Breaking the Ceiling: Interest Rate Deregulation and Liquidity Creation

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Abstract

This paper exploits the 1999 Gramm–Leach–Bliley Act, which eliminated Arkansas's longstanding interest rate cap for Arkansas-headquartered banks, to identify how releasing a strict pricing constraint alters bank liquidity creation. We find clear differences across bank size: large banks increase liquidity creation after deregulation, while small banks reduce it, a pattern consistent with established differences in how banks of different sizes adjust to regulatory constraints. The composition of liquidity creation also changes, with large banks shifting toward commercial, industrial, and mortgage lending and small banks increasing individual loans. Competitive pressures intensify once the ceiling is lifted, contributing to the divergent responses among banks. We further show that the ceiling muted the responsiveness of liquidity creation to monetary policy and that this friction disappears following deregulation. Overall, the findings advance the literature by connecting interest rate (de)regulation to core banking functions and the effectiveness of monetary policy.

JEL-Codes: G21; K22; E51

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1 Introduction

Interest rate ceilings remain an important but understudied element of financial regulation in the

U.S. Although nearly every state has maintained some form of interest rate limit over the past century (Bodenhorn, 2007; Boyes and Roberts, 1981), relatively little is known about how such ceilings affect banks' core intermediation activities, particularly their ability to create liquidity. Prior research has primarily focused on the political or macroeconomic dimensions of interest rate ceilings (Temin and Voth, 2008; Benmelech and Moskowitz, 2010; Rigbi, 2013), leaving open fundamental questions about how binding interest rate caps influence bank behavior, competitive dynamics, and the transmission of monetary policy.

This paper examines these issues using a regulatory change affecting banks headquartered in Arkansas. For more than a century, Arkansas maintained the strictest interest rate ceiling in the country, constraining the lending margins of all banks headquartered in the state, regardless of charter type. While out-of-state banks could legally export higher rates after the 1978 Marquette National Bank v. First of Omaha decision (Elliehausen et al., 2021; White, 1999), out-of-state banks never achieved a significant presence in Arkansas. As a result, the ceiling applied disproportionately to Arkansas-chartered institutions, which accounted for over 80% of deposit market share in Arkansas in 1994. Section 731 of the Gramm–Leach–Bliley Act (GLBA) of 1999 eliminated the ceiling by allowing Arkansas banks to match the highest permissible rate charged by any bank operating in the state (Galchus and Vibhakar, 2002; Hill, 2002). Because the law change was externally imposed at the federal level and applied only to Arkansas-headquartered institutions, it provides a clean setting to evaluate the effects of lifting a binding interest rate constraint.

Our primary focus is on bank liquidity creation, a central function through which banks transform illiquid assets into liquid liabilities (Bryant, 1980; Diamond and Dybvig, 1983). Liquidity creation depends heavily on interest-bearing activities, meaning binding interest rate ceilings may limit banks' ability to price risk, expand loan portfolios, and absorb shifts in funding costs. Although banks can adjust fee income or deposit pricing, non-interest income constituted only about 20% of total income for Arkansas banks, limiting their capacity to offset suppressed lending margins. These features make Arkansas a compelling setting for understanding how interest rate ceilings affect the scale and composition of bank intermediation.

Importantly, the impact of removing the ceiling is likely to vary systematically across banks of

different sizes. Large and small banks differ in their business models, capital structures, and sensitivity to pricing constraints (Berger and Bouwman, 2009). Large banks typically operate with more diversified portfolios and greater access to national or wholesale funding markets (Humphrey and Pulley, 1997; Carter and McNulty, 2005; Thakor and Edison, 2024). This flexibility allows them to accommodate higher-risk lending and to rapidly expand liquidity creation when regulatory constraints are lifted. In contrast, small banks rely more heavily on relationship lending and local deposit funding (Cole et al., 2004; De la Torre et al., 2010; Berger and Black, 2011). These characteristics may leave them more vulnerable to intensified competition once interest rate ceilings are removed, constraining their ability to expand credit. Consistent with these mechanisms, we find that after deregulation small banks decrease asset-adjusted liquidity creation by 6.4%, while large banks increase it by 34.7%.[1] Moreover, banks with higher profitability, stronger capital positions, and greater risk appetite experience larger increases in liquidity creation after the reform, suggesting that financial strength and risk appetite play an important role in enabling banks to capitalise on the deregulation.

The removal of the ceiling also had pronounced effects on competition. Interest rate ceilings compress pricing margins and limit the scope for price-based competition, removing these constraints increased competitive pressure within Arkansas. The Lerner index declined significantly after deregulation, with sharper reductions among large banks (Illueca et al., 2014; Kick and Prieto, 2015). Additional indicators reinforce this pattern, market share shifted away from small banks toward larger banks, interest rate margins expand more significantly for large banks. These shifts suggest that the removal of the ceiling intensified competitive forces in a way that disproportionately affected banks of different sizes.

Interest rate ceilings also influence the transmission of monetary policy. The lending channel is a key mechanism through which changes in the federal funds rate affect credit supply (Ashcraft, 2006; Morais et al., 2019). When a binding interest rate ceiling prevents banks from repricing loans in response to changes in funding costs, monetary policy becomes less effective. Consistent with this mechanism, we find that before the ceiling was removed, a 1% increase in the federal funds rate reduced liquidity creation by only 2.48%. After the deregulation, the effect grew

[1]Following Berger and Bouwman (2009), we classify banks with less than $1 billion in assets as small and those above $1 billion as large.

substantially: the same 1% increase lowered liquidity creation by 13.89%. This stark contrast shows that binding interest rate ceilings can materially distort monetary policy transmission by muting banks' responsiveness to policy shocks.

We conduct a wide range of robustness tests to validate these findings. Adjusting the treatment date to account for the delayed implementation of the GLBA yields consistent estimates. Restricting the sample to neighboring states alleviates concerns about regional heterogeneity and confirms the robustness of our results. In addition, we employ alternative measures of bank exposure to Arkansas, beyond bank headquarters location, to further mitigate measurement concerns. Our conclusions also remain robust to alternative clustering methods, controls for state-level macroeconomic conditions, and tests for the parallel trends assumption. Pre-treatment comparisons show no significant differences in key bank characteristics or local economic conditions between Arkansas and non-Arkansas banks, supporting the exogeneity of the policy change.

Taken together, our results show that binding interest rate ceilings significantly constrained banks' liquidity creation, shaped competitive dynamics, and weakened monetary policy transmission. The removal of Arkansas's ceiling through the GLBA provides rare evidence on how lifting a long-standing regulatory constraint can reshape the scale, composition, and responsiveness of bank intermediation.

