Usury law, lending and competition: empirical study of the reversal of usury law in Arkansas

January 2021

Preliminary version, do not quote and circulate

Jiaxuan Wang

University of Bristol

Abstract

This paper investigates the effect of the reversal of usury law on bank lending, bank soundness level and bank competition through the passage of Gramm-Leach-Bliley Act. I find that the deregulation of usury law in Arkansas leads to a reallocation of bank lending among different categories of loans for Arkansas-chartered banks. Additionally, bank soundness is adversely affected, implying the potential cost relating to the deregulation. This paper also revealed an unintended effect of the deregulation in increasing the marginal cost of Arkansas-chartered banks. The results of this paper provide an insight for the impacts of adjusting the usury ceiling.

1. Introduction

Usury law, one of the oldest and ubiquitous forms of financial regulation in the history of the U.S., prohibits loans at excessive interest rates by setting limits on interest rate that lenders can charge. Arkansas is one of the states that has the strictest usury laws during the U.S. history. However, in 1999, Section 731 of the Gramm-Leach-Bliley Act (GLBA) directly targets Arkansas to remove the usury limits of Arkansas chartered banks which has existed for over 100 years. This paper exploits this inconspicuous but important part of the Gramm-Leach-Bliley Act which remains underexplored.

Although few previous studies examined the effects of the usury laws, there is no paper providing an all-rounded empirical study on exploiting the effects of removing the usury caps on banking system, at best, imperfectly understood.[1] Empirical studies are rare partly because economic historians traditionally believed that usury laws were ignored in practice (Rockoff (2003) and Tan (2001)). Additionally, it is difficult to find the relevant historical periods and micro-evidence to conduct conclusive studies. Hence, the contribution of this paper is to offer a unique opportunity to study how removing the usury caps affects bank lending, risks, and competition in Arkansas thorough the passage of Gramm-Leach-Bliley Act.

In this paper, I exploit the passage of Section 731 of Gramm-Leach-Bliley Act (also known as "Financial Modernization Act) to study the effect of reversal of usury laws on three aspects of banks characteristics. First, I investigate the relation between relaxation of usury law and bank lending. Although an extremely restrictive usury law is less common nowadays in developed countries such as the U.S., Japan and Canada, it still wildly exists in different parts of the world, especially in countries such as Sub-Saharan Africa, Latin America and the Caribbean (Maimbo and Gallegos (2014)). This question is policy-relevant in evaluating the potential cost of usury law in affecting lending. Second, I evaluate whether the reverse of usury law imposes threat to bank soundness and profitability. The result provides delightful insight to policy makers when they consider abandoning the usury law, to a less

[1] e.g.,Robins (1974); Crafton (1980); Peterson (1983); Villegas (1989); Bodenhorn (2007); Temin and Voth (2008); Benmelech and Moskowitz (2010); Rigbi (2013).

extent adjusting the ceiling of the usury limit. Lastly, I examine the effect of the reverse of usury law on the competition of the banking system, the finding reveals a conceivably unintended effect of the usury law.

The empirical analysis shows that the reversal of usury law does not affect total lending of banks, but it contributes to a reallocation among different categories of loans. The results suggest that construction and land development loans of Arkansas-chartered banks decrease, while their commercial and industrial lending records increase after the reversal of usury limit.

While Arkansas-chartered banks do not increase total lending following the deregulation, we I find that the charge-off over total assets ratio significantly increases after the reversal of usury law. It highlights the pitfall of the deregulation. Before the deregulation, the origination of risky lending by Arkansas-chartered banks are largely restricted by the usury limit, contributing to the lack of skills and experience of handling risky lending. Therefore, the relaxation of usury limit on one hand allows them to originate risky lending for higher profit, on another hand exposes them under greater credit risk. With these two opposing factors, the reversal of usury law turns out reducing the profitability of Arkansas-chartered banks.

I also identify a novel effect of usury law on bank competition. Before the passage of Gramm-Leach-Bliley Act, only non-Arkansas chartered banks could originate loans with a rate exceeding the usury ceiling in Arkansas. From another perspective, this group of banks residing in Arkansas are more like oligopoly in supplying riskier lending. Arkansas-chartered banks did not have any power to compete with this group of banks. After the reversal of usury law, I find that the Lerner index of Arkansas-chartered banks slightly decreases. The decrease is not strongly significant, statistically speaking, because both the price and marginal cost of Arkansas-chartered banks significantly increase after the reversal of usury law.

This paper contributes to following strands of literatures, namely the impact of the usury law on banks, real economic activities, and social welfare. For the rest of the section, I go through literatures related to our study.

The effects of usury regulation on banking sector have remained controversial. Several scholars in the 20th century argue that usury caps have damaging consequences and that this conclusion applies to both the prohibition of interest as well as to limitations on maximum rates. Max Weber argues that the Catholic Church's restrictions on interest slowed capital accumulation and growth (Weber (1998); Tawney (1926)). Ekelund et al. (1989) examine medieval restrictions on maximum interest rates, arguing that lower interest rates served to extract rents from lenders. In addition, Wesson (2001) points out that some states set strict limitations on interest rates to protect their citizens, however, have proven harmful to banks. Bank can only provide credit to those customers who meet the risk guidelines for a loan that charges the restrictive legal interest rate, so they cannot charge a higher rate to provide credit to high-risk customers. Meanwhile, theses ceilings are preventing some lenders from raising rates commensurate with the increase in their cost of funds (Federal Reserve Bank of Chicago. (1983)). Therefore, an important question to consider in this context is whether improving access to credit, for example by raising or removing usury limit alleviate the problems emerged with harsh usury ceilings.

In terms of lending, with a binding price ceiling, total quantity transaction should theoretically be reduced (Friedman (2007)). In this case, interest rate ceiling is expected to reduce total lending. Empirical evidence supports this theoretical expectation (Robins (1974); Peterson (1983); Benmelech and Moskowitz (2010)). Some scholars point out that the usury limits influence the allocation of credit. Temin and Voth (2008) examine the effects of interest rate restrictions on loan allocation after the British government tightened the usury laws in 1714, finding significant redistributive effects in London credit markets. However, Alessie et al. (2005) provide a conflicting result that credit allocation did not change markedly after the change in the law by studying the introduction of legal maxima on interest rates for consumer credit in Italy in 1996. In the meanwhile, another question which draws our attention is which type of borrowers are more adversely affected by the credit rationing? Are there even some borrowers can benefit from the usury law? Benmelech and Moskowitz (2010) finds that small, risky borrowers who are likely the first to be credit rationed. Those who can obtain credit at low rates (e.g., large, collateralized borrowers with established reputations) can even be benefited by the lower cost of capital. In other words, the middle- and upper-income groups

benefit from a legal limit on interest rates and, yet, they do not have to worry about being prohibited from obtaining a loan. Therefore, usury limits lower lending activities, particularly for small, risky borrowers, and it may have effect on allocation of credits.

Although there is evidence show the usury law reduce total quantity of lending, we cannot conclude that the interest rate ceiling will unfavourably affect the real economic activities. Potential borrowers might be capable to find alternative ways to circumvent the usury law such as borrowing from neighbour states. Considering the extra transaction cost involved in the circumvention of the law, it is still very likely that the usury law has negative impact on the real economy. Most of the literatures study concerned with usury laws have examined their effect on mortgage loans, and most of these have focused on home building. Majority of the studies find that building permits to be severely affected by usury limits (Austin and Lindsley (1976), Robins (1974), Rosen (1975), Ostas (1976), France (1975), and Crafton (1980)). Brophy (1970) insists that in states where usury ceilings lie below market interest rates there is a significant reduction in the level of homebuilding. Dahl et al. (1977); Yandle and Proctor (1978) also support the negative impact of rate ceilings on mortgage loans and housing construction markets. However, Rolnick et al. (1975) found that usury limits in Minnesota had little effect on building permit activity. Aside from McNulty (1979), who finds that usury limits had very little effect on building permits but did significantly reduce loan volume, there are some evidence that usury laws have the effect of squeezing first time home buyers and/or low wealth, low income, low job- stability individuals out of the home buying market (Boyes and Roberts (1981) and Rolnick, et al. (1975)). Brimmer (1968) has taken a similar position stating: the adverse effects of usury ceilings-while most evident in the behaviour of lenders are particularly harsh on builders of new houses.

Apart from the effects of the usury law on commercial activities, the interest limit, at the same time, restricts the access to credit of individuals, and restricts the low-income, less wealthy individual for accessing credits (Boyes (1982)). There are a few empirical literatures on the effects of access to credit on borrowers. Some of the studies find that access to credit exacerbates individual financial distress (Skiba and Tobacman (2009); Melzer (2011); Carrell and Zinman (2014)). These findings suggest that psychological biases lead consumers to do themselves more harm than good when handling

expensive liquidity, and hence that restricting access will help consumers by preventing overborrowing. But several other studies suggest otherwise. They find that, on average, access to risky consumer loans helps borrowers make productive investments, broadly defined: smoothing negative expenditure shocks (Wilson et al. (2010); Morse (2011)), preventing negative income shocks (Karlan and Zinman (2009)), or otherwise managing liquidity to alleviate financial distress (Morgan and Strain (2008)). These findings suggest that restricting access will harm borrowers by preventing them from financing valuable consumption smoothing and investment opportunities.

