each state's charter policy (Wallis et al. (1994)). In the industrial northeast, some states moved towards *du jure* (New York) or *de facto* (Massachusetts) free banking, and incumbent banks began to face direct competition. Other states adopted more conservative bank charter policies, resulting in fewer large banks. In these states, a fixed set of banks remained the sole provider of institutional lending in the local credit market for extended periods. Thus, the variation in state

bank charter policies created different competitive environments over time, producing strong effects on regional economic growth.

While existing literature focuses on the cross-country comparison of the financial system and growth outcomes, recent literature attempted to examine the relationship between the industrial organization of banks and its impact on economic growth. Using data from early twentieth century U.S. states, Mitchener and Wheelock (2010) found that the higher concentration of banks is associated with more rapid industrial growth; states with relatively few banks grew faster in early 20th century. The potential explanation to this phenomenon is that banks with more market power may help them screen borrowers and establish long-term relationships with their clientele.

Antebellum banks often made loan decisions based on their previous relationships with borrowers and the accumulation of private information. Monopoly status of banks strengthens the incentive to cultivate long-term relationships because, as the only institutional lenders, monopoly banks are more willing to incur the cost of collecting private information (Petersen and Rajan (1995)). In addition, the unilateral denial of bank credit access serves as a dynamic incentive to mitigate opportunistic default (Stiglitz and Weiss (1983)). Empirical research using modern data shows that, as the relationships between banks and borrowers strengthen, the terms of credit improve. Established borrowers are able to borrow on more favorable terms: lower interest rate, greater loan sizes, and without the need for collateral (Berger and Udell (1995), Harhoff and Körting (1998), Degryse and Van Cayseele (2000), Bodenhorn (2003), Brick and Palia (2007)). Modern theoretical and empirical research also shows that, as competition intensifies, banks may increasingly rely on collateralized loans (Berger and Udell (1990)). In the context of the Antebellum period, this means that banks were more likely to discount short-term

commercial paper, especially to those who were previously unknown to the banks. Thus, although competition between banks enabled more borrowers to access bank credit, new borrowers may not have enjoyed the same credit terms as established borrowers.

This paper uses loan records from early America to investigate the effect of competition on credit access. The detailed bank records from Plymouth County, Massachusetts enable comparison of loan amount, duration, collateral requirements, and borrower characteristics before and after competition was introduced. The results suggest that when facing competition, bank responded by expanding credit access in a unique way. Before the entrance of its competitor, like most banks in New England, Plymouth Bank lent to a relatively small group of borrowers without collateral. Upon the entry of a competitor, the bank broadened its clientele, increasing loans to the rising class of small manufacturers. However, new borrowers did not enjoy the same terms of credit as existing ones; loans to these new borrowers tended to be short-term and required collateral. In contrast, established borrowers, even after the introduction of competition, continued to receive long-term loans without a collateral requirement. In other words, competition expanded credit access at a cost to new borrowers. These results not only provide evidence for the effect of competition on bank lending behavior, but also shed light on the channel through which bank concentration affects economic growth. Monopolist banks may have played the role of a Schumpeterian bank in financing long-term investment and innovation, while banks facing competition shifted their focus towards a real-bills bank.

2. Theoretical and Historical Backgrounds

Theoretically, the effect of competition on credit access remains somewhat inconclusive. Petersen and Rajan (1995) argue that competition may be welfare-reducing under asymmetric

information. In their model, monopolist banks could offer relatively low interest rates for startups, only to charge higher interest when the borrowers are captivated. The monopolist status of lenders ensures their ability to allocate rent across time. Competition limits the power of the bank to extract rent, thereby reducing relationship lending. Thus in a relationship-based credit market, reforms that introduce competition may not be welfare-improving. However, Boot and Thakor (2000) argue that this is not necessarily the case. Banks often engage in relationship as well as transaction (impersonal) lending. While interbank competition weakens the bank's incentive to invest in relationship lending, such loans better insulate the bank from price competition on the front of transaction lending. Thus it is possible that intensified competition prompts banks to extend more relationship loans. The impact of competition therefore remains an empirical question. If banks shift their focus from relationship lending to impersonal lending, the problem of moral hazard becomes more severe. Boot and Thakor (1994) find that if lenders do not possess private information on borrowers, they would require collateral and lend at higher interest rates. Once borrowers demonstrated their credit-worthiness through repayment, they could receive loans at a lower rate and without collateral. It is the higher payoff of cheaper future loans that keeps the borrowers from opportunistic defaults. This is consistent with Diamond (1989), who argues that a reputation mechanism is crucial in preventing borrowers from engaging in excess risk.