We contribute to several strands of the literature. Theoretical and empirical research suggests that liquidity creation plays a crucial role in capital allocation and economic growth (Levine, 1991; Donaldson et al., 2018). Given its economic significance, prior studies have examined various determinants of liquidity creation, including bank capital (Berger and Bouwman, 2009), financial distress (Cornett et al., 2011), and government interventions such as the Troubled Asset Relief Program (Berger and Roman, 2017; Duchin and Sosyura, 2014). Recent research also extends the discussion of liquidity creation to the insurance sector, highlighting a reciprocal link between reinsurance demand and liquidity creation (Desjardins et al., 2022). This paper contributes to the liquidity creation literature by providing the first empirical analysis of how interest rate deregulations affect bank liquidity creation. By exploiting a natural experiment in Arkansas, this study sheds light on how regulatory changes affect liquidity creation and how bank characteristics shape the intermediation process.

Our work also contributes to the literature on monetary policy transmission by documenting a previously overlooked factor: the role of interest rate ceilings in restricting the effectiveness of monetary policy. Prior research has examined the bank lending channel (Kashyap and Stein, 1995, 2000; Gambacorta, 2008), the net worth channel (Bernanke and Gertler, 1995; Mishkin, 1996), the impacts on financial markets (Fern´andez-Amador et al., 2013; Malliaropulos and Migiakis, 2023), and the redistributive effects of monetary policy (Brunnermeier and Sannikov, 2016). While previous studies have also examined how monetary policy influences lending and risk-taking (Acharya and Steffen, 2015; Adrian et al., 2019), we highlight how regulatory interest rate caps limit banks' ability to adjust lending rates in response to monetary policy changes, thereby weakening the transmission mechanism. By analysing the removal of interest rate ceiling in Arkansas, we demonstrate that interest rate ceiling introduces a friction that weakens the impact of monetary policy on liquidity creation, and their removal enhances liquidity creation by allowing banks to respond more dynamically to policy changes. These insights extend the existing literature by showing how financial regulation can either impede or facilitate monetary policy effectiveness.

Our study extends to the literature on interest rate ceiling by moving beyond their effects on bank lending to examine their broader impact on liquidity creation and multiple dimensions of banking activities, including lendind and competition. While prior research has primarily focused on how interest rate ceiling restrict credit availability and alter loan allocation (e.g., Benmelech and Moskowitz (2010); Temin and Voth (2008), we document a new channel through which these regulations shape the banking sector—by constraining liquidity creation and limiting banks' ability to respond to monetary policy. Analyzing the removal of interest rate regulation in Arkansas, we show that lifting these restrictions not only increased bank lending but also enhanced overall liquidity creation, allowing banks to adjust more dynamically to policy shifts. Furthermore, our findings highlight the broader implications of interest rate ceiling on banking competition and loan quality. While prior studies suggest that interest rate caps can lead to credit rationing and distort market allocation (Wesson, 2001; Peterson, 1983), we show that their removal fosters a more competitive banking environment. By documenting how interest rate ceiling repeal affects bank behavior across several dimensions, our study offers fresh evidence on the links between interest rate ceiling, monetary policy transmission, and the functioning of the banking sector.

The remainder of the paper is organized as follows. Section 2 provides an overview of the institutional background. Section 3 describes the data used in our analysis. Section 4 outlines the empirical strategy, while Section 5 presents and discusses the results. Finally, Section 6 offers concluding remarks.

2 Institutional background

The institutional environment in Arkansas provides an ideal setting for studying the effects of interest rate ceilings. For decades, banks headquartered in the state operated under a binding regulatory cap that restricted their ability to price loans in line with market conditions. Because these rules applied broadly across charter types and loan categories, they directly constrained bank lending and liquidity creation in Arkansas. The following details the evolution of the ceiling, the scope of its coverage, and the mechanisms through which it influenced bank behavior, forming the basis for our empirical identification strategy.

2.1 Evolution and economic significance of the Arkansas ceiling

The Arkansas Constitution of 1874 established a uniform interest rate cap of 10%, applying to all loan types and maturities. This limit was broadly in line with prevailing market conditions, as the prime rate fluctuated between 9% and 11% in 1874. However, as market interest rates rose in subsequent decades, especially during the 1970s, and early 1980s, the fixed 10% limit became increasingly binding. Lending at 10% was often unprofitable when the same funds could earn substantially higher returns in other states (Galchus et al., 1989).

Historical evidence indicates that when market conditions pushed lending rates toward or above the statutory ceiling, Arkansas lenders often charged the maximum permissible rate and adjusted non-price terms, such as collateral requirements, maturities, and ancillary charges, to partially compensate for the inability to price risk freely (Collins and Sonstegaard, 1999; Galchus et al., 1989; Galchus and Vibhakar, 2002). These adjustments provided some mitigation, but they

were far from sufficient to offset the underlying constraints imposed by the interest rate ceiling. Consistent with theoretical predictions (e.g., Vandenbrink et al., 1982), such ceilings tend to generate credit rationing pressures, particularly for higher-risk borrowers. Empirical research

likewise shows that stricter interest-rate limits are associated with lower loan volumes and a shift in lending toward safer or better-collateralized segments (Rigbi, 2013; Benmelech and Moskowitz, 2010).

While a full historical analysis is beyond the core scope of the paper, it is informative to examine the earlier period during which the fixed 10% cap interacted with unusually high inflation. To do so, we collected Call Report data from 1976 to 1981, the earliest years available and a period that predates the 1982 reform (Galchus et al., 1989). This allows us to isolate the inflation channel by comparing Arkansas banks with non-Arkansas banks in the full U.S. sample and, separately, with banks headquartered in neighboring states. We analyze how lending and liquidity creation responded to elevated inflation. The results, presented in Table A.2 in the Online Appendix, show that higher inflation was associated with significantly stronger negative effects on liquidity creation among Arkansas banks, consistent with the ceiling becoming increasingly binding as real interest rates tightened.

To mitigate the growing constraint, Arkansas passed Amendment 60 in 1982, allowing loan rates to be set at up to 5 percentage points above the federal discount rate. However, by 1987–1988, as the prime rate rose, the effective maximum permissible interest rate in Arkansas was only one percentage point above the prime rate, leaving the state's ceiling still highly restrictive relative to its neighbors.

Figure 1 plots the Arkansas ceiling alongside the federal funds rate from 1990 to 2007. During the low-interest-rate environments of the early 1990s and early 2000s, the maximum allowable interest rate in Arkansas again fell to 6–8%, making it the strictest interest rate ceiling among neighboring states (Galchus and Vibhakar, 2002). By comparison, Tennessee capped business loans at 24%, Kansas at 15%, while Texas applied varying ceilings by loan type rather than a single statutory limit (Wesson, 2001).