This paper is proceeded as follows. Section 2 describes the institutional background that the changes in the Arkansas usury law in its historical content, and Section 3 introduces testable predictions. Section 4 and Section 5 describe the methodology and the data, respectively. Section 6 introduces the matching procedure. The regression results are presented in Section 7. Section 8 concludes.

2. Institutional background

Nearly every U.S. state imposed a usury on loans at some point in its history. In 1978, 48 states and the District of Columbia had statutory limits on interest rates (Boyes, 1982). Even nowadays, the legal cap of interest rate still commonly exists in many states, such as Illinois, District of Columbia, Washington etc. The continuing controversy over an appropriate rate limit has been likely to remain an issue over at least the last 100 years. While various states have different restrictions on usury limit, some of them are more lenient, some of them are relatively harsh. Arkansas is undoubtedly one of the states with a harsher usury restriction. In an attempt to remedy banking problems brought by the strict usury laws, Congress has repeatedly changed state usury laws.

In Arkansas, the 1874 constitution set the usury limit at 10% and it did not vary with the type of loan or its terms, which was a high ceiling at that time, because by September of that year the prime rate was fluctuating between 9% and 11%. The relatively high prime rates in this period put banks and other lending institutions under tremendous pressure. It simply was not profitable to lend money at 10% in Arkansas when the same money could earn the market rate in other states that were not hampered by a strict usury law (Galchus, Martin and Vibhakar (1989)). Amendment 60 that had been passed in 1982

provided that the interest rate on consumer loans as well as business loans could be a maximum of 5% points per annum above the federal discount rate. However, in 1987-1988, the prime rate experienced a slow drift upward. By the end of 1988, the maximum rate under Amendment 60 was only one percentage point higher than the prime rate. This made Arkansas being the state having strictest usury law compared to its neighbouring states (Galchus and Vibhakar (2002)). For example, Oklahoma limited business loans to 45 percent interest. In Missouri, there was not usury limit. Texas had a set of ceilings for different kinds of loans but no set usury limit. In addition, Tennessee's usury rate was 24 percent and Kansas caped interest at 15 percent (Wesson (2001)). Later, after the passage of Riegle-Neal Interstate Banking and Branching Efficiency Act in 1994, national-chartered banks were able to export the usury limit of their home state to other states. In other words, branches in Arkansas of out-of-state banks would not be constrained by the residing state's usury law, while Arkansas-chartered banks would be. Obviously, banks based in Arkansas would be at a competitive disadvantage compared with branches of their out-of-state rivals.

As an inconspicuous part of the Gramm-Leach-Bliley Act (GLBA) which was enacted on 12th November 1999, the GLBA allowed Arkansas banks to charge interest at the same rate as any out-of-state branches that may be operating in the state. The conceivable purpose of the related enactment is to enhance competitiveness of Arkansas chartered banks. Section 731 of GLBA directly targeted Arkansas, the only remaining state with a constitutional provision that set the maximum lawful annual percentage rate of interest at not more than 5% above the Federal Reserve discount rate (discount rate) for 90 days commercial paper (Galchus and Vibhakar (2002); Hill (2002)). Section 731 of GLBA provides:

> *"[A]ny State that has a constitutional provision that sets a maximum lawful annual percentage rate [APR] of interest on any contract at not more than 5 percent above the discount rate... upon the establishment in such State of a branch of any out of-State insured depository institution in such State under this section, the maximum interest rate... that may be charged... by any insured depository institution whose home State is such State shall be equal to not more than the greater of-*

(A) the maximum interest rate . . .that may be charged... [in] the home State of the out-of-State insured depository institution establishing any such branch ... or

(B) the maximum rate …that may be charged... in a similar transaction by a State insured depository institution chartered under the laws of such State or a national bank or Federal savings association whose main office is located in such State ...."

As a result, if an out-of-state bank whose home state had no interest rate limit opened a branch in Arkansas, there would be no limit in Arkansas. For example, a Texas bank with a 24% cap and a Kansas bank with a ceiling at 15% are operating in the state of Arkansas, then the Texas bank, the Kansas bank, and all Arkansas banks would be able to charge 24%.

3. Hypothesis development

This section illustrates 4 testable hypotheses of this paper. I first develop the potential effect of the reversal of usury law on lending. Then, I discuss the potential effect on bank credit risk and profitability. Lastly, I evaluate the potential influence on bank competition.

3.1 Hypothesis 1

The starting point for my prediction is the theory by Vandenbrink (1982). He argues that usury law is a form of the price control which restricts the upper limit for the price of loans, in other words, the market price cannot reach the equilibrium to clear the market. As a result, the quantity transaction of the market is expected to be below the equilibrium level, thus resulting an excess demand of loans in the market. Boyes and Roberts (1981) also point out that usury ceilings have had the effect of reducing the quantity of credit and squeezing the high-risk borrowers out of the loan market.

With the reversal of the usury law in Arkansas, the excess demand of loans should be mitigated. After the reversal, Arkansas-chartered banks can set the equilibrium price for loans to clear the market, to a less extent, be able to set the price closer to the equilibrium, therefore, I expect that the reversal of usury law increase lending of Arkansas-chartered banks. However, the expansion of lending is largely

conditional on the availability of additional funding. If there is a lack of additional funding, I would expect a reallocation of lending. Moreover, when usury ceilings become binding, banks unable to equate supply and demand through price increases will adjust other terms of the loans to push the market toward equilibrium (Peterson (1983) and Rockoff (2003)). In other words, Arkansas-chartered banks would be expected to increase loans with an equilibrium rate above the usury ceiling, while reduce loans with an equilibrium rate below the usury ceiling. To test this effect, I additionally classify loans into different categories to examine whether there is a redistribution among different categories of loans, depending on their risk level.

Hypothesis 1: Following the passage of Gramm-Leach-Bliley Act, total lending of Arkansas-chartered banks increase

3.2 Hypothesis 2

Following the discussion on the potential effect of the reversal of usury law on lending in section 3.1, I expect Arkansas-chartered banks increase riskier lending. With this expected raise in risky lending, credit risk of these banks is expected to increase. Furthermore, before the reversal of usury law, Arkansas-chartered banks are not allowed to issue lending with interest rate above the usury ceiling, thus Arkansas-chartered banks lacked relevant skills and experience in screening and monitoring risky lending. Apart from the mechanically positive relationship between risky lending and credit risk, the lack of relevant skills and experience sharpen the credit risk of Arkansas-chartered banks after the reversal of usury law. Therefore, I come up with the hypothesis 2:

Hypothesis 2: Following the passage of Gramm-Leach-Bliley Act, credit risk of Arkansas-chartered banks increase

3.3 Hypothesis 3

While Arkansas-chartered banks are expected to record a surge in risky lending and credit risk after the reversal of usury law, its effect on the profitability of Arkansas-chartered banks is uncertain. According to McKinnon (1973) and Shaw (1973), restrictions on regulations reduce the profitability of providing intermediation services. In Arkansas, the reversal of the restrictions of usury law enables Arkansas-chartered banks to participate in risky lending, it enables banks to expand their income

sources and borrower base. Additionally, the profit margin of riskier lending is plausibly higher because profit is a reward for risk taken in business (Hawley (1893)). From this perspective, the reversal of usury law could enhance the profitability of Arkansas-chartered banks.

However, if credit risk of Arkansas-chartered banks indeed increases after the reversal of usury law, these banks must spare a proportion of their profit to deal with the charge-off. From this perspective, the reversal of usury law could harm the profitability of Arkansas-chartered banks. With these 2 opposing factors, I examine the actual effect of the reversal on Arkansas-chartered banks based on hypothesis 3.

Hypothesis 3: Following the passage of Gramm-Leach-Bliley Act, profitability of Arkansas-chartered banks increase

3.4 Hypothesis 4

Prior to the reversal of the usury restriction, non-Arkansas-chartered banks were able to lend with interest rate exceeding the usury ceiling in Arkansas, while Arkansas-charted banks were not allowed to compete with them due the usury ceiling. Thus, this group of non-Arkansas-chartered banks may exist in a form of monopoly, to a less extent oligopoly in the segment of riskier loan market. It implies that the bank competition in Arkansas was compressed by the usury law.

The deregulation frees Arkansas-chartered banks competition from the restriction. Arkansas banks can compete with non-Arkansas-chartered banks in the segment of riskier lending. Based on the rationale of Lerner index, I expect the price charged by Arkansas-chartered banks increase after the reversal of usury law, however, marginal cost of them is expected to increase, caused by the lack of skills and experience in handling riskier lending. Taken opposing force into consideration, the effect of deregulation on bank competition is uncertain, depending on the relative force of both sides.