On the empirical side of the literature, Berger, Goldberg, and White (2001) use data from U.S. banks between 1993 and 1998 to investigate the impact of competition on credit access for small businesses. They find that the entry of smaller banks tends to broaden credit access for these borrowers. Beck, Demirguc-Kunt, and Maksimovic (2004) use international data and find that higher bank concentration actually raises financing obstacles, especially when a country's

financial system is less developed. However, this effect is less pronounced in countries with well-developed financial systems. In addition to expanding credit access, banks may also respond to changes in competitive environment by adjusting their risk-taking behavior in lending and collateral requirement. Jimenez, Lopez, and Saurina (2007) find that banks tend to extend riskier loans when faced with more competition. With higher risk, banks are likely to tighten loan terms accordingly; one such example is collateral requirement. Berger and Udell (1990) Jimenez and Saurina (2004), and Jimenez, Salas, and Saurina (2006) all confirm that riskier borrowers are more likely to borrow with collateral. The stringency of loan terms, however, relaxes as borrowers establish relationships with their banks. Berger and Udell (1995), Harhoff and Körting (1998), Degryse and Van Cayseele (2000), and Brick and Palia (2007) find that loan terms, such as interest rate and collateral requirement, improve with stronger relationships between borrowers and banks. Established borrowers enjoy lower interest rates and are less likely to pledge collateral.

These theoretical and empirical studies highlight two related observations. First, at least under certain conditions, competition broadens credit access. When new banks enter the market, existing banks are forced to expand their clientele. The inclusion of new borrowers thus results in a broadening of credit access. Second, the entrance of new competitors also induces changes in loan terms. Specifically, banks tend to take more risk when the credit market becomes more competitive. If a bank is forced to extend credit to borrowers it previously declined, these loans are likely to involve higher perceived risks. For a prudent bank, the potential rise in default risk calls for a collateral requirement or higher risk premia. This study links these two observations by investigating how changes in competition affect credit access under usury laws and credit rationing. Theoretically, banks with monopoly power have more incentive in investing in long-

term relationships. The captivity of borrowers ensures the bank's returns from acquiring costly information. The introduction of competition, however, compromises if not eliminates such incentives. In order for competition to expand credit access, the banks, entrant or incumbent, must seek effective alternative strategies in screening borrowers. Collateral may be the least costly means to achieve this goal.

This paper exploits historical loan records from early nineteenth century New England to examine the effect of competition on credit access and loan terms under asymmetric information. The data come from Plymouth Bank in Plymouth, Massachusetts. During the first half of the nineteenth century, many states experienced changes in bank chartering policy (North, Wallis, and Weingast (2006)), and Massachusetts was no exception. The regulatory change thus provides a testing ground for the impact of competition. In terms of data quality, the detailed loan records, combined with information from manuscript censuses, enable us to study carefully terms of loans and borrower characteristics on an individual level. The availability of micro-level data for this historical event enables a comparison of lending practice and loan terms, especially collateral requirement, before and after the introduction of competition.

In addition to its parallels with modern banking literature, this paper also echoes studies on financial markets in the contexts of economic development. Credit markets in the developing world today share many features with those in nineteenth century America; both suffer from asymmetric information and limited credit sources. As a result, credit rationing is prevalent. In addition, credit markets in developing countries are usually segmented (Ghosh, Mookherjee, and Ray (2000)). Lenders often face little competition, resulting in repeated interactions with their borrowers. The same phenomenon is also evident in early American banking (Lamoreaux (1994), Bodenhorn (2003), Wang (2008)). Some early banks remained the only bank in their

region for extended period of time. As states moved towards more liberal charter policies in the course of the nineteenth century, competition intensified. Understanding the impact of competition policy improves our assessment of the allocation of credit in a competitive market, which in turn has strong implications on the role of such policies in the formation of capital and economic growth.

3. Historical Background

In the Colonial period, British mercantilist policies prohibited the formation of banks in American colonies. After the Revolutionary War, such policies no longer applied, and Alexander Hamilton's financial revolution granted states the power to charter banks (Sylla (2002)). Up to the Civil War, the development of banking systems varied across different states. While some states maintained a stricter control over the number of banks, others experimented with more liberal charter policies (Wallis et al. (1994)). Among all regions in the newly formed United States, New England became the leader in banking development; for most of the time before 1840, there were more banks in Massachusetts than in any other state.² Even after 1838, when New York passed the Free Banking Act, Massachusetts was still among the states with the highest bank credit per capita, second only to Rhode Island.³ The subsequent discussion will focus on Massachusetts.

Although the number of banks in Massachusetts grew rapidly between 1790 and 1860, the pace of such growth varied over time. The late 1820's saw a major shift in entry policy.

² Pennsylvania took a short lead in the number of banks after the "Omnibus Act" of 1814. However, the number of banks stalled for the next 20 years.

³ Bodenhorn (2000)

Before 1829, the content of bank charters in Massachusetts differed from one bank to another. Consequently, banks were subject to different sets of rules. An 1829 act saw the first set of comprehensive regulations that applied to all banks. The contents of the 1829 act served as the standard for all subsequent charters and renewals. After 1829, all banks were put under a uniform regulatory framework. Combined with the economic boom of early 1930's (Davis (2006)), the number of banks chartered grew rapidly between 1830 and 1833 (Weber (2006))⁴. Geographically, banks did not spread out evenly across the state. Outside the major cities of Boston and Salem, relatively few townships had more than one bank. Many banks remained the sole provider of institutional lending in a given area. Even at the county level, as of 1820, only 9 out of 13 counties in the state had more than one bank. As nineteenth century progressed, more banks were chartered and many existing banks began to face competition from new entrants. For example, Plymouth Bank, chartered in 1803, was the first bank in Plymouth County and among the first in the state. It remained the sole bank in the County until 1828, but did not really face direct competition until 1832, when Old Colony Bank opened in the same town.