2.2 Adaptation and partial circumvention

Although borrowers and lenders pursued a number of workarounds, these channels only partially mitigated the constraints imposed by the Arkansas ceiling. Studies document that borrowers in border cities, such as Texarkana and Fort Smith, sometimes sought loans from retailers and finance

companies across state lines, where higher rates were legal (Lynch, 1968; Blades and Lynch, 1976; Peterson and Falls, 1981). More recent evidence shows that small-dollar installment lending to Arkansas residents is concentrated almost exclusively in perimeter counties near state borders (Lukongo and Miller Jr, 2022). Interior counties, which contain most of the state's population—had little access to such alternatives. Peterson (1983) also finds that Arkansas consumers increasingly relied on point-of-sale finance, price markups, credit insurance, and other embedded charges as substitutes for conventional loans . While these channels provided some credit, they did not fully replicate the pricing flexibility or availability of traditional bank lending. While these channels provided some credit, they did not fully replicate the pricing flexibility or availability of traditional bank lending. Although out-of-state institutions could export higher rates after the 1978 Marquette National Bank v. First of Omaha decision, their footprint in Arkansas remained small compared with local banks, which accounted for over 80% of the state's deposit market share.

2.3 Federal intervention and the Gramm–Leach–Bliley Act

The Riegle–Neal Interstate Banking and Branching Efficiency Act of 1994 intensified competitive pressures by allowing out-of-state banks to export their home-state interest rate caps into Arkansas. This placed Arkansas banks, still bound by their own constitutional limit, at a structural disadvantage.

Congress addressed this issue through the Gramm–Leach–Bliley Act (GLBA) of 1999. Section 731 targeted Arkansas specifically, as it remained the last state with a constitutional ceiling tied to the federal discount rate. The statute temporarily allowed Arkansas banks to match the highest permissible rate charged by any bank operating in the state (Galchus and Vibhakar, 2002; Hill, 2002).

"[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 Arkansas banks would be able to charge 24%.

2.4 Population of banks affected by the GLBA

All banks headquartered in Arkansas, both state-chartered and nationally chartered, were subject to the Arkansas constitutional interest rate ceiling when extending credit to Arkansas borrowers prior to the passage of the GLBA. Following the Arkansas Supreme Court’s Sloan v. Sears (1957) decision, the 10% ceiling was explicitly affirmed to apply uniformly to virtually all forms of credit issued within the state, regardless of loan type, lender charter, or borrower characteristics. In practice, this meant that any bank whose home state was Arkansas faced the same binding statutory interest-rate constraint.

Although the U.S. Supreme Court’s Marquette (1978) ruling permits out-of-state banks to “export” the interest rate ceilings of their home state (Elliehausen et al., 2021; White, 1999), the presence of such institutions in Arkansas remained limited throughout our sample period. Arkansas-headquartered institutions overwhelmingly dominated the local banking market. In 1994,

for instance, they accounted for 81.9% of total deposits in the state and operated approximately 79% of all branch offices. Consequently, the vast majority of lending relationships, deposit intermediation, and liquidity creation in Arkansas were undertaken by banks that were directly bound by the state's restrictive interest rate ceiling.

Given this market structure, the introduction of the GLBA had particularly important implications for Arkansas and Arkansas-headquartered banks, both state-chartered and federally

chartered banks. By allowing in-state banks to charge the same rates as any out-of-state institution operating within Arkansas, the GLBA effectively eliminated a longstanding competitive disadvantage. Prior to the reform, Arkansas banks faced a binding and often severe interest rate constraint, while out-of-state competitors, though limited in number, could legally charge higher rates under Marquette. The GLBA therefore represented a substantial regulatory shock: it leveled the playing field across institutions in Arkansas, relaxed a century-old pricing constraint, and fundamentally altered the environment in which Arkansas banks set loan rates, priced risk, and created liquidity.

3 Data and sample

To construct our sample, we begin with the universe of all commercial and savings banks in the U.S. from 1995 to 2008. The sample period ends before 2008 to exclude the effects of the financial crisis, ensuring that our results are not influenced by the significant disruptions that occurred during that time. Pre-1995 observations are excluded to rule out the impact of the 1994 Riegle-Neal Interstate Banking and Branching Efficiency Act, which allowed nationally chartered banks to apply their home state's interest rate ceiling to other states.

For bank-level balance sheet and income statement data, we obtain quarterly data from the Quarterly Reports on Condition and Income (Call Reports), which are collected and maintained by the Federal Reserve Bank of Chicago. These reports require all U.S. depositary institutions to submit detailed financial information. While some fields, such as trading assets, are only required for banks with total assets exceeding $100 million, most of financial variables are reported by all banks, making the dataset comprehensive for our analysis. The granularity of the Call Reports

allows us to conduct a detailed examination of the interest rate ceiling removal on banks in different aspects. We exclude a bank if it has no deposits, has 0 or negative equity capital. We further exclude banks with changing headquarter states over the sample period.

For liquidity creation, we follow Berger and Bouwman (2009) to construct category-based liquidity creation measures[2]. They classify each on- and off-balance sheet bank item as liquid,

[2]Another measure focuses on the maturity of loans, but the category-based liquidity creation measures are preferred by Berger and Bouwman (2009).

semiliquid, or illiquid. Each category is then assigned a weight to reflect its contribution to liquidity creation. illiquid assets, liquid liabilities, and illiquid off-balance sheet items receive a weight of 0.5, while liquid assets, illiquid liabilities, and liquid off-balance sheet items receive a weight of -0.5. Semiliquid items are assigned a weight of 0. These weights assume that banks create liquidity by transforming illiquid assets into liquid liabilities and destroy liquidity by doing the reverse.

The measure of liquidity creation of a bank is calculated as the weighted sum of asset-side, liability-side, and off-balance sheet liquidity creation. To ensure comparability across banks, we normalize these measures by gross total assets, which include total assets, allowances for loan and lease losses, and the allocated transfer risk reserve.

In addition to bank-level data, we incorporate macroeconomic state-level data from the Bureau of Economic Analysis. This includes key economic indicators such as the state unemployment rate, real total gross domestic product and per capita personal income , which help control for broader economic conditions that may influence banking outcomes.

3.1 Summary statistics

Table 3.1 shows summary statistics of key variables in the dataset, based on 378,992 observations. Detailed variable descriptions are in Table A.1 of the Online Appendix. The variable, Arkansas, indicates whether a bank is Arkansas-chartered, suggesting that around 2.4% of banks in the sample belong to this category. The variable, Post-GLBA, which takes a value of 1 for observations in the post-GLBA period, reflecting the distribution of observations across pre- and post-policy change periods. The interaction of the variables, Arkansas and Post-GLBA, reflects

that around 1.2% of observations are Arkansas-chartered banks in the post-GLBA period.