Hypothesis 4: Following the passage of Gramm-Leach-Bliley Act, bank competition in Arkansas increase

4. Methodology

I use difference-in-difference approach to exploit the plausibly exogenous reversal of usury limit in Arkansas. Under the context of our paper, there are 2 groups of banks, namely the Arkansas-chartered banks

and non-Arkansas-chartered banks. Before the reversal of usury law, Arkansas-chartered banks are not allowed to originate a loan with exceeding the usury ceiling and this restriction is released after that passage of Gramm-Leach-Bliley Act, while non-Arkansas banks are constantly not subject to the usury limit imposed by the Arkansas usury law. Under this setting, difference-in-difference is appropriate for evaluating the effect of removing the usury caps. Arkansas-chartered banks are the treated group, while non-Arkansas banks are the control group. The Gramm-Leach-Bliley Act is enacted in November 1999; thus, I define the treatment period as 2000Q1-2002Q4 since the treatment is assumed to be enforced in a quarter after to the enactment. I estimate the following equation to study our hypotheses 1-4:

$$y_{i,t} = \beta_0 + \beta_1 treat_i * post_t + \delta X_{i,t} + \gamma_i + \gamma_t + \varepsilon_{i,t} \quad (1)$$

where $y_{i,t}$ is the value of respective dependent variable of bank i at time t; $treat_i$ implies the dummy variables for Arkansas-chartered banks; $post_t$ is the dummy variables for the observation which within the period of 2000Q1-2002Q4.Therefore, $treat_i * post_t$ equals to 1 if the observation is an Arkansas-chartered banks in 2000Q1-2002Q4, 0 otherwise. β_1 is our coefficient of interest, the examination of hypothesis 1 depends on the result of the estimated β_1.

To control for the bank-level and state-level characteristics, I insert a battery of control variables $X_{i,t}$ in different specifications. These bank-level control variables include the logarithm of total assets to measure size; the ratio of total equity to total assets; loan loss provisions over total interest income; return over equity; proportion of total deposits to total assets; the level of overheads over total assets; quarterly growth of total assets and proportion of non-interest income over total incomes.

The state-level control variables include the logarithm of Real Total Gross Domestic Product; the logarithm of Per Capita Personal Income; the logarithm of Personal Consumption Expenditures Total; the logarithm of Real Median Household Income; the logarithm of Resident Population and the logarithm of Unemployment Rate. I start our analysis with the speciation without any control variables and gradually insert bank-level and state-level control variables to check the robustness of our results.

In all the specifications, I control for bank fixed effect and time fixed effect through the variable of γ_i and γ_t respectively. I also cluster the standard errors at the bank-level to account for serial correlation within each panel (Bertrand et al. (2004)).

5. Data

I obtain quarterly bank-level data for commercial and savings banks in the U.S. from their Quarterly Reports on Condition and Income (Call Report), available from the Federal Reserve Bank of Chicago for the period 1997Q1 to 2002Q4. It requires each U.S. banks to fill in related financial information. Although some information is only required to be filled in by banks with 100 million, most of the financial information are available for all banks. The detailed financial information of each banks in Call report allows us to conduct the analysis. I collect the macroeconomic state-level data from Bureau of Economic Analysis from 1997 to 2002 annually.

Regarding the measurement of competition, I follow several recent studies in the competition-stability literature (Beck et al., 2013; Forssbaeck and Shehzad, 2014), using the Lerner index as a proxy for bank market power. The Lerner index captures a bank's profits over and above its marginal cost. It is defined as:

$$L_{i,t} = \frac{P_{i,t} - MC_{i,t}}{P_{i,t}} \quad (2)$$

where *P* is the price of the bank output (ratio of total income to total assets) and *MC* is the marginal cost of the production of this output. The marginal cost is estimated on the basis of a translog cost function with one output (total assets) and three input prices (personnel expenses, operating costs, and interest expenses). It is estimated following Beck et al. (2013) and others. The marginal cost for each bank is obtained by differentiating the cost with the bank output (total assets). A higher value of the Lerner index indicates that the bank extracts more rents and has higher market power. The variables used in calculating the Lerner index are from the Call report.

[TABLE 1]

The detailed definition of all variables is recorded in Table 1, while the summary statistics of respective bank-level variables and state-level variables are detailed in the panel A and panel B of Table 2. The summary statistics in Table 2 is based on the matched sample. The reasons of doing a matching and the details of the matching procedure are described in the following section.

[TABLE 2]

6. Matching

The first 3 columns (Pre-Match) in Panel A and the first column (Pre-Match) in panel B of Table 3 illustrate why I undertake a matching approach when comparing our treatment and control groups. The first 3 columns (Pre-Match) in Panel A highlights that the non-Arkansas chartered banks are different from the Arkansas chartered banks in two dimensions. On average, treatment banks have higher deposits over assets ratio and lower overheads cost-to-assets ratio. Thus, a comparison of Arkansas chartered banks to non-Arkansas chartered banks may provide an inaccurate estimate of the impact of the reversal of the usury law.

[TABLE 3]

Our matching procedure relies on a nearest neighbour matching of propensity scores, originally developed by Rosenbaum and Rubin (1983). The matching begins with a probit regression at the bank level of a binary variable indicating whether a particular bank is chartered in Arkansas on a host of bank characteristics. Specifically, I include averages over the pre-treatment era (i.e., pre-2000) of variables identified by previous studies examining the distinction between these two groups.

The probit model is estimated on a cross section of 248 Arkansas-chartered (treatment) banks and 10,321 non-Arkansas-chartered (control) banks containing non-missing data for all the variables included in the specification. The estimation results are presented in the first column of Panel B in Table 3, labelled "Pre-Match," and reveal differences that are more significant than those found in the pairwise comparison in Panel A. I then use the predicted probabilities, or propensity scores, from this probit estimation and perform a nearest-neighbour match without replacement, which means that a neighbour can only be used once. That is, each bank in the treatment group is paired with the bank in the control group whose propensity score is closest. Because the number of non-Arkansas-chartered banks is so large relative to the number of Arkansas-chartered banks (approximately 42 times as large), I choose to find 2 control banks matches for each treatment bank. I note that changing the number of matches to any number between 1 and 5 has little effect on our results.

The accuracy of the matching process is also shown in the columns denoted "Post-Match" in Panels A and B of Table 3. Specifically, Panel A reveals no statistically significant differences across any of the bank characteristics after the matching process. Similarly, Panel B reveals that none of the determinants are

statistically significant in a probit regression restricted to the matched sample. Further, I note that the magnitudes of the coefficient estimates decline significantly from the Pre-Match estimation to the Post-Match estimation, ensuring that our findings are not simply an outcome of a decline in degrees of freedom. In sum, the matching process has removed any meaningful differences along observables from the two groups of banks.

[GRAPH 1]

[GRAPH 2]

Despite using the matched sample tackles the empirical challenge caused by the difference between the Arkansas-chartered banks and non-Arkansas chartered banks, it is crucial to recall that difference-in-differences approach also requires the satisfaction of the parallel trend assumption. That is, whether Arkansas-chartered banks would have evolved similarly to non-Arkansas chartered banks in the absence of the deregulation in the matched sample. To complement the visual illustration in Graph 1 and Graph 2, I follow Roberts and Whited (2013) and conduct t-tests to verify parallel trends. I examine differences in the growth rate between the Arkansas-chartered banks and non-Arkansas chartered banks during each pre-treatment quarter. Table 4 shows that the null of equality of means cannot be rejected in any but 10 out of 80 cells at 5 % significance level, suggesting the parallel trends assumption plausibly holds.

[TABLE 4]

7. Results

In this section, I present the empirical results of our hypotheses. First, I discuss the results on lending in section 7.1. Then, the results for credit risks and profitability are shown in section 7.2 and 7.3, respectively. Lastly, I discuss the results of competition in section 7.4.

These results are corroborated by the following structure. In column 1, I only run the estimation with a univariate regression with the treatment variable as the only independent variable, to determine whether the reversal of the usury law affect the respective dependent variable. In column 2, I add the bank-level variables, such as: the bank size (logarithm of total assets); loan loss provisions over total interest income; return over equity; proportion of total deposits to total assets; and proportion of non-interest income over total incomes to determine whether the result is robust to the inclusion of the control variable. I further include state-level control variables for an additional test in column 3.

7.1 Effect of the reversal of usury law on lending

I start our analysis on the effect of the reversal of usury law on total lending of Arkansas-chartered banks. Across all specifications and samples in column 1-3 of Table 5, the results show that total lending of Arkansas-charted bank has no significant changes after the reversal. The result is robust to the inclusion of control variables. The logarithm of total assets is added into the specification in column 2 and all state-level control variables are further included into the specification in column 3. The estimated coefficient of interest in these respective 2 columns are similar to the specification without any control variables.

[TABLE 5]

Although I show that the reversal of usury limits has no effects on total lending of Arkansas-chartered banks, I focus on the heterogenous effect of the reversal on different categories of lending. To do so, I break down total lending into the 3 most common categories of loans: residential mortgages; construction and land development loans; and commercial and industrial loans.