Like banks today, banks in early America faced the problem of information asymmetry, a problem rendered more severe by the lack of modern credit reporting. Thus early banks had to resort to other means to acquire information. Most notably, "insider lending" (Lamoreaux (1986), Lamoreaux (1994)) was prevalent in New England. Bank directors relied on private

⁴ The number of banks reported in Weber (2006) shows that the number of banks remain roughly the same between 1829 and 1832, and increased dramatically between 1832 and 1833. The number of new charters approved for 1831, 1831, and 1832 were, 15, 16, and 14, respectively. While it is unclear what caused the discrepancy, one reasonable explanation would be that it took new banks some time to raise the capital needed to begin operation. Davis (2006) shows that 1833 is a peak of the business cycle, and it is not surprising that banks were better able to raise capital during economic booms.

information through kinship and familial ties to make loan decisions. As a result, a small number of bank directors and their kin were often overrepresented in the bank's lending portfolio. Note that the source of this practice was information advantage rather than favoritism. The existing relationship lowers the cost of ex-ante screening and ex-post monitoring. Plymouth Bank, like many other New England banks, also lent disproportionately to insiders.

To be sure, banks still extended loans to borrowers other than insiders. How did banks determine the credit-worthiness of these borrowers? Bodenhorn (2003) and Wang (2008) show that borrowers' reputation was important for access of credit in nineteenth century America. Borrowers could establish their reputation through repeated repayment of previous loans. In return, banks would be willing extend loans in greater amounts without collateral. The success of reputation mechanism, as in Petersen and Rajan (1995), hinges on the monopoly power of the banks. Thus examining the changes in lending behavior after competition provides empirical evidence to support the theory of reputation.

4. Data

The main data sources for the study are Plymouth Bank Records and manuscript Censuses from 1820, 1840, and 1850. Plymouth Bank records started at the Bank's founding in 1803. The loan records provide detailed information on lending practices of the Bank, dating from 1803 to 1833 and from 1843 to 1849. Each loan entry contains the loan date, names of promisor, endorser, and presenter of each loan, collateral, amount, duration, and amounts discounted (as interest).⁵ Most loans had the recorded duration of 60 to 120 days. The majority of

⁵ Promisor refers to the original debtor of the debt, and presenter refers to the individual who brought the paper to the bank. In the case of an accommodation loan, the two names are the same. Endorsers were guarantors for the

early bank loans fell into two categories: accommodation paper and commercial paper.⁶ Each represented a different credit activity. The former was similar to a modern day bank loan with no specific collateral, whereas the latter was the discount on a specific commercial transaction. Such a distinction is instrumental in understanding lending practice of nineteenth century banks. Accommodation papers were often renewed multiple times, making them *de facto* long-term loans. Commercial papers, on the other hand, were self-liquidating since the credit was attached to the goods in a specific transaction. As a result, commercial paper could not be renewed. Identifying one form of loan from the other turns out to be crucial for my purposes.⁷ Accommodation loans were often renewed multiple times. In this case, I string together the renewals with the initial loan to identify the real duration of each loan. After combining each new loan with its renewals, the records contain 1,689 new loans between 1803 and 1833, and 2,608 between 1843 and 1849.

Another subject of interest is the interest rate and the role of usury law in credit market. Massachusetts did not abolish usury laws until 1867. Virtually all loans from Plymouth Bank in

loan. This is because the borrowers presented the note to the bank and promised to pay back a certain amount in the future. For a commercial paper, these two names would differ. The promisor was the original drawer of the commercial paper and the presenter was the final holder of the paper, who brought the paper to the bank for discount. Endorsers in this case represents the recipient of the paper but sold the paper to a third party, potentially the presenter.

⁶ Other than these two major categories, the Bank also extend credit using land (mortgage) or bank stocks as collateral. As shown below, the proportion of these loans was relatively insignificant and did not change much over time.

⁷ A loan is identified as commercial paper if all following criteria are met: a) the presenter of the paper is different from the promisor, b) the loan amount is not rounded in dollars, and c) the loan was not renewed.

the periods under investigation were made at the 6 percent rate usury ceiling.⁸ While the effectiveness of usury law in this period is still open to scholarly debate (Bodenhorn (2007), Wright (2002), and Rockoff (2003)), little evidence from the bank records demonstrates blatant violation of the law. Rockoff (2003) argues that at least for the first half of the nineteenth century, usury law could have been binding in bank lending. In this regard, the lack of evidence in the violation of usury is consistent with Rockoff's view. In contrast to modern literature (Brick and Palia (2007), Steijvers and Voordeckers (2009)), the binding usury rate eliminates the need to jointly consider both loan rates and collateral requirement.