The category-based liquidity creation measures show moderate variation, with CatFat accounting for off-balance sheet items, while CatNonFat does not, having mean values of 0.26 and 0.2, respectively. The liquidity creation measures based on assets and liabilities, LC-Assets and LC-Liabilities, exhibit different levels of dispersion. LC-Assets has a mean of 0.0354, with values ranging from -0.32 to 0.36, while LC-Liabilities has a higher mean of 0.1662 and a narrower range.

The average loan volume of banks, expressed in logarithmic form, is 11.05, which corresponds to approximately USD 63,070 thousands in monetary terms. Among the different loan categories, mortgages have the highest mean at 10.4946, indicating that mortgages constitute the largest share of bank lending. The total assets, which represents the size of the bank in natural logarithm form, have an average of 11.54, translating to approximately USD 102,631 thousands in monetary terms.

Bank performance measures exhibit varying degrees of dispersion. RoA has an average value of 1.11%, while the Interest income ratio and Interest expense ratio have means of 1.7% and 0.7%, respectively. The Equity ratio averages 10.38%, and the Z-score, which reflects distance to default, has a mean of 3.84. Average Lerner index is 0.22.[3]

Lastly, the table also reports the average state-level unemployment rate, real GDP, and per capita personal income.[4] The federal funds rate has a mean of 4.27% over the sample period. For our competition analysis, we additionally report the state-year number of branches, number of banks, and the market share of large banks.

4 Empirical strategy

We employ a difference-in-differences (DiD) approach to examine the impact of removing the interest rate ceiling in Arkansas. This setting involves two groups of banks: Arkansas-chartered banks and non-Arkansas-chartered banks. Before the repeal of the interest rate cap,

Arkansas-chartered banks were prohibited from originating loans exceeding the interest rate ceiling. However, this restriction was lifted following the passage of the Gramm-Leach-Bliley Act. In contrast, non-Arkansas-chartered banks were never subject to the Arkansas interest rate ceiling and the related section of the GLBA.

Given this setup, the DiD approach is well-suited for assessing the effect of removing the state-level interest rate cap. Arkansas-chartered banks serve as the treatment group, while non-Arkansas-chartered banks form the control group. A potential concern is that the Gramm-Leach-Bliley Act (GLBA), enacted in November 1999, introduced several nationwide regulatory changes, most notably the repeal of the separation between commercial banking,

[3]Calculation process of the Lerner index follows Duqi et al. (2021)

[4]These macroeconomic variables are available only from 1997 onward, resulting in a slightly smaller number of observations for these measures.

investment banking, and insurance activities, that may have affected banks differentially. However, these changes applied uniformly to all U.S. banks, regardless of whether they were headquartered in Arkansas. As such, the DiD framework nets out these nationwide effects and isolates the incremental impact associated specifically with Arkansas's removal of its interest rate cap. In other words, any universal impact of GLBA, particularly those accruing to larger banks due to expanded permissible activities, are captured by the control group and therefore differenced out of the estimated treatment effect.

We define the post-treatment period as post-2000Q1, assuming the policy change took effect one quarter after enactment. To address the concern that the effects may materialize only after a related court ruling confirms the interest rate ceiling removal, we adjust the post-treatment date accordingly and replicate the estimation in Section 5.7. The results remain consistent with our baseline findings. To test our hypotheses, we estimate the following equation:

$$Y_{i,t} = \beta_0 + \beta_1 Arkansas_i \times Post\ GLBA_t \times Big\ Banks_{i,t} + \beta_2 Arkansas_i \times Post\ GLBA_t + Other\ Lower\ Order\ Terms + \delta X_{i,t} + \gamma_i + \gamma_t + \varepsilon_{i,t} \quad (1)$$

where $Y_{i,t}$ represents the dependent variable for bank i at time t, and $Arkansas_i$ is a dummy variable

indicating whether a bank is Arkansas-chartered. $Post\ GLBA_t$ is a dummy variable equal to 1 for observations after 2000Q1. $Big\ Banks_{i,t}$ is a dummy variable indicating whether the gross total asset value of the bank i exceeds USD 1 billion at time t. *Other Lower Order Terms* includes all lower-order interactions between $Arkansas_i$, $Post\ GLBA_t$ and $Big\ Banks_{i,t}$, as well as standalone terms that are not absorbed by fixed effects. The coefficient of interest, β_2, captures the effect of removing the interest rate cap on the dependent variable, $Y_{i,t}$. The coefficient β_1 on the triple interaction term $Arkansas_i \times Post\ GLBA_t \times Big\ Banks_{i,t}$ captures the heterogeneous impact of interest rate ceiling removal on large banks.

To account for bank-specific characteristics, we include a set of control variables $X_{i,t}$, including logarithm of total assets, the ratio of total equity to total assets, return on assets, the interest income ratio, interest expense ratio, and the Z-score. Additionally, we control for time-invariant

bank characteristics and common time shocks using bank fixed effects (γ_i) and time fixed effects (γ_t). Standard errors are clustered at the state level to address potential serial correlation arising from economic, institutional, or regional factors. Section 5.7 shows that our results are robust to (i) clustering standard errors at the bank-level and (ii) double clustering the standard errors at the state and year level.

4.1 Setting Validity

The validity of our setting depends on two key assumptions. First, the exogeneity of the removal of interest rate ceiling. We argue that this deregulation was exogenous to bank liquidity creation because it was implemented externally at the federal level as part of the Gramm-Leach-Bliley Act (GLBA), a broader financial reform mainly aims at removing barriers in the market among banking companies, securities companies, and insurance companies that eliminated the restrictions that separated commercial banking from investment banking, merchant banking, and insurance services (Yeager et al., 2004). Moreover, the act had no particular incentive to target Arkansas banks' liquidity creation or local economic conditions, but aimed to level the playing field of Arkansas banks and branches of out-of-state banks (Galchus and Vibhakar, 2002).

Second, the difference-in-differences (DiD) approach relies on the parallel trends assumption

that the dependent variables of Arkansas-chartered banks would have evolved similarly to those of non-Arkansas-chartered banks in the absence of the GLBA. To validate this assumption, we compare treatment and control observations across all U.S. banks over the 1995–1999 period, before the removal of Arkansas' interest rate limit. Table 2 shows that the normalized differences across all characteristics remain below the Imbens and Wooldridge (2009) critical threshold of 0.25, indicating no significant pre-treatment differences between the groups.