Among these 3 categories of loans, residential mortgage is the one with lower risk, following by construction and land development loans and commercial and industrial lending (Berger & Bouwman (2009)). Does the reversal of the usury law tend to have significant effect on these three types of loans?

In column 1-3 of Table 6, I show that the ratio of construction and land development loans-to-total assets of Arkansas-chartered banks decrease significantly after the reversal of the usury limit, irrespectively the inclusion or exclusion of bank-level and state-level control variables. In column 1-2 of Table 6, I show that the ratio of construction and land development loans-to-total assets of Arkansas-chartered banks decrease 0.6% (t-statistic -2.77 and -3.21, respectively) and after controlling for state-level variables, the ratio decrease 0.5% (t-statistic -2.34) following the year of the deregulation.

The ratio of commercial and industrial loans-to-total assets of Arkansas-chartered banks record a surge following the reversal of the usury law, shown in the column 4-6 of Table 6. The results are robust to the inclusion of bank-level control variables. With the model in the column 4-5, the results suggest that the reversal of usury law contribute to an increase of around 0.5% (t-statistic 1.84) to the ratio of commercial and industrial loans-to-total assets of Arkansas-chartered banks. After controlling for the state-level variables, the result still shows that the ratio increases 0.4% (t-statistic 1.35), but marginally insignificant at commonly used significance level.

In column 7-9 of Table 6, I show that the reversal of the usury limit increases ratio of mortgages-to-total assets of Arkansas-chartered banks, irrespective the inclusion or exclusion of control variables. With the most saturated specification in the column 9 of Table 6, I show that Arkansas banks increase 0.1% (t-statistics 0.25) in the ratio of mortgages-to-total assets quarterly following the reversal of usury limit. However, the results are statistically insignificance at commonly used significance level.

[TABLE 6]

7.2 Effect of the reversal of usury law on credit risk

In the previous section, I show that the reversal of usury law has no significant effect on total lending of Arkansas-chartered banks, but it has significant negative effect on the construction and land development loans and positive effect on the commercial and industrial loans. Subject to data constraints, I cannot clearly identify the total amount and number of loans with market rate over the usury limit after the reversal of usury limit, therefore, I cannot compare the change of this type of loans before and after the deregulation. However, the effect of the reversal of usury law should theoretically be stronger for risker lending. With the plausibly increase in risky lending, does it increase credit risk of Arkansas chartered banks?

I estimate equation 1 with dependent variable of the charge-off over total assets to study our hypothesis 2. The results in column 1-3 of Table 7 soundly support that the reversal of usury law increase the credit risk of Arkansas-chartered banks during the three years following the deregulation, no matter in the specifications with or without bank-level and state-level control variables. In the most saturated specification in column 3, the result suggest that the deregulation leads to 1.7% (t-statistics 1.72) increase of charge-off over total assets ratio for Arkansas-chartered banks during the 3 years following the deregulation.

[TABLE 7]

7.3 Effect of the reversal of usury law on bank profitability

As the previous results suggest that the reversal of usury law change the borrower base of Arkansas-chartered banks (shown in section 7.1), but at the same time increase the credit risk (discussed in section 7.2), the actual effect of the deregulation on bank profitability is uncertain. It largely depends on banks' capability in screening and monitoring riskier borrowers and the related cost of screening and monitoring.

As a result, I estimate equation 1 with the dependent variable of the net income to total assets to investigate hypothesis 3.

[TABLE 8]

The results are presented in column 1-3 of Table 8. Across all specification, the evidence suggests that the usury law negatively affect the profitability of Arkansas-chartered banks. For the first 2 column in Table 8, the net income to total assets significantly decreases approximately 2.3% (t-statistics -1.77) for Arkansas-chartered banks after the reversal of usury limit. With controlling for the state-level variables, results in column 3 suggest that the profitability of Arkansas-chartered banks decrease around 0.6% (t-statistics -0.54). However, this result is statistically insignificance at commonly used significance level.

7.4 Effect of the reversal of usury law on bank competition

In this section, I examine the effect of the reversal of usury law on bank competition. Bank competition in this paper is measured by Lerner index, which capture the pricing power of banks, a higher Lerner index implies a higher market power of banks, thus implying lower competition, vice versa. The reversal of usury law has an uncertain effect on the Lerner index of Arkansas-chartered banks for 2 major reasons. First, the deregulation allows Arkansas chartered banks to charge higher interest rate, thus it potentially increases total income of Arkansas chartered banks. Second, the deregulation increases the marginal cost of Arkansas-chartered banks. Arkansas-chartered banks lack the skills and experience in monitoring and screening riskier loans, because they were restricted to do so before the deregulation. Thus, I expect the extra screening and monitoring increase the marginal cost of Arkansas-chartered banks. To test this hypothesis, I first analysis the effect of the deregulation on the Lerner index of Arkansas-chartered. Following this step, I proceed the study by decomposing the Lerner Index to identify the drivers of the Lerner index.

[TABLE 9]

In Table 9, the dependent variable is Lerner index, which is a proxy for bank market power. The lower Lerner index indicates weaker market power. The Lerner index represents the mark-up of price over marginal costs and is an indicator of the degree of market power. We can see from the column 1, 2 and 3, the respective estimated coefficient of interest is negative. The coefficient is statistically significant in column 2 yet insignificant in column 1 and 3. The most saturated specification in column 3 shows that the Lerner index

of Arkansas chartered banks reduce 0.7 % (t-statistics -1.44) during the 3 years following the deregulation.

Why does the negative effect in Lerner index not statistically significant? I conduct separate analysis on various components of the Lerner index to identify which components contribute to the finding in Lerner index.

[TABLE 10]

The price charged by Arkansas-chartered banks is expected to be higher after the deregulation, because of the removal of interest rate ceiling. The results in column 1-3 of Table 10 are consistent with the conjecture, the finding is robust to the inclusion of bank-level and state-level control variables. The result in column 3 suggest that the average price charged by Arkansas-chartered banks increase 1.3% (t-statistics 2.34) during the 3 years following the deregulation.

While Lerner index should increase based on the finding in the previous paragraph, if marginal cost of Arkansas-chartered banks is not affected by the deregulation. However, I expect the marginal cost of Arkansas-chartered banks increase following the deregulation, largely driven by the lack of experience in screening and monitoring risky loans. The finding in column 4-6 of show that marginal cost of Arkansas-chartered banks indeed increases after the deregulation, and the magnitude of increase is larger than the increase in price, thus Lerner index of Arkansas-chartered banks even decrease after deregulation. In column 6, it shows that Arkansas-chartered banks record an increase of 2.0% (t-statistic 2.96) in marginal cost.

8. Conclusion

Usury law has long been a controversial policy in the society. However, its effects on banking behaviours imposes steep empirical identification challenges. The reason may lie in the lack of an empirical setting that allows a properly constructed empirical research. This paper exploits an econometrically appealing setting, the passage of the Gramm-Leach-Bliley Act, to shed light on the potential effect of the oldest form of financial regulation-usury law. I test the effects of the reversal of usury limit on bank lending, bank soundness level and bank competition.

My results show that the reversal of usury limit generate a reallocation of lending in different categories of loans for Arkansas-chartered banks. This paper also reveals an undesirable consequence for the deregulation in the increased credit risk driven by the increase of riskier loans in bank portfolio.

Additionally, it shows a surprising effect of the deregulation on bank competition: Lerner index stays constant for affected banks. At the beginning, one would expect the market power of affected banks increase, because of the higher price charged by those banks. However, this conjecture neglects the increase in marginal cost for them in screening and monitoring risky loans. I find that the effect on marginal cost is actually very strong, to an extent that exceeding the influence of the increased price.

The findings offer three implications to policymakers. First, the finding shows that the reversal of usury law does not necessarily lead to an increase in lending of banks, therefore it suggests lowering usury limit is not a panacea to increase the supply of credit in the society. Second, the result shows that the reversal of usury limit increases credit risk of affected bank, and it highlights the need of strengthening regulation after the relaxation of usury ceilings. Third, my paper documents an unexpected effect of the relaxation of usury limit in increasing the marginal cost of affected banks.

References

Austin, D. V., & Lindsley, D. A. (1976). Ohio usury ceilings and residential real estate development. *Real Estate Economics*, 4(1), 83-95.

Avio, K.L., (1973). An economic rationale for statutory interest rate ceilings. *Quarterly Review of Economics and Business* 13 (3), 61–72.

Alessie, R., Hochguertel, S., & Weber, G. (2005). Consumer credit: evidence from Italian micro data. *Journal of the European Economic Association*, 3(1), 144-178.

Ausubel, L. M. (1997). Credit card defaults, credit card profits, and bankruptcy. American Bankruptcy. *Law Journal*, Vol. 71, pp. 249-270.

Blitz, R.C., Long, M.F. (1965). The economics of usury regulation. *Journal of Political Economy* 73 (6), 608–619.