In addition to information from the loan records, I also use Federal Censuses of 1820, 1840, and 1850 to identify the occupation of each borrower. Such information is crucial in analyzing changes in banking practice, as the occupation of borrowers and the types of loans they received were often highly correlated. Merchants, for example, tended to borrow short-term commercial papers to finance their trade. However, not every borrower's name appeared in the censuses, resulting in attrition of the sample.⁹ After matching occupation information from the censuses, the sample size declines from 1,689 to 1,147 for the first period and from 2,608 to 1,762 in the second.

⁸ All loans between 1803 and 1833 were charged 6% interest rate. Between 1843 and 1849, one can occasionally observe outliers on both ends. However, the records on duration were not always accurate in this period, making it difficult to calculate the actual interest rate.

⁹ The occupation information is only available in the census of 1820 and 1840 onwards. For my purpose, the census information is based on the closest census date to the date of the loan. In the 1820 census, only the name of head of household was reported; whereas the name of each individual is available for the 1840 and 1850 censuses. All three censuses were used in some cases to minimize missing values.

5. Analysis of Loan patterns

The Bank initially relied heavily on reputation mechanism to build long-term relationships with its borrowers. As the sole institutional lender in the region, access to Plymouth Bank was valuable. Consequently, borrowers had the incentive to invest in a long-term relationship. Repeated repaying of previous debts secured a borrower's future access to bank credit. The conservative lending policy is evidenced in the total asset holding for the bank. Between 1803 and 1833, the Bank never exceeded its limit on note-issuing.¹⁰ In other words, the bank could have lent more if it so wished.¹¹ Consistent with credit-rationing, the lending rate never fell below the usury limit, signifying a sufficient demand for credit to support a high interest rate. Taken together, these data reveal that the bank deliberately practiced credit rationing in the spirit of Stiglitz and Weiss (1981).

The composition of the Bank's clientele also reflects its conservative lending policy. Like many contemporary banks, the Plymouth Bank was founded and run by merchants. Since merchants had existing access to information on their peers, evaluating credit worthiness was easier. Not surprisingly, the bank predominantly lent to merchants. Table 1 illustrates such a pattern. In this period, merchants received 78 percent of the total number of loans. If one takes into account loan size and duration, this figure increases to 84 percent. Note that this is consistent with using reputation as a mechanism to screen borrowers; the bank lent to acquaintances to avoid problems from asymmetric information.

¹⁰ According to bank laws in Massachusetts, the total notes outstanding should not exceed twice the capital. Since banks issued notes when making loans, this put a cap on the loans a bank may extend.

¹¹ This assumes that there was demand for bank loans. Empirical evidence from inter-personal lending suggests there existed a strong demand for bank credit. For more detailed discussion, see Wang (2008).

The introduction of a competing bank in 1832 dramatically changed the banking landscape in Plymouth County. Some borrowers suddenly stopped borrowing from the Bank, apparently having switched to its competitor. This changed the profit pattern of the Plymouth Bank. Figure 1 demonstrates the profit pattern from 1808 to 1849 for Plymouth Bank and its competitor, Old Colony Bank. While profits and dividends remain largely positive after 1832, they decline significantly from the previous periods. Moreover, the profit pattern also seems more volatile. Little evidence exists to demonstrate the relationship between bank profits and local economic conditions. However, judging from the high correlation between the profit rates of the two local banks, the source of such fluctuations is likely to be associated with local economic activities.

In response to the new entrant, Plymouth Bank changed its lending policy. The lack of loan records between 1833 and 1843 prevents a direct investigation into the composition of borrowers immediately after 1832. Nevertheless, the records from 1843 onwards show that the Bank lent to a broader clientele. The number of borrowers increased dramatically from the previous period. Table 1 shows the contrast of borrower profiles between the two periods. While merchants still received a sizeable portion of total loans, small loans to artisans became increasingly important in the Bank's asset portfolio. To be sure, once loan size and duration are considered, loans to merchants still constitute a majority of the Bank's resources. Even by this measure, the percentage of bank resources lent to artisans increased dramatically from less than 1 percent to more than 18 percent. Loans to manufacturers also saw an increase, albeit in a less dramatic fashion. Thus competition forced the Bank to reach out to different groups of clientele. Most prominently, artisans and manufacturers gained importance among bank borrowers. While this change partially reflects the rise of industry in early nineteenth century America, there is no

doubt that the abrupt change in the composition of bank borrowers could be attributed to the introduction of competition.¹²