Additionally, differences in bank characteristics could undermine comparability between Arkansas and non-Arkansas banks. To address this, Table 2 presents a comparison of key bank characteristics, such as profitability and capital adequacy. We find no significant differences in the average characteristics of Arkansas and non-Arkansas banks before the interest rate ceiling removal. This suggests that our results are unlikely to be driven by pre-existing differences in bank fundamentals. In particular, non-interest income ratios show that Arkansas banks and

non-Arkansas banks exhibit broadly similar reliance on fee-based and other non-lending income sources. The modest differences suggest that banks in both groups draw on comparable levels of non-interest revenue relative to total income. Regarding the possibility that banks circumvented the ceiling by reducing deposit rates, our empirical results show that interest-expense ratios were very similar across Arkansas and non-Arkansas banks prior to deregulation and the normalised difference is below 0.25. It indicates that Arkansas banks did not maintain unusually low deposit costs that could have offset the constraint imposed by the binding cap. Furthermore, the observed similarity provides additional support for the exogeneity of the deregulation, as it indicates that the policy change was not systematically influenced by underlying differences in Arkansas banks.

5 Findings

5.1 Bank liquidity creation

To examine the effects of interest rate ceiling removal on liquidity creation, we employ two measures: (1) CatNonFat, which captures liquidity creation excluding off-balance-sheet items, and (2) CatFat, which includes off-balance-sheet items. We estimate these measures using the full sample, and additionally restrict the sample to banks headquartered in Arkansas and its neighboring states (Missouri, Tennessee, Mississippi, Louisiana, Texas, and Oklahoma) to

enhance comparability. The results are reported in Table 3.

Column 1 begins with a simple specification without any control variables or fixed effects, providing a raw comparison of liquidity creation before and after deregulation for Arkansas banks. The coefficient on *Arkansas* × *P ost-GLBA* is negative, indicating that, on average, Arkansas banks reduced liquidity creation after the deregulation. While this may appear counterintuitive, since the deregulation relaxes interest rate constraints, the result is likely driven by the fact that the sample is dominated by small banks. These institutions face stronger funding frictions, more intense competitive pressure from larger banks, and have less flexibility to reprice loans or adjust their portfolios once the interest rate ceiling was removed. Consequently, a decline in liquidity creation among small banks can outweigh the response of larger banks, leading to an overall negative average effect.

Large banks, by contrast, may respond differently to the deregulation for several reasons. They tend to hold more diversified loan portfolios (Humphrey and Pulley, 1997), employ more advanced risk-management systems (Carter and McNulty, 2005), and face fewer liquidity constraints with greater access to external funding sources (Thakor and Edison, 2024). These factors may enable large banks to expand liquidity creation more aggressively once interest rate ceilings are removed.

To evaluate this possibility, Columns 2–4 incorporate bank size heterogeneity through two key terms: *Arkansas* × *P ost* − *GLBA*, capturing the effect for small Arkansas banks, and *Arkansas* × *P ost* − *GLBA* × *Big Bank*, capturing how this effect differs for large Arkansas banks (i.e., gross total asset value exceeds USD 1 billion). With fixed effects included, the standalone Arkansas and Post-GLBA terms are absorbed by the fixed effects. Column 2 of Table 3 presents the estimates of Equation 1 without control variables but with fixed effects. The coefficient on *Arkansas* × *P ost* − *GLBA* is –0.013, implying that smaller Arkansas banks reduced liquidity creation by approximately 6.4% (−0.013⁄0.2016) after the removal. The triple interaction term is 0.083 and significant at the 1% level, indicating that large Arkansas banks increased liquidity creation by 34.7% ($\frac{-0.013+0.083}{0.2016}$) relative to smaller banks. These results point to a substantial redistribution of liquidity creation activity from small to large banks.

Column 3 includes bank-level control variables to account for observable differences across institutions. The key coefficients remain highly stable, reinforcing the exogeneity of the interest rate ceiling removal and the robustness of our findings. The removal of interest rate ceilings could also affect off-balance-sheet activities—such as loan commitments—we re-estimate the specification using the CatFat measure. Column 4 shows that the results remain very similar, indicating that off-balance-sheet items do not drive the main findings.

Columns 5 and 6 replicate the analysis using only banks headquartered in Arkansas and its neighboring states. This sample restriction ensures comparability across institutions operating in the same regional credit markets. Column 5 reports results for CatNonFat and Column 6 for CatFat. The estimates closely mirror those from the full-sample specification, confirming that including the broader U.S. sample does not bias the baseline results and reinforcing the validity of our identification strategy.

In Table A.3 of the Online Appendix, we verify that our findings are not sensitive to how we measure banks' exposure to Arkansas. While headquarters location serves as a natural baseline indicator, it may not fully capture the geographic distribution of bank activity. To address this concern, we construct two alternative exposure measures using Summary of Deposits (SoD) data: (i) the share of a bank's branches located in Arkansas and (ii) the share of deposits sourced from Arkansas. Arkansas-chartered banks exhibit very high exposure on both dimensions—typically exceeding 90%, whereas out-of-state banks maintain only a minimal operational presence within the state. Re-estimating our baseline specifications using these SoD-based measures produces results that closely mirror those obtained with the headquarters indicator. These robustness checks, reported in Table A.3 of the Online Appendix, confirm that our results are not driven by the choice of exposure measure.

Overall, these findings provide strong evidence that large banks responded differently from small banks to the removal of interest rate ceiling, with the former increasing liquidity creation.

5.1.1 Dynamic effects

Having established the average treatment effects of interest rate ceiling removal on banks' liquidity creation using our baseline DiD specifications, we next examine how these effects on large banks evolved over time. To do so, we estimate the dynamic response of Arkansas large banks by implementing the following event–study specification:

$$CatNonFat_{i,t} = \alpha + \sum_{Year=1998, Year\neq 2000}^{2005} \beta_k Arkansas_i \times 1\{\text{Year} = t\}) + \delta X_{i,t} + \gamma_i + \gamma_t + \varepsilon_{i,t} \quad (2)$$

where $CatNonFat_{i,t}$ denotes the liquidity creation measure, and $1\{\text{Year} = t\}$ is an indicator equal to one if observation t in calendar year, $Year$, with the deregulation year, year 2000, omitted as the baseline. The coefficients β_k trace the year-by-year dynamic response of large Arkansas banks relative to non-Arkansas banks. We include bank and year fixed effects and estimate the model to capture the temporal adjustment path. Definitions of all other variables follow equation 1.

Figure 2 plots the event–study coefficients together with their 95% confidence intervals. As illustrated in the figure, the pre-deregulation coefficients (1998–1999) are small, statistically insignificant, and centred around zero, with confidence intervals that span zero. This provides strong support for the parallel-trends assumption underlying our DiD framework. Beginning in 2001, the point estimates become positive and remain consistently above zero through 2005. The corresponding 95% confidence intervals tighten over time and lie entirely above zero in most post-treatment years, indicating a gradual and statistically significant increase in liquidity creation by large Arkansas banks after the GLBA. The magnitude of the effects rises to roughly 0.015–0.025 in the later years (2002–2005), consistent with the cumulative expansion documented in our baseline estimates.