Bodenhorn, H. (2007). Usury ceilings and bank lending behavior: Evidence from nineteenth century New York. Explorations in Economic History, 44(2), 179-202.

Beck, T., O. De Jonghe, and G. Schepens (2013). "Bank competition and stability: Cross-country heterogeneity." *Journal of Financial Intermediation*, Vol. 22, pp.218-244.

Beck, T., R. Levine, and A. Levkov (2010). Big bad banks? The winners and losers from bank deregulation in the United States. *Journal of Finance*, Vol. 65, pp. 1637-1667.

Berger, A. N., and C. H. Bouwman (2009). Bank liquidity creation. *Review of Financial Studies*, Vol. 22, pp. 3779-3837.

Boyes, W. J., & Roberts, N. (1981). Economic effects of usury laws in Arizona. *Ariz. St. LJ*, 35.

Boyes, W. J. (1982). In defense of the downtrodden: Usury laws? *Public Choice*, 269-276.

Brophy, D. J. (1970). The Usury Law: A Barrier to Home Financing. *Mich. Bus. Rev*., 22, 25.

Benmelech, E., and T. J. Moskowitz (2010). The political economy of financial regulation: Evidence from U.S. state usury laws in the 19th century. *Journal of Finance*, Vol. 65, pp. 1029-1073.

Brimmer, A. F. (1968). Statutory Interest Rate Ceilings and the Availability of Mortgage Funds. *Federal Reserve Bank of Philadelphia Business Review*, Vol. June, pp. 1

Carrell, S., and J. Zinman (2014). In harm's way? Payday loan access and military personnel performance. *Review of Financial Studies*, Vol. 27, pp. 2805-2840.

Crafton, S. M. (1980). An empirical test of the effect of usury laws. *Journal of Law and Economics 23*(lXApril): 135-146.

Dahl, D. S., S.L. Graham, and A. J. Rolnick (1977). Minnesota's usury law: A re-evaluation. *Ninth District Quarterly*, Vol. 4, pp.1-6.

Ellis, D. (1998). The effect of consumer interest rate deregulation on credit card volumes, charge-offs, and the personal bankruptcy rate. *Federal Deposit Insurance Company, Bank Trends*, No. 98-05.

Ekelund, R.B., Jr., Hebert, R.F., and Tollison, R.D. (1989). An economic model of the medieval church: usury as a form of rent seeking, *Journal of Law, Economics, and Organization*, vol. 5(2), pp. 307–31.

Federal Reserve Bank of Chicago. (1983). Leveling the Playing Field: A Review of the DIDMCA of 1980 and the Garn-St Germain Act of 1982. *Federal Reserve Bank of Chicago.*

Forssbaeck, J., and C. T. Shehzad (2014). The conditional effects of market power on bank risk—cross-country evidence. *Review of Finance*, Vol. 19, pp. 1997-2038.

Friedman, M. (2007). Price theory. *Transaction Publishers.*

France, C. L. (1975). Pennsylvania's floating usury ceiling: An economic evaluation. *Federal Home Loan Bank of Pittsburgh.*

Galchus, K. E., Martin, C. G., & Vibhakar, A. P. (1989). A History of Usury Law in Arkansas: 1836-1990. *UALR LJ*, 12, 695.

Galchus, K. E., and A. Vibhakar (2002). A Continuing History of Arkansas's Usury Law: On the Verge of Extinction. *University of Arkansas at Little Rock Law Review*, Vol. 25, pp. 819-834.

Hawley, F. B. (1893). The risk theory of profit. *Quarterly Journal of Economics*, Vol. 7, pp. 459-479.

Hill, A. K. S. (2002). State Usury Laws: Are They Effective in a Post-GLBA World. *North Carolina Banking Institute*, Vol. 6, pp. 411-428.

Karlan, D., and J. Zinman (2009). Observing unobservables: Identifying information asymmetries with a consumer credit field experiment. *Econometrica*, Vol. 77, pp.1993-2008.

Kroszner, R. S., and P. E. Strahan (1999). What drives deregulation? Economics and politics of the relaxation of bank branching restrictions. *Quarterly Journal of Economics*, Vol. 114, pp. 1437-1467.

Maimbo, S. M., and C. A. H. Gallegos (2014). Interest rate caps around the world: still popular, but a blunt instrument. *World Bank*.

Melzer, B. T. (2011). The real costs of credit access: Evidence from the payday lending market. *Quarterly Journal of Economics*, Vol. 126, pp. 517-555.

Morgan, D. P., and M. Strain (2008). Payday holiday: How households fare after payday credit bans. *FRB of New York Staff Report*, Vol. 309.

Morse, A. (2015). Peer-to-peer crowdfunding: Information and the potential for disruption in consumer lending. *Annual Review of Financial Economics*, Vol. 7, pp. 463-482.

McKinnon, R.I., 1973. Money and Capital in Economic Development. *The Brookings Institution*, Washington, DC.

McNulty, J. E. (1980). A re-examination of the problem of state usury ceilings -the impact in the mortgage market. *Quarterly Review of Economics and Business*, 20(1), 16-29.

Ostas, J. R. (1976). Effects of usury ceilings in the mortgage market. *Journal of Finance*, Vol. 31, pp. 821-834.

Rigbi, O. (2013). The effects of usury laws: Evidence from the online loan market. Review of Economics and Statistics, 95(4), 1238-1248.

Peterson, R. L. (1983). Usury laws and consumer credit: a note. *Journal of Finance*, Vol. 38, pp. 1299-1304.

Lemmon, M., and M. R. Roberts. (2010). The response of corporate financing and investment to changes in the supply of credit. *Journal of Financial and Quantitative Analysis*, Vol. 45, pp. 555-587.

Rolnick, A., Graham, S. L., and Dahl, D. S. (1975). Minnesota's usury law: An evaluation. Ninth District Quarterly, *Federal Reserve Bank of Minneapolis*, April.

Roberts, M. R., and T. Whited (2013). Endogeneity in empirical corporate finance. In Handbook of the *Economics of Finance*, Vol. 2, pp. 493-572.

Robins, P. K. (1974). The effects of state usury ceilings on single family homebuilding. *Journal of Finance*, Vol. 29, pp. 227-235.

Rosen, K. (1975). The impact of state usury laws on the housing finance system and on new residential construction. Princeton University. Mimeo.

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41-55.

Riemersma, J.C., 1952. Usury restrictions in a mercantile economy. *Canadian Journal of Economics and Political Science* 18 (1), 17–26.

Rougeau, V. D. (1996). Rediscovering usury: An argument for legal controls on credit card interest rates. *University of Colorado Law. Review*, Vol. 67, pp. 1-46.

Rockoff, H. (2003). Prodigals and projecture: An economic history of usury laws in the United States from colonial times to 1900 (No. w9742). *National Bureau of Economic Research.*

Skiba, P. M., and J. Tobacman (2009). Do payday loans cause bankruptcy*? Vanderbilt Law and Economics research paper*, No. 11-13.

Shaw, E.S., 1973. Financial Deepening in Economic Development. *Oxford University Press*, New York, and Oxford.

Tan, E. (2001). An empty shell? Rethinking the usury laws in medieval Europe, *Journal of Legal History*, vol. 23(3), pp. 177–96.

Temin, P., & Voth, H. J. (2008). Interest rate restrictions in a natural experiment: Loan allocation and the change in the usury laws in 1714. *The economic journal*, 118(528), 743-758.

Tawney, R. H. (1926). Religion and the Rise of Capitalism; a Historical Study, New York: Harcourt Brace.

Villegas, D. J. (1989). The impact of usury ceilings on consumer credit. Southern Economic Journal, 126-141.

Vandenbrink, D. (1982). The effects of usury ceilings. *Economic Perspectives*, (Midyear), 44-55.

Wilson, B. J., D.W. Findlay, J. W. Meehan, C. Wellford, and K. Schurter (2010). An experimental analysis of the demand for payday loans. *BE Journal of Economic Analysis & Policy*, Vol. 10

Weber, M. (1998). The Protestant Ethic and the Spirit of Capitalism, Los Angeles: Roxbury Pub.

Wesson, S. (2001). A Cost-Benefit Analysis of the Arkansas Usury Law and Its Effects on Arkansas Residents and Institutions. *In Academic Forum.*

Yandle, B., and J. Proctor (1978). Effect of State Usury Laws on Housing Starts: Comments. *Journal of Financial and Quantitative Analysis*, Vol. 13, pp. 549-557.