6. Regression Analysis: Collateralized Loans and Borrower Characteristics

The previous section documents the effect of competition on bank profit and borrower characteristics. First, as theory predicts, the Bank opened up credit access to a broader clientele. In addition, the profit rate declined and became more volatile. However, it is still unclear how Plymouth Bank was able to expand its clientele and remain profitable in the presence of competition. Specifically, how did it overcome the problem of asymmetric information? Before the entrance of its competitor, like many contemporary banks (Bodenhorn (2003)), Plymouth Bank relied on reputation mechanism to screen its borrowers. The process, in Bodenhorn's words, is to establish long-term relationships through short-term borrowing. The long-term relationships between the bank and its borrowers thus took years to build up. The entrance of a new bank eroded the existing clientele of the Plymouth Bank, thereby disrupting the long-term relationships. Therefore the Bank must have relied on alternative strategies to extend loans when faced with competition. Table 2 documents the difference in the number of renewals for the two periods under investigation. Between 1803 and 1833, only 38 percent of loans were never renewed. This percentage surged dramatically to 83 between 1843 and 1849. The pattern reveals that the Bank relied more heavily on short-term loans between 1843 and 1849.

The transition from lending long-term to short-term may signify a major shift in the Bank's lending policy. The question remains as to how such a change in policy relates to changes in competition and increased information asymmetry. Table 3 compares the volume of

¹² For a more detailed discussion, see Wang (2008)

collateralized loans and accommodation loans for the periods under investigation. As mentioned above, the bank extended more short-term credit in smaller amounts. From the composition of the loan types, the bank made such transitions by increasing the share of commercial papers. In terms of the number of loans, only 17 percent of loans were commercial paper between 1803 and 1833. This percentage increased to almost 48 percent between 1843 and 1849. The main source of an increase in short-term loans thus stemmed from a rise in commercial paper discounts.

One important caveat of looking solely at the number of new loans is that the durations of loans are not taken into account. A majority of collateralized loans were commercial papers, which were short-term (often less than 120 days). On the other hand, accommodation papers were often renewed multiple times. Therefore, from the bank's perspective, the frequency of different types of loans may not represent the Bank's asset allocation at a specific point in time. A more appropriate measure of the bank's asset position is the amount of loans weighted by duration.¹³ The last three rows of Table 3 present these figures. As shown, about 15 percent of the bank's assets were in the form of collateralized loans before 1833, and this percentage increased to 39% between 1843 and 1849. Among different types of collateralized loans, commercial papers experienced the most dramatic changes, rising from less than 2 percent to more than 25 percent. Thus the changes in lending practices could be mainly attributed to a shift away from accommodation loans to discount of short-term commercial papers.

¹³ Notice that only new loans are considered and each renewal will add to the duration of the loan. Ideally, one can simply weigh all loans, both new loans and renewals, by the duration. This will enable us to measure the relative importance of each type of loans on an annual basis. However, the recording of the loan duration makes it difficult to identify the actual duration of each renewal.

Taken together, after the introduction of competition, the Bank responded by opening up credit access and shifting its lending portfolio towards collateralized commercial paper. What was the mechanism that induced such a drastic change in lending policy? Previous works have established that nineteenth century banks relied heavily on private information and related lending. However, changes towards a more competitive credit market tended to disrupt such relationships. The Bank needed new borrowers to replace the reputable ones that were lost. With little information on the new borrowers, the Bank needed a substitute for long-term relationship to ensure the repayment of loans. The most reasonable move to maintain profitability under such circumstances was to extend more credit in the form of commercial papers. As commercial papers were backed by the goods in the transaction, in case of defaults, the Bank could still reclaim some of the losses by liquidating the goods. In other words, the Bank opened up credit access by shifting towards secured loans.

If the bank shifts towards collateralized loans to minimize default risk, the new borrowers, who had no previous history with the bank, should be the ones to receive commercial paper discounts. In the meantime, established borrowers should continue to enjoy long-term accommodation loans without collateral requirement. Ideally one could compare the collateral requirement for both old and new borrowers. Unfortunately, the missing data from 1833 to 1843 created a gap in the transition process. As a result, relatively few borrowers from the earlier period still appeared in the records after 1843. However, we could test the hypothesis using other borrower characteristics, such as borrowers' occupations. Before competition, most loans went to merchants who often had long-standing relationships with the bank. After 1843, artisan and manufacturers became a major outlet for the Bank's funds. If these new borrowers were more

likely to receive collateralized loans, it confirms the conjecture that asymmetric information was the key to the transformation in lending practice.

To formally test this hypothesis, I estimate a logit model using the loan records. The dependent variable is the binomial variable denoting if the loan is collateralized. The explanatory variables includes the “insider” variable, the stockholding status, the occupations of the borrowers, the dummy variable for years 1843 to 1849, and the interaction term between occupations and time period dummy. The insider variable equals to 1 if the borrowers were the director or the cashier of the bank; it is meant to capture the effect of insider lending. Stockholder status is also important in explaining the incidence of collateral, since many loans, were extended as stock transfers, meaning that stockholders borrowed against their shares. The occupations dummies contain five major categories: farmers, artisans, merchants, manufacturers, and others, with merchants being the omitted category. A priori, merchants and manufacturers would be more inclined to discount commercial papers, thereby increasing the probability of receiving a collateralized loan. The interaction of between later period and occupations is designed to capture the changes in collateral requirement after the new entrant. From previous sections, competition induced the bank to broaden credit access; artisans and manufacturers were the beneficiary of this change. Therefore, if the bank used collateral to replace reputation, the coefficient of these two interaction terms should be positive and significant.