The dynamic pattern confirms two key points. First, there are no differential trend exists prior to deregulation, validating the identification strategy. Second, large banks progressively expand liquidity creation after the removal of interest rate ceilings, aligning with the effects documented in

the main results.

5.2 Bank assets ad liabilities

After documenting the overall effects of deregulation on total liquidity creation, we next examine how the removal of interest rate ceiling reshaped the composition of bank balance sheets. Specifically, we separate the analysis into the asset side and liability side of liquidity creation, and further investigate the underlying components, deposits and various loan categories. This decomposition provides insight into the channels through which large and small banks adjusted their intermediation activities following deregulation.

5.2.1 Asset-side effects

Panel A of Table 4 reports the effects on asset-side liquidity creation and various loan categories. Column (1) shows that asset-side liquidity creation declined for small Arkansas banks after deregulation, as indicated by the negative and significant coefficient on *Arkansas* × *P ost* − *GLBA*. In contrast, the triple interaction term is strongly positive, implying that large banks expanded their liquidity creation on the asset side. These patterns mirror the earlier aggregate results: deregulation

widened the gap between large and small institutions in terms of their capacity to create liquidity.

We next examine the effect on total lending. In Column 2 of Panel A we find that the coefficient of *Arkansas* × *P ost GLBA* is -0.043, statistically significant at the 1% level, indicating that total loans declined by 4.2% (= (exp(−0.043) − 1) × 100) for small banks. However, the triple interaction term “Arkansas x Post GLBA x Large Banks” is positive and statistically significant, suggesting that the removal of interest rate ceiling led to a 2.9% increase (= (exp(−0.043 + 0.072) − 1) × 100) in total loans for large banks. This finding reinforces the notion that while small banks contracted lending activities post-removal, large banks expanded their loan portfolios.

To better understand how the removal affected different types of lending, we further examine its impact on three major loan categories in Column 3-5: individual loans, commercial and

industrial (C&I) loans, and mortgages (Den Haan et al., 2007). The responses of large and small banks to the policy change may differ across these categories due to variations in risk tolerance, borrower profiles, and business strategies. For instance, small banks may be more reliant on relationship-based lending (De la Torre et al., 2010; Berger and Black, 2011) and constrained by local market conditions, while large banks, with their greater risk diversification and more sophisticated financial instruments, might be better positioned to exploit newly available lending opportunities (Kishan and Opiela, 2000).

Column 3 in Panel A presents the results for individual loans. The coefficient suggests that the removal of interest rate ceiling increased individual loans by 3.5%, though this effect is only statistically significant at the 10% level. Importantly, the triple interaction term is not significant, implying that both large and small banks responded similarly in terms of individual lending.

For C&I loans, the results in Column 4 reveal a more nuanced pattern. The interest rate ceiling removal did not have a statistically significant impact on small banks' C&I lending. However, large banks expanded their C&I loan portfolios by approximately 11.3%, as indicated by the positive and statistically significant triple interaction term. This could reflect the fact that large banks are better equipped to finance business expansion in a deregulated environment, leveraging their economies of scale and broader access to capital markets.

The most pronounced heterogeneity in response appears in the mortgage market. As shown in Column 5, small banks reduced mortgage lending by approximately 6.2% following the removal of interest rate ceiling. In contrast, large banks significantly increased their mortgage lending by approximately 19.4% . This shift suggests a redistribution of mortgage lending from small to large banks, possibly driven by differences in risk management capabilities, underwriting standards, and access to secondary mortgage markets (Loutskina and Strahan, 2009; Loutskina, 2011). The expansion of mortgage lending by large banks is also consistent with the observed increase in liquidity creation post-removal, as mortgages constitute a substantial portion of banks' asset-side liquidity creation.

Findings thus far highlight the heterogeneous effects of interest rate ceiling removal on bank lending behavior. While small banks appear to have retrenched their lending activities, large banks capitalized on the regulatory change by expanding their loan portfolios, particularly in the commercial and mortgage markets. These results provide further evidence that the removal of interest rate ceiling led to a redistribution of lending and liquidity creation across different bank sizes.

5.2.2 Liability-side effects

Panel B of Table 4 examines the liability side of the balance sheet, beginning with LC–Liabilities in Column (1). The coefficient on *Arkansas* × *P ost* − *GLBA* is negative and statistically significant, indicating that small Arkansas banks reduced liability-side liquidity creation following deregulation. This pattern is consistent with the contraction observed on the asset side: as small banks curtailed their lending activities, their ability—or need—to generate liquidity through deposit-taking and other liability-side channels also diminished. By contrast, the triple interaction term *Arkansas* × *P ost* − *GLBA* × *Big bank* is positive and highly significant, showing that large banks increased liability-side liquidity creation.

These results imply that deregulation not only changed bank lending behavior but also produced corresponding adjustments in funding structures. The weaker effects on the liability side (reflected in the smaller coefficients of interest, compared with the results in column 1 of Panel A) are consistent with our expectations that the removal of interest rate ceilings affects the asset side directly by relaxing constraints on loan pricing, while liability side adjustments occur indirectly as banks modify

their funding strategies in response.

Column (2) provides examine the impact on deposits, the primary funding source for most commercial banks. The coefficient on *Arkansas* × *P ost* − *GLBA* indicates that deposits at small banks declined by approximately 1.6% after deregulation. In sharp contrast, the triple interaction term reveals that large banks increased deposits by roughly 10.8%. This substantial inflow of

deposits toward large institutions suggests that they were able to attract new funding to support their post-deregulation expansion in lending documented in Panel A.

Taken together, the liability-side results in Columns (1) and (2) show a consistent pattern: deregulation led to a reallocation of deposit funding away from small banks and toward large institutions. This reallocation both enabled and reflected the expansion of lending by large banks and the relative retrenchment of smaller banks, reinforcing the broader narrative of competitive restructuring triggered by the removal of interest rate cap.

5.3 Heterogeneous effects across banks

Beyond bank size, other dimensions of cross-sectional variation in banks' responses to the interest rate ceiling removal is their financial strength and risk appetite. We hypothesize that banks with higher capital ratios, which have greater financial resilience, may be better positioned to expand lending without the need for additional external funding (Carlson et al., 2013; Kim and Sohn, 2017). This ability to lend more freely could allow them to increase liquidity creation and total loan issuance at a greater pace than less well-capitalized banks. Similarly, banks with stronger, more stable profitability, and longer distance-to-default, measured by Z-score, may also respond more aggressively by expanding their loan portfolios and liquidity creation. More profitable banks tend to have stronger internal capital generation, reducing their reliance on costly external financing and enabling them to extend more credit after regulatory changes. Banks with lower charge-off ratios, reflecting more conservative risk-taking. By contrast, banks with higher charge-off ratios, reflecting more aggressive risk-taking, may exhibit a stronger incentive to exploit the relaxed interest rate ceilings.