Tables and figure

TABLE 1
Variable Definitions

Table 1 provides the definitions of variables

Variable	*Definition*
TLTA	Total value of total loans over total assets.
CILTA	Total value of commercial and industrial loans over total assets.
CLDLTA	Total value of construction and land development loans over total assets.
MGTA	Total value of mortgages over total assets.
NITA100	The value of net income over total assets times 100.
COTA100	The ratio of charge-off over total assets times 100.
Lerner index	Lerner index, the calculation process of Lerner index is detailed in section 5.
lnP	The logarithm of price, the calculation process of price is detailed in section 5.
lnMC	The logarithm of marginal cost, the calculation process of marginal cost is detailed in section 5.
Treat	Treat=1 if the observation is an Arkansas-chartered bank, 0 otherwise.
Post	Post=1 if the observation is within the period of 2000Q1-2002Q4, 0 otherwise.
lnTA	The logarithm of total assets.
TETA	The ratio of total equity to total assets.
ROE	The ratio of net income over total equity
CR	Loan loss provisions over total interest income.
OverheadsTA	The level of overheads over total assets.
GrowthTA	Quarterly growth of total assets.
DOA	The ratio of deposits over total assets.
NIT	The ratio of non-interest income over total income.
RGDP	The logarithm of Real Total Gross Domestic Product
PCPI	The logarithm of Per Capita Personal Income
PCE	The logarithm of Personal Consumption Expenditures Total
RMHI	The logarithm of Real Median Household Income
RP	The logarithm of Resident Population
UR	The logarithm of Unemployment Rate

TABLE 2

Summary Statistics

Table 2 reports the summary statistics for all variables with matched sample. This table presents the number of observations, mean, standard deviation, *p*5, and *p*10 of bank-level variables in Panel A and state-level variables in Panel B. Definition of all variables ae detailed in Table 1. All bank-level control variables are 1 quarter lagged. All state-level control variables are 1 year lagged.

Panel A			*Bank-level variables*		
Variable	N	Mean	SD	5th Percentile	95th Percentile
TLTA	14190	0.596	0.143	0.332	0.807
MGTA	14190	0.327	0.138	0.115	0.566
CLDLTA	14190	0.027	0.042	0.000	0.098
CILTA	14190	0.092	0.063	0.008	0.218
COTA100	14171	0.070	0.227	0.000	0.245
NITA100	14171	0.277	0.249	-0.020	0.537
Lernerw1	13130	0.281	0.097	0.128	0.416
lnpw1	14171	-3.928	0.155	-4.150	-3.730
lnmcw1	13130	-4.253	0.189	-4.529	-3.983
lnTA	14163	11.408	1.041	9.844	13.219
TETA	14163	0.106	0.038	0.068	0.169
CR	14142	0.036	0.105	0.000	0.130
ROE	14142	0.028	0.025	-0.002	0.059
DOA	14163	0.857	0.056	0.752	0.917
NIT	14142	0.094	0.083	0.026	0.199
OverheadsTA	14142	0.005	0.002	0.003	0.008
GrowthTA	14163	1.026	0.103	0.959	1.114
Panel B			*State-level variables*		
Variable	N	Mean	SD	5th Percentile	95th Percentile
RGDP	11486	12.149	0.934	11.210	13.814
PCPI	14190	10.125	0.168	9.876	10.424
PCE	11486	11.466	0.903	10.544	13.071
RMHI	14190	10.884	0.178	10.620	11.157
RP	14190	8.438	0.809	7.499	9.889
UR	14190	1.484	0.213	1.030	1.740

TABLE 3

Propensity Score Matching Diagnostics (Call report)

Panel A of Table 3 presents pairwise comparisons of the variables before and after the matching. *Panel B* presents parameter estimated form the probit model used in estimating the propensity scores for the treatment and control groups. The treatment means that the bank is chartered in Arkansas. The control means that banks is not chartered in Arkansas. The probit is run at bank level, and all covariates included in the regression are averages over the pre-treat period (1997-1999). The Pre-match column contains the parameter estimates of the probit estimated on the entire sample, prior to matching. This model is used to generate the propensity scores for matching. The Post-Match column contains the parameter estimates of the probit estimated on the subsample of matched treatment and control observations, after matching. The matching procedure is a one-to-two nearest-neighbour match of treatment and control banks falling in the common support of estimated propensity scores. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Panel A

			Pre-match			Post-match
Variable	Control	Treatment	T-Diff	Control	Treatment	T-Diff
lnTA	11.340	11.344	0.004	11.346	11.344	-0.002
TETA	0.113	0.108	-0.005	0.107	0.108	0.001
CR	0.036	0.039	0.003	0.035	0.039	0.003
ROE	0.027	0.028	0.000	0.028	0.028	0.000
DOA	0.832	0.860	0.028***	0.864	0.860	-0.004
NIT	0.100	0.094	-0.006	0.091	0.094	0.003
OverheadsTA	0.006	0.005	-0.001**	0.005	0.005	0.000
GrowthTA	1.058	1.036	-0.022	1.031	1.036	0.005
No. of banks	10321	248	-	466	248	-

Panel B

Dependent variable	**AR=1 if bank is headquartered in AR, 0 otherwise**	
Variable	Pre-match	Post-match
lnTA	0.027	-0.041
	(0.026)	(0.052)
TETA	2.885***	-0.516
	(0.884)	(1.817)
CR	0.462	0.534
	(0.291)	(0.930)
ROE	-3.178**	0.500
	(1.245)	(2.898)
DOA	3.967***	-1.061
	(0.785)	(1.321)
NIT	1.716***	1.075
	(0.390)	(0.991)
OverheadsTA	-135.082***	-48.989
	(28.697)	(38.547)
GrowthTA	-0.003	0.796
	(0.004)	(0.860)
No. of banks	10569	714
Treatment	248	248
Control	10321	466

TABLE 4

Difference in the growth rate of respective variable between Arkansas-chartered banks and other banks

Table 4 shows the difference and the significance level of the difference in the growth rate of various dependent variables in 8 quarters (2 years) prior to the reversal of the usury law. Definition of all variables ae detailed in Table 1. *, ** and ***indicate significance at the 10%, 5% and 1% levels, respectively.

Quarter	1998q1	1998q2	1998q3	1998q4	1999q1	1999q2	1999q3	1999q4
ΔTLTA	0.010*	0.017*	0.012**	-0.009	-0.007	0.013	-0.008	-0.019***
ΔMGTA	0.016**	0.004	0.002	-0.018	-0.023	0.012	-0.016	-0.010
ΔCLDLTA	0.267*	0.315	-0.095	0.114	-0.067	-0.323	0.558	0.145
ΔCITLA	0.004	1.437	-0.005	0.031	0.028	-0.007	-0.051	0.043***
ΔCOTA100	-3.277	0.246	-1.117	3.159**	0.173	1.278	-0.845	0.371
ΔNITA100	-0.409	0.080	-1.742	-0.092	-0.777	-0.140	-0.160	0.012
ΔLerner index	-0.174	-0.052	1.718	0.028	-0.028	0.078	0.104	-0.008
ΔlnP	0.003	-0.003*	0.001	-0.002	0.002	-0.002	0.000	0.001
ΔlnMC	0.002	0.004*	-0.001	-0.007**	0.001	0.003	-0.003	0.002

TABLE 5

Effect of the reversal of usury law on total lending

Table 5 reports the estimation result of the equation 1. The dependent variable is total loan over total assets (TLTA) in column 1-3. The treatment variable (Treat) is an indicator variable that takes the value of 1 if the bank is chartered in Arkansas, 0 otherwise. Post is an indicator variable that takes the value of 1 if the time period is from 2000Q1-2002Q4, and 0 otherwise. Definition of all variables is detailed in Table 1. All control variables are 1 quarter or 1year lagged. *, ** and ***indicate significance at the 10%, 5% and 1% levels, respectively. Robust standard errors in parentheses are clustered at the bank level.

	y= TLTA		
Variable	(1)	(2)	(3)
Treat×Post	0.004	0.002	0.001
	(0.55)	(0.29)	(0.22)
lnTA		0.040***	0.048***
		(3.58)	(4.46)
TETA		-0.194	-0.090
		(-1.46)	(-0.65)
CR		0.019*	0.016
		(1.96)	(1.61)
ROE		0.252***	0.253***
		(3.89)	(3.77)
DOA		-0.021	-0.044
		(-0.38)	(-0.97)
NIT		-0.057**	-0.103***
		(-2.18)	(-2.62)
OverheadsTA		4.127***	4.088***
		(3.93)	(4.07)
GrowthTA		-0.024**	-0.030***
		(-2.31)	(-2.82)
RGDP			0.136
			(1.25)
PCPI			-0.094
			(-0.64)
PCE			-0.104
			(-0.61)
RMHI			-0.021
			(-0.70)
RP			-0.019
			(-0.13)
UR			0.014
			(0.71)
No. of obs.	14,190	14,142	11,464
No. of banks	714	714	664
R-squared	0.095	0.135	0.139
Bank FE	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes

TABLE 6

Effect of the reversal of usury law on construction and land development loans, commercial and industrial lending and Mortgage