Table 4 reports the regression results. Specification 1 includes all explanatory variables except interaction terms between occupation and later period. Specification 2 adds the interaction terms between later period and occupation dummies. Specification 3 further includes year fixed effects for the year each loan was first approved. Consistent with the findings in previous sections, the period 1843 to 1849 saw a surge in collateralized loans. For all three specifications,

the control variables for later period have positive and significant coefficients. In specification 1, this indicates that the bank indeed was more likely to lend with collateral after 1843. In comparison to merchants, artisans were less likely to borrow with collateral while manufacturer were more likely to do so.

Specification 2 adds the interaction terms, which allow us to further isolate the effect of occupation across different periods. The coefficient to second period dummy remains positive and significant. This suggests that bank was more likely to discount commercial paper even for merchants. As in Specification 1, the coefficient to the Artisan dummy remains negative and significant. However, the interaction term between later period and artisan is positive and significant. This shows that, all else equal, the bank was more likely to extend collateralized loans to artisans only after 1843. Loans to manufacturers also exhibit a similar pattern, albeit less dramatic. As artisans and manufacturers were likely to be the bank's new customers, the regression results confirm our theory that the bank used collateral when it did not possess private information on new borrowers.

Another identification strategy to examine the effect of the bank's response to broader clientele is to exploiting familial ties among different borrowers. Based on Lamoreaux (1994) the practice of insider lending was often based on kinships and personal relationships. To test the changes in collateral requirement for different groups of borrowers, one would identify the family ties of each borrower and use such variation to identify the effect of competition on collateral requirements. Another useful measurement would be the repayment history of each borrower over a long period of time. However, with a gap of missing data between 1833 and 1843, it is difficult to trace out the entire loan history for each borrower; relatively few borrowers remain active both before 1833 and after 1843.

Instead of tracing out the personal network of each borrower, the next section uses their last names to proxy for previous relationship with the banks. If insider lending was indeed based on familial relationships, then the observed effect should be sustained across different generations. Thus the heirs of a reputable borrower should also be able to enjoy the advantage of insider information and loans without collateral. To take advantage of the information on family loan history from 1803 to 1833, the next set of regressions focuses on the period between 1843 and 1849. The analysis introduces a few new variables based on the records before 1833. Ancestor is a dummy variable to indicate if the last name of a borrower after 1843 has appeared in the loan records before 1833 and takes the value 1 if his last name has appeared before. Self indicated that the same person has borrowed from the bank before 1833. Notice that if this was the case, the values of both Ancestor and Self would be 1. In other words, Self is only measuring the additional impact of the same person having borrowed from the bank before. Alternatively, I also use the number of total loans, number of accommodation loans, and the number of commercial paper discounts before 1833 under the same surname as proxies for relationship. To be sure, these variables capture private information only imperfectly. First, it is possible that some borrowers may have shared the same surnames without familial ties. Nevertheless, such possibility is relatively small outside a population center within a relatively short period of time. Another concern is that individuals closely tied to each other did not always share the same last name. Marriages or business partnerships may have also provided private information in loan decisions. In this case, the estimation strategies underestimate the effects of familial relationships on collateral requirements.

Table 5 presents the logit regression output in the format of marginal probabilities. The dependent variable is the probability of collateralized loan. Specification 1 uses both the

appearance of family surnames (Ancestor) and the borrower himself (Self) in previous records as measures of previous relationship with the bank. Regression results show that such appearance reduces the likelihood of borrowing with collateral in the later period. Moreover, the coefficient to Self is negative and significant. This indicates that if the borrower himself has borrowed from the bank before, it reduces such likelihood even further.¹⁴ Specification 2 and 3 presents alternative setups in an attempt to capture the intensity of interaction between the borrower and bank before 1833. Specification 2 only includes the number of loans in earlier period while specification 3 distinguishes accommodation loans from commercial paper discounts. The results are consistent with our theory and existing literature. Stronger past relationships will lower the likelihood for collateral requirement. Moreover, such effect is particularly strong for previous accommodation loans—a sign that the bank may have possessed private information on the individual or family. It is also worth noting that even though the regression only includes samples between 1843 and 1849, once the model accounts for previous interaction, the coefficient to Artisan became negative and significant. This is again consistent with the conjecture that they were more likely to borrow with collateral mainly because there were newcomers with little previous history with the bank.

The section establishes that the Bank responded to changes in competitive environment in a particular way. The entry of a competitor forces the incumbent bank to expand credit access and reach out to a broader clientele. However, it did so by shifting focus towards collateralized loans. The change in lending policy, as evidenced in the regression analysis, affected existing and new borrowers differently. While borrowers who had ties to the bank continued to receive

¹⁴ Note that in this case, the dummy variables Ancestor and Self both take the value of 1; the interpretation of the coefficient to Self is the difference between having borrowed himself and having the same surname.

accommodation loans, new borrowers gained access to credit mainly by collateralized loans. The competition did expand credit access, although in a very specific way.