To test these conjectures, we introduce triple interaction terms in our regression framework to examine the heterogeneous effects of interest rate ceiling removal on banks with different financial characteristics. The results in Table 5 are consistent with our expectations: banks with higher capital ratios exhibit greater increases in liquidity creation (Column 1) and total loan issuance (Column 4) following the removal of interest rate ceiling. Consistent with Berger and Bouwman (2009), this finding underscores the critical role of capital in supporting liquidity creation, as

well-capitalized banks have more flexibility to absorb risks and expand their balance sheets when regulatory constraints are lifted.

We also find that banks with higher Z-scores, indicating greater financial stability, also experience significant increases in liquidity creation (Column 2) and total loans (Column 5) in Table 5 after the interest rate ceiling removal. This result aligns with the idea that banks with stronger profitability and stability are better equipped to take advantage of new lending opportunities.

Finally, Columns (3) and (6) of Table 5 examine heterogeneity using the charge-off ratio, which serves as a proxy for banks' risk appetite. Higher charge-off ratios generally indicate that banks either take on riskier borrowers or apply more aggressive lending standards. Consistent with this interpretation, we find that banks with higher charge-off ratios exhibit substantially larger increases in both liquidity creation and total loans following deregulation. This pattern suggests that institutions already engaging in riskier lending behaved even more aggressively once interest rate ceilings were lifted, potentially exploiting wider lending margins. In contrast, banks with lower charge-off ratios, indicative of more conservative risk preferences, display a more muted response, expanding neither liquidity creation nor lending to the same extent.

In addition to bank-level heterogeneity, we also explore how the effects of interest rate ceiling removal vary across states with different regulatory environments. Specifically, we examine two neighboring states, Oklahoma and Mississippi, that differed markedly in the strictness of their interest rate ceilings during our sample period. Oklahoma maintained one of the most restrictive interest rate ceilings in the region (Penick, 1953), whereas Mississippi has no statutory usury limits (Honigsberg et al., 2017). Following the logic that more binding ceilings should generate larger regulatory shocks, we would expect the impact of interest rate ceiling removal to be stronger when benchmarking Arkansas banks against institutions in Oklahoma and weaker when comparing them

to those in Mississippi. The results, presented in Table A.4 in the Online Appendix, are broadly consistent with this expectation: the contrast with Oklahoma yields stronger estimated effects, while comparisons with Mississippi yield weaker effects. We interpret these findings with caution because statutory ceilings often vary by loan category, maturity, and borrower type, making it difficult to construct perfectly comparable regulatory intensity measures across states. For this

reason, we reference the results in the main text to provide readers with a more complete picture of how the regulatory environment conditions the impacts documented in our baseline analysis.

5.4 Loan quality, bank soundness and profitability

In addition to documenting how interest rate ceiling removal reshaped banks' lending behavior, it is important to assess whether these adjustments were accompanied by changes in loan quality, which directly reflects the riskiness of newly originated credit. Because deregulation expands pricing flexibility and increases lending margins, banks may adjust their credit allocation, potentially altering borrower composition or underwriting standards in ways that affect realized loan performance. At the same time, greater pricing freedom may allow banks to better screen and price risk, resulting in stable or even improved loan quality.

To examine this dimension, we focus primarily on loan quality, measured using the forward-looking charge-off ratio as an indicator of realized credit losses. We complement this with two broader measures, the forward-looking Z-score (capturing distance to default) and forward-looking return on assets (RoA), measured twelve quarters ahead, to determine whether any changes in loan performance translated into shifts in overall stability or profitability. Comparisons are made against banks in neighboring states to control for shared regional economic conditions and to isolate the effect of the interest rate ceiling removal from broader trends.

The results, presented in Table A.5 in the Online Appendix, show no evidence that deregulation materially affected loan quality. Charge-off ratios for Arkansas banks do not differ significantly from those of banks in neighboring states after the removal of interest rate ceilings, indicating that the observed shifts in lending volume and composition did not lead to an increase in realized credit losses. Similarly, we find no significant changes in the Z-score or forward-looking RoA, suggesting

that the broader risk profile and profitability of Arkansas banks remained stable over the longer term.

5.5 Bank competition

A central mechanism through which the removal of interest rate ceilings may affect bank behavior is competition. By relaxing constraints on lending rates, deregulation can alter banks' incentives to enter markets, expand their physical presence, and compete for borrowers. Examining changes in market structure therefore provides complementary evidence on whether deregulation reshaped competitive conditions in Arkansas and helps clarify how competitive forces underpin the effects documented in our baseline analysis.

5.5.1 Bank entry

To evaluate the impact of deregulation on competitive dynamics, we first examine whether the removal of Arkansas's interest rate ceiling led to changes in bank entry in Arkansas. Deregulation may alter competitive incentives in ways that affect market structure. The deregulation may attract new entrants or encourage branch expansion, while heightened competition may increase exit among weaker institutions. Understanding these structural adjustments provides additional insight into how deregulation reshaped the Arkansas banking landscape.

We estimate the impact of interest rate ceiling removal on the number of bank branches and the number of banks headquartered in each state using the following difference-in-differences model:

$$Y_{i,t} = \beta_0 + \beta_1 (Arkansas_i \times Post\text{-}GLBA_t) + \delta X_{i,t} + \gamma_i + \gamma_t + \varepsilon_{i,t}. \quad (3)$$

where $Y_{i,\ t}$ is either the natural logarithm of the number of branches in state i in year t, or the natural logarithm of the number of banks headquartered in state i year t. $Arkansas_i \times Post - GLBA_t$ captures the differential post-deregulation change specific to Arkansas; $X_{i,t}$ is a vector of state-level controls (unemployment, real GDP, personal income); γ_i and γ_t denote state and year fixed effects, respectively.

Table 6 reports the estimated impacts on the number of branches (Columns 1-3) and the number of banks headquartered in each state (Columns 4-6).

Across all specifications, the coefficient on *Arkansas* × *P ost* − *GLBA* is positive, significant, and stable in magnitude. The estimates indicate that Arkansas experienced a 9.6% to 10.7% increase in the number of branches relative to other states following deregulation. This suggests that banks expanded their physical presence as lending margins widened, consistent with intensified post-deregulation competition and greater incentives to capture local market share. The results remain robust after controlling for macroeconomic conditions and including state and year fixed effects.

The results for the number of banks headquartered in each state show a similar pattern Columns 4–6. The coefficient on *Arkansas* × *P ost* − *GLBA* ranges from 0.129 to 0.170, indicating a 13% to 17% relative increase in the number of banks headquartered in Arkansas after the policy change.