Table 6 reports the estimation result of the equation 1. The dependent variable is construction and land development loans over total assets (CLDLTA) in column 1-3; and the dependent variable is commercial and industrial loans over total assets (CILTA) in column 4-6. The dependent variable is Mortgage over total assets (MGTA) in column 7-9. The treatment variable (Treat) is an indicator variable that takes the value of 1 if the bank is chartered in Arkansas, 0 otherwise. Post is an indicator variable that takes the value of 1 if the time period is from 2000Q1-2002Q4, and 0 otherwise. Definition of all variables is detailed in Table 1. All control variables are 1-quarter or 1year lagged. *, ** and ***indicate significance at the 10%, 5% and 1% levels, respectively. Robust standard errors in parentheses are clustered at the bank level.

	y=CLDLTA			y=CILTA			y= MGTA		
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treat×Post	-0.006***	-0.006***	-0.005**	0.005*	0.005*	0.004	0.004	0.003	0.001
	(-2.77)	(-3.21)	(-2.34)	(1.84)	(1.83)	(1.35)	(0.68)	(0.52)	(0.25)
lnTA		0.020***	0.020***		0.001	0.002		0.030***	0.034***
		(4.23)	(4.14)		(0.31)	(0.31)		(2.84)	(3.28)
TETA		-0.008	-0.004		-0.020	0.004		-0.028	0.022
		(-0.15)	(-0.06)		(-0.59)	(0.12)		(-0.32)	(0.23)
CR		0.003	0.004*		0.006*	0.003		0.010*	0.012*
		(1.19)	(1.76)		(1.83)	(0.99)		(1.69)	(1.84)
ROE		0.036**	0.051***		0.031	0.031		0.164***	0.187***
		(1.98)	(2.94)		(1.21)	(1.06)		(3.91)	(3.89)
DOA		-0.030	-0.034		0.022	0.017		0.021	-0.001
		(-1.37)	(-1.49)		(1.17)	(0.81)		(0.48)	(-0.03)
NIT		-0.013	-0.030**		-0.009	-0.010		-0.029	-0.062*
		(-1.20)	(-2.17)		(-1.13)	(-0.58)		(-1.29)	(-1.85)
OverheadsTA		0.258	0.461*		0.585*	0.391		1.341	1.742*
		(0.97)	(1.74)		(1.80)	(1.26)		(1.33)	(1.81)
GrowthTA		-0.003	-0.004		0.003	0.001		-0.012	-0.020**
		(-1.08)	(-1.35)		(0.93)	(0.18)		(-1.46)	(-2.20)
RGDP			0.134***			0.010			0.005
			(3.61)			(0.19)			(0.05)
PCPI			-0.071			0.054			-0.187
			(-0.89)			(0.62)			(-1.26)
PCE			-0.135			0.037			-0.021
			(-1.36)			(0.47)			(-0.13)
RMHI			-0.016*			0.003			-0.014
			(-1.83)			(0.23)			(-0.50)
RP			0.012			-0.051			0.040
			(0.14)			(-0.73)			(0.29)
UR			-0.006			0.001			0.027
			(-0.88)			(0.08)			(1.53)
No. of obs.	14,190	14,142	11,464	14,190	14,142	11,464	14,190	14,142	11,464
No. of banks	714	714	664	714	714	664	714	714	664
R-squared	0.079	0.125	0.128	0.016	0.017	0.017	0.101	0.122	0.130
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

TABLE7

Effect of the reversal of usury law on credit risk

Table 7 reports the estimation result of the equation 1. The dependent variable is charge-off over total assets times 100 (COTA100). The treatment variable (Treat) is an indicator variable that takes the value of 1 if the bank is chartered in Arkansas, 0 otherwise. Post is an indicator variable that takes the value of 1 if the time period is from 2000Q1-2002Q4, and 0 otherwise. Definition of all variables is detailed in Table 1. All control variables are 1-quarter or 1year lagged. *, ** and ***indicate significance at the 10%, 5% and 1% levels, respectively. Robust standard errors in parentheses are clustered at the bank level.

	y= COTA100		
Variable	(1)	(2)	(3)
Treat×Post	0.026***	0.020**	0.017*
	(2.62)	(2.27)	(1.72)
lnTA		0.025	0.021
		(1.59)	(1.03)
TETA		-0.226	-0.305
		(-1.55)	(-1.54)
ROE		-0.783***	-0.797***
		(-3.50)	(-3.55)
DOA		-0.047	-0.104*
		(-0.91)	(-1.81)
NIT		0.114	0.193*
		(1.31)	(1.87)
OverheadsTA		5.185	4.194
		(0.87)	(0.66)
GrowthTA		-0.056***	-0.064***
		(-3.17)	(-2.75)
RGDP			0.096
			(0.43)
PCPI			-0.104
			(-0.36)
PCE			0.321
			(0.82)
RMHI			0.056
			(0.97)
RP			-0.630
			(-1.22)
UR			-0.007
			(-0.15)
No. of obs.	14,171	14,141	11,463
No. of banks	714	714	664
R-squared	0.017	0.032	0.037
Bank FE	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes

TABLE 8

Effect of the reversal of usury law on net income

Table 8 reports the estimation result of the equation 1. The dependent variable is net income over total assets times 100 (NITA100). The treatment variable (Treat) is an indicator variable that takes the value of 1 if the bank is chartered in Arkansas, 0 otherwise. Post is an indicator variable that takes the value of 1 if the time period is from 2000Q1-2002Q4, and 0 otherwise. Definition of all variables is detailed in Table 1. All control variables are 1-quarter or 1year lagged. *, ** and ***indicate significance at the 10%, 5% and 1% levels, respectively. Robust standard errors in parentheses are clustered at the bank level.

	y=NITA100		
Variable	(1)	(2)	(3)
Treat×Post	-0.023*	-0.021*	-0.006
	(-1.77)	(-1.88)	(-0.54)
lnTA		-0.025	-0.020
		(-0.75)	(-0.58)
TETA		-1.549***	-1.561***
		(-4.07)	(-3.65)
ROE		1.414***	1.779***
		(6.25)	(5.15)
DOA		0.173*	0.198*
		(1.70)	(1.89)
CR		0.089**	0.100**
		(1.97)	(1.97)
OverheadsTA		-8.117***	-8.533**
		(-3.44)	(-2.09)
GrowthTA		-0.068***	-0.080***
		(-3.33)	(-3.99)
RGDP			0.525*
			(1.73)
PCPI			0.009
			(0.03)
PCE			-0.567
			(-1.30)
RMHI			0.069
			(1.13)
RP			-0.104
			(-0.21)
UR			0.087
			(1.55)
No. of obs.	14,190	14,142	11,464
No. of banks	714	714	664
R-squared	0.024	0.081	0.089
Bank FE	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes

TABLE 9

Effect of the reversal of usury law on Lerner index

Table 9 reports the estimation result of the equation 1. The dependent variable is the Lerner index (Lerner index). The treatment variable (Treat) is an indicator variable that takes the value of 1 if the bank is chartered in Arkansas, 0 otherwise. Post is an indicator variable that takes the value of 1 if the time period is from 2000Q1-2002Q4, and 0 otherwise. Definition of all variables is detailed in Table 1. All control variables are 1-quarter or 1year lagged. *, ** and ***indicate significance at the 10%, 5% and 1% levels, respectively. Robust standard errors in parentheses are clustered at the bank level.

	y=Lerner index		
Variable	(1)	(2)	(3)
Treat×Post	-0.008	-0.009**	-0.007
	(-1.56)	(-2.22)	(-1.44)
lnTA		0.030***	0.040***
		(2.92)	(3.54)
TETA		-0.433***	-0.420***
		(-4.35)	(-4.11)
ROE		0.057***	0.063***
		(4.10)	(4.33)
DOA		0.660***	0.649***
		(7.07)	(6.56)
CR		0.038	0.042
		(1.12)	(1.15)
NIT		-0.026	-0.059
		(-0.65)	(-1.26)
OverheadsTA		-2.680***	-2.888***
		(-3.06)	(-2.98)
GrowthTA		-0.053***	-0.062***
		(-5.19)	(-5.37)
RGDP			0.073
			(0.67)
PCPI			0.057
			(0.39)
PCE			0.013
			(0.47)
RMHI			0.031
			(0.20)
RP			-0.126
			(-0.85)
UR			-0.013
			(-0.81)
No. of obs.	13,130	13,100	10,422
No. of banks	714	714	664
R-squared	0.080	0.177	0.190
Bank FE	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes

TABLE 10

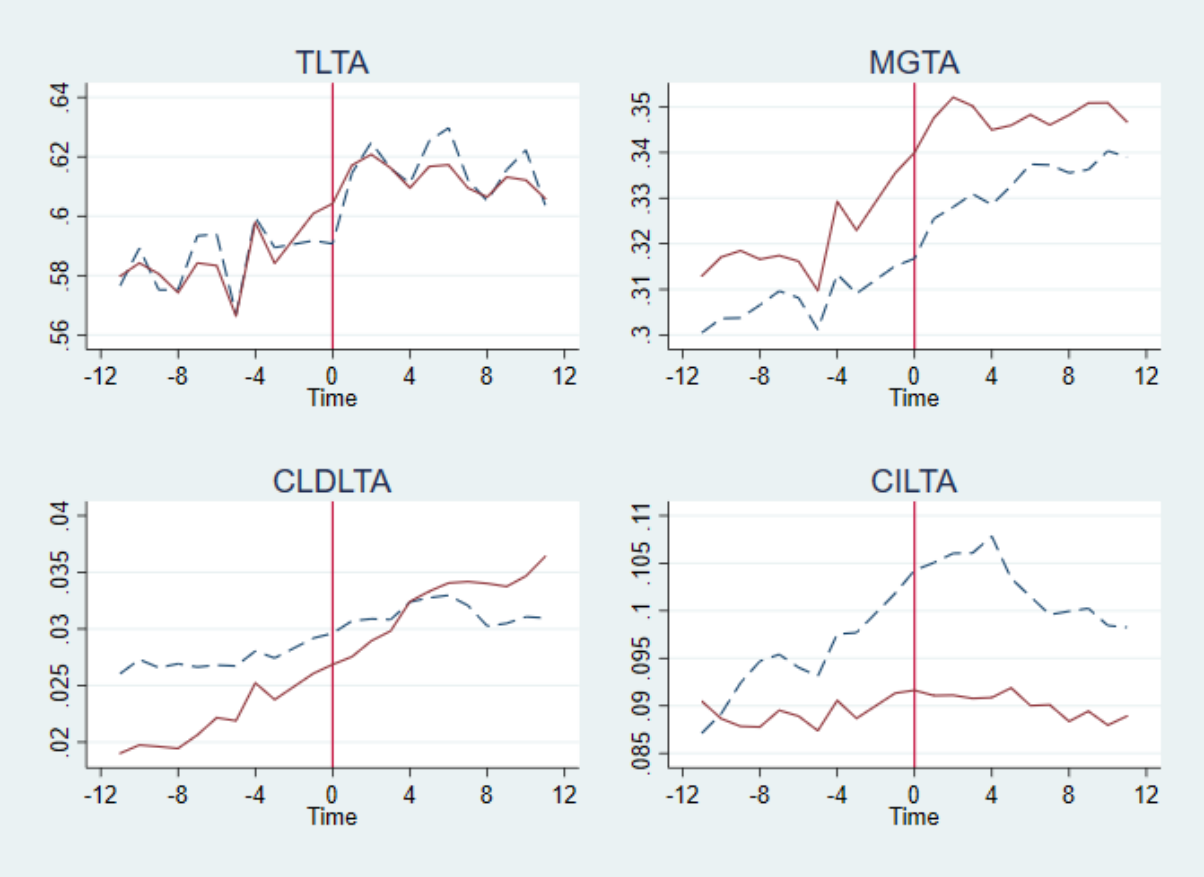
Effect of the reversal of usury law on price and marginal cost

Table 10 reports the estimation result of the equation 1. The dependent variable is the logarithm of price (lnP) in column 1-3; and the dependent variable is the logarithm of marginal cost (lnMC) in column 4-6. The treatment variable (Treat) is an indicator variable that takes the value of 1 if the bank is chartered in Arkansas, 0 otherwise. Post is an indicator variable that takes the value of 1 if the time period is from 2000Q1-2002Q4, and 0 otherwise. Definition of all variables is detailed in Table 1. All control variables are 1-quarter or 1year lagged. *, ** and ***indicate significance at the 10%, 5% and 1% levels, respectively. Robust standard errors in parentheses are clustered at the bank level.

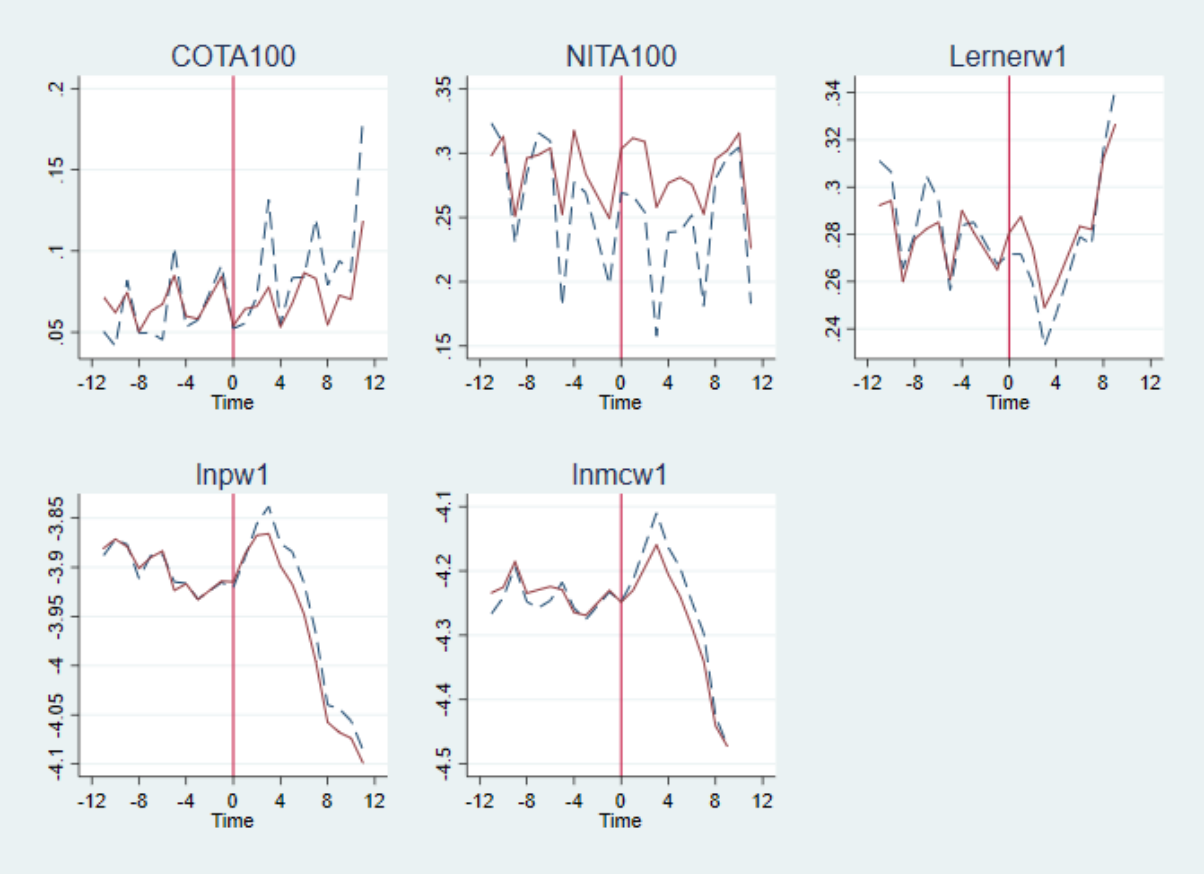
	y= lnP			y=lnMC		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Treat×Post	0.018***	0.013***	0.013**	0.030***	0.027***	0.020***
	(2.84)	(2.63)	(2.34)	(4.04)	(4.27)	(2.96)
lnTA		0.027**	0.040***		-0.008	-0.001
		(2.11)	(2.70)		(-0.71)	(-0.07)
TETA		-0.548***	-0.516***		0.073	0.184
		(-4.54)	(-3.82)		(0.57)	(1.27)
CR		-0.009	-0.002		-0.080***	-0.082***
		(-0.56)	(-0.13)		(-4.25)	(-3.90)
ROE		0.224**	0.251*		-0.645***	-0.634***
		(2.30)	(1.96)		(-5.71)	(-5.17)
DOA		-0.142***	-0.137***		-0.135**	-0.115**
		(-3.06)	(-2.79)		(-2.57)	(-2.09)
NIT		0.383***	0.409***		0.416***	0.484***
		(5.21)	(3.26)		(4.44)	(3.31)
OverheadsTA		4.073**	3.585*		4.217	3.168
		(2.19)	(1.86)		(1.45)	(1.18)
GrowthTA		-0.044***	-0.036***		0.023*	0.043**
		(-4.85)	(-3.27)		(1.77)	(2.55)
RGDP		0.013***	-0.062			-0.047
			(-0.37)			(-0.22)
PCPI			0.009			-0.303
			(0.05)			(-1.24)
PCE			-0.034			-0.045
			(-0.90)			(-0.91)
RMHI			-0.089			-0.033
			(-0.44)			(-0.13)
RP			0.175			0.103
			(1.12)			(0.54)
UR			0.043**			0.039*
			(2.03)			(1.73)
No. of obs.	14,171	14,141	11,463	13,130	13,100	10,422
No. of banks	714	714	664	714	714	664
R-squared	0.394	0.448	0.471	0.357	0.400	0.443
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes

Parallel trend assumption

Graph 1



Graph 2



Notes: Graph 1 and 2 illustrate the behaviour of the dependent variables for 12 quarters preceding the reversal of the usury law enactment, and the following 12 quarters. The dash line represents the Arkansas-chartered banks, and the solid line represents the Non-Arkansas-chartered banks. The vertical solid line represents the start of the treatment period.