7. Conclusion

This paper examines the impact of competition policy in the expansion of credit access and changes in credit terms, with an emphasis on the collateral requirement. The analysis draws from detailed loan records from nineteenth century Massachusetts. In the late 1820's, the state experienced a relaxation in charter policy. As a result, in 1832, the bank under investigation faced direct competition for the first time in its history. The detailed loan records from this period provide an opportunity to investigate how banks respond in general to competitive pressure.

The analysis shows that before competition, the Bank relied heavily on insider lending and reputation mechanism to screen its borrowers. Competition changed the bank's lending practices on multiple levels. Consistent with modern empirical literature, the Bank expanded credit access to a broader clientele. Thus credit availability seemed to have improved. However, in this process, the bank also shifted towards short-term commercial paper. Because of a lack of information, the bank is particularly likely to extend this type of loan to new borrowers. This echoes the theoretical prediction that banks are likely to raise collateral requirements when private information is unavailable.

These results urge a more detailed investigation of the role of banking in economic development. In this regard, two views existed. First, Schumpeter argues that banks should serve as the provider of long-term credit, thereby facilitating the accumulation of capital. Thus, banks should focus on lending long-term accommodation loans. At the other end, real bills doctrine

promotes sound banking practice through discounting commercial papers only. While these two objectives are not necessarily mutually exclusive, as shown in Bodenhorn (1999), banks may put emphasis on one over the other. This paper shows that changes in entry policy shaped the bank's cost calculation when deciding between accommodation loans and commercial papers, and the bank's lending policy changed accordingly. At least in the case of Plymouth Bank, the introduction of competition broadened credit access but reduced the bank's incentive to extend accommodation loans. The net impact on capital formation thus remains an open question. While this is not to say that lowering barrier to entry reduces the rate of capital formation, the real impact of entry policy needs to be more carefully evaluated.

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Table 1 Occupation Distribution of Loans of Plymouth Bank

Occupation	1803-1833		1843-1849			
	Frequency	Percentage	Weighted Percentage	Frequency	Percentage	Weighted Percentage
Farmers	97	8.46	7.24	145	8.23	5.47
Artisans	52	4.53	0.97	409	23.21	18.28
Merchants	899	78.38	83.86	467	26.50	51.05
Manufacturer	34	2.96	3.62	457	25.94	7.99
Others	65	5.67	4.31	284	16.12	17.21
Total	1147	100.00	100.00	1762	100.00	100.00

Table 2 Number of Renewals for Loans, 1803-1849

Number of Renewals	1803-1833		1843-1849	
	Frequency	Percent	Frequency	Percent
0	646	38.25	2,167	83.09
1	140	8.29	159	6.1
2	127	7.52	82	3.14
3	81	4.8	55	2.11
4	70	4.14	31	1.19
5	62	3.67	37	1.42
6	50	2.96	24	0.92
7	41	2.43	14	0.54
8	33	1.95	8	0.31
9	33	1.95	4	0.15
10	38	2.25	11	0.42
>10	368	21.79	16	0.63
Total	1689	100	2608	100

Table 3 Summary Statistics of Amount and Duration for Different Loan Types, 1803-1849

	Types of Loans	1803-1833		1843-1849	
		Frequency	Mean	Frequency	Mean
Amount	No Collateral	1330	913.28	1316	513.35
	Collateral	359	860.96	1292	596.48
	Commercial Paper	283	920.32	1232	501.76
Duration	No Collateral	1330	605.14	1297	265.72
	Collateral	359	515.84	1285	124.79
	Commercial Paper	283	49.17	1227	120.76
Amount	No Collateral	85.18%		61.24%	
Weighted by	Collateral	14.82%		38.76%	
Duration	Commercial Paper	1.48%		25.84%	

Table 4 Marginal Effects from Logit Regression: Collateral on Borrower Characteristics

	Dependent Variable: Collateral		
	Specification 1	Specification 2	Specification 3
Insider	0.052 (0.037)	0.051 (0.037)	0.006 (0.039)
Stockholder	0.119*** (0.029)	0.124*** (0.029)	0.110*** (0.032)
Farmer	-0.242*** (0.029)	-0.155*** (0.058)	-0.083 (0.071)
Artisan	-0.105*** (0.028)	-0.305*** (0.084)	-0.310*** (0.083)
Manufacturer	0.499*** (0.027)	-0.055 (0.098)	0.148 (0.131)
Others	-0.278*** (0.023)	0.008 (0.072)	0.045 (0.079)
Later	0.229*** (0.022)	0.213*** (0.026)	0.343*** (0.121)
Later*Farmer		-0.159** (0.073)	-0.216*** (0.063)
Later*Artisan		0.300** (0.141)	0.316** (0.143)
Later*Manufacturer		0.600*** (0.056)	0.407*** (0.116)
Later*Others		-0.317*** (0.040)	-0.341*** (0.038)
Year Fixed Effect	No	No	Yes
Observations	2908	2908	2774