Overall, the findings in Table 6 suggest that the removal of interest rate ceilings did not merely influence lending and liquidity creation but also contributed to broader structural changes in Arkansas's banking market. The increase in both branch counts and the number of banks headquarterd in the state is consistent with a more competitive environment, which encouraged expansion and drew additional institutions into the market.

5.5.2 Competition effects

The preceding analysis shows that Arkansas experienced a notable increase in both the number of bank branches and the number of banks operating in the state following the removal of the interest rate cap. Such structural expansions typically occur when competitive conditions shift, either because deregulation opens new profit opportunities or because institutions reposition themselves to defend or expand their market share. Theoretically, the implications for competition may run in two opposing directions. On the one hand, competition among Arkansas banks may

intensify, as institutions compete more aggressively for borrowers and depositors in a newly deregulated environment. This increased rivalry can raise marginal costs, particularly if banks expand into riskier lending markets where they have limited expertise (Illueca et al., 2014; Kick and Prieto,

2015). Because the Lerner index captures both price-setting ability and cost conditions, a rise in marginal costs that is not matched by higher revenues would lower the index, indicating reduced market power. On the other hand, the removal of interest rate ceilings may strengthen Arkansas banks' market power if deregulation enables them to compete more effectively with out-of-state institutions, thereby increasing their loan revenues and potentially raising their Lerner index. To empirically assess which mechanism dominates, we examine three complementary measures of market power: the Lerner index, the interest margin, and deposit market share across bank sizes.

Column (1) of Table 7 shows that the Lerner index for Arkansas banks declines by approximately 0.8% after deregulation. Since the Lerner index measures the ability to set loan prices above marginal cost, this decline indicates an increase in competitive pressure. Combined with the branch expansion documented earlier, this pattern is consistent with banks competing more aggressively for both borrowers and depositors once interest rate ceilings were lifted.

Column (2) introduces heterogeneity by bank size. The triple interaction term *Arkansas* × *P ost* − *GLBA* × *Big bank* is negative and significant, indicating that large banks experienced a sharper decline in pricing power than smaller banks. This aligns with earlier findings that large institutions expanded their lending portfolios and branch networks more aggressively after deregulation. Rapid expansion can raise marginal costs, through higher overhead, riskier loan origination, or increased screening costs, which can compress the Lerner index despite higher loan revenue. In this sense, the decline in large banks' Lerner index reflects an intensified competitive environment in which expansion does not translate into greater pricing power.

Column (3) shows that interest margins increased significantly after the removal of the interest rate ceiling. This is expected, as banks were no longer constrained by the statutory cap. The effect is even stronger for large banks, as indicated by the positive and significant triple interaction term. This pattern, when read alongside their falling Lerner index, suggests that large banks captured wider spreads mechanically due to deregulation, but competitive pressures and rising marginal

costs tempered their ability to fully translate these higher spreads into greater Lerner index.

Column (4) examines the deposit market share of large banks and reveals a substantial gain—approximately 5.1 percentage points—for Arkansas's large institutions after deregulation.

This is a crucial link to the branch and bank entry/exit results: the earlier expansion of branches and institutional presence is consistent with large banks strategically strengthening their position in the deposit market. Increased branch presence likely enhanced their ability to attract deposits, supporting the substantial loan growth observed in earlier sections. This result demonstrates that deregulation not only intensified competition but also contributed to a redistribution of market share toward larger banks, which were better positioned to capitalise on expanded lending margins.

Taken together, the results in Table 7, a decline in pricing power, wider interest margins, and a significant rise in large-bank market share, complement the earlier evidence on branch expansion and institutional growth. Deregulation did not simply reshape how banks priced loans; it transformed the competitive structure of Arkansas's banking sector. Large banks expanded most aggressively, gained market share, and faced heightened competitive pressures.

5.6 Monetary policy transmission

The findings above show that removing interest rate limits significantly altered banks' liquidity creation, with heterogeneous effects between large and small institutions. These results have broader implications for understanding how regulatory constraints interact with the functioning of the banking system. In particular, if interest rate ceilings restrict banks' ability to adjust lending terms, they may also impede the transmission of monetary policy through the lending channel. This raises an important policy question: could the presence of interest rate ceiling have dampened banks' responsiveness to changes in policy rates, thereby introducing frictions into the monetary transmission mechanism?

Lending channel plays an important role in transmitting monetary policy (Ashcraft, 2006; Morais et al., 2019), interest rate ceiling could introduce frictions in the transmission of monetary policy through the lending channel. For example, an expansionary monetary policy may not be

effectively transmitted to Arkansas banks due to the presence of an interest rate ceiling, which restricts their ability to adjust lending rates accordingly. This is a policy-relevant discussion but lack of empirical evidence, as heterogeneous interest rate ceilings could be an overlooked factor influencing the transmission of monetary policy.

To investigate this, we introduce a measure of monetary policy into Equation 1, specifically the federal funds rate, to capture variations in monetary policy. Columns 1 and 3 of Table 8 present the estimation results for “CatNonFat” and the logarithm of total loans, respectively, without time and bank fixed effects. We exclude fixed effects in these columns to directly capture the effect of changes in the federal funds rate on liquidity creation and total bank lending. The coefficients for changes in the federal funds rate align with our expectations—an increase in the federal funds rate reduces both liquidity creation and bank lending.

Our key variables of interest are “Arkansas x Fed Funds Rate” and “Arkansas x Fed Funds Rate x Post GLBA.” In both Columns 1 and 3, the coefficient for “Arkansas x Fed Funds Rate” is positive and statistically significant at the 1% level. The absolute value of this coefficient is smaller than the direct effect of the federal funds rate, implying that while changes in the federal funds rate negatively impact liquidity creation, the effects are muted for Arkansas banks. This suggests that, due to the interest rate ceiling, liquidity creation and total lending by Arkansas banks are less responsive to monetary policy changes.

The triple interaction term “Arkansas x Fed Funds Rate x Post GLBA” in both Columns 1 and 3 is negative and statistically significant at the 1% level. This result implies that the removal of the interest rate ceiling eliminates the friction in monetary policy transmission caused by interest rate ceilings. Specifically, before the interest rate limit was removed, a 1% increase in the federal funds rate reduced liquidity creation by 2.48% and total loans by 1.4%. However, after the removal of the interest rate ceiling, the same 1% increase in the federal funds rate led to a significantly larger reduction of 13.89% in liquidity creation and 6.2% in total loans.

To ensure robustness, we re-estimate these results in Columns 2 and 4 of Table 8 with time and bank fixed effects. The conclusions remain unchanged, confirming that our findings are not driven by omitted fixed effects. These results provide undocumented evidence that the interest

rate ceiling introduced a friction in monetary policy transmission in Arkansas, and its removal eliminated this distortion, allowing monetary policy to have a more uniform impact across states.

5.7 Robustness tests

In this section, we conduct a series of robustness tests to assess the