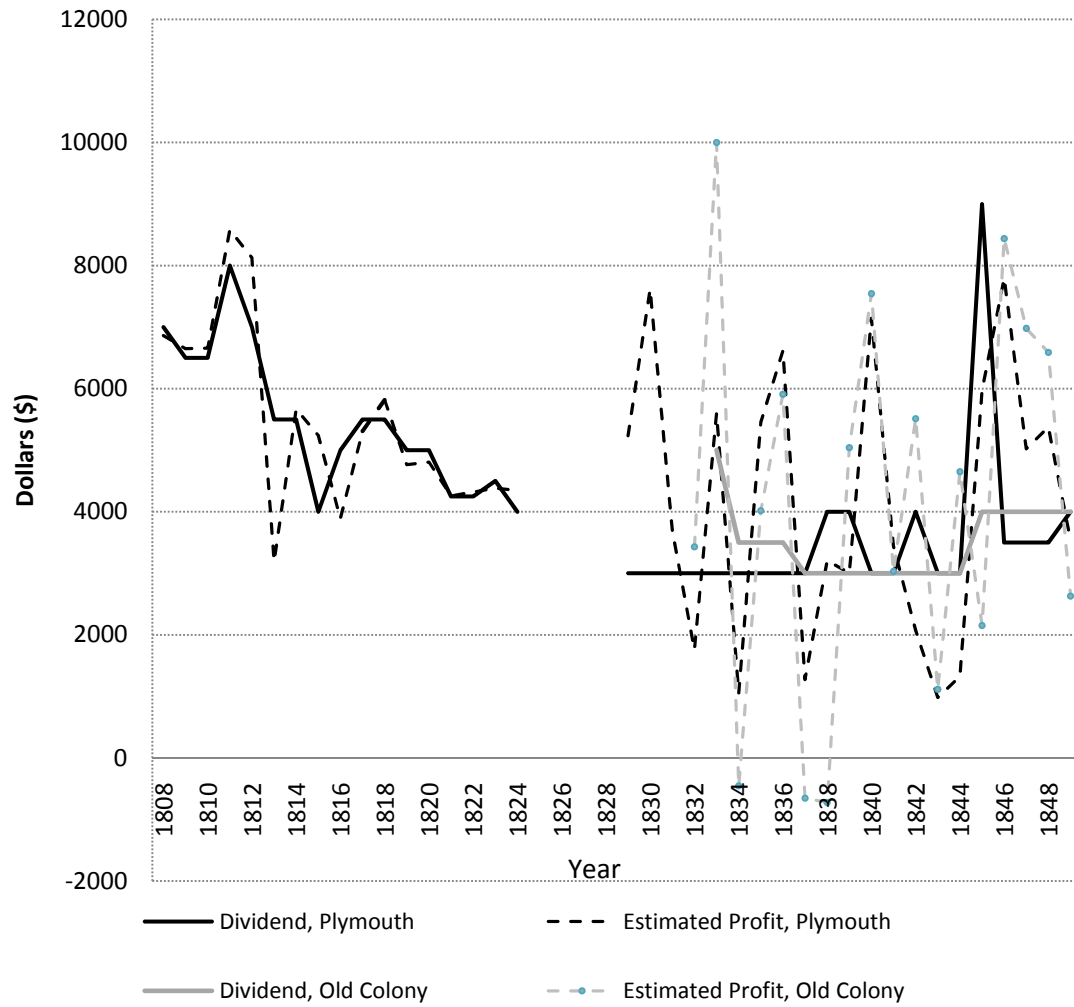
Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5 Marginal Effects from Logit Regression: Collateral and Personal Relationships, 1843-1849

	Dependent Variable: Collateral		
	Specification 1	Specification 2	Specification 3
Stockholder	0.259*** (0.047)	0.238*** (0.046)	0.242*** (0.047)
Insider	0.017 (0.075)	0.087 (0.071)	0.024 (0.081)
Ancestor	-0.178*** (0.036)		
Self	-0.204*** (0.051)		
Number of loans in previous period		-0.004*** (0.001)	
Number of accommodation loans in previous period			-0.006*** (0.001)
Number of loans in previous period			0.004 (0.005)
Farmer	-0.286*** (0.046)	-0.313*** (0.043)	-0.313*** (0.043)
Artisan	-0.064 (0.040)	-0.110*** (0.040)	-0.116*** (0.040)
Manufacturer	0.453*** (0.040)	0.483*** (0.036)	0.477*** (0.037)
Others	-0.413*** (0.030)	-0.418*** (0.030)	-0.422*** (0.029)
Year Fixed Effect	Yes	Yes	Yes
Observations	1750	1750	1750

Figure 1 Profit and Dividend for Plymouth Bank and Old Colony Bank, 1808-1849



Source: Wang (2008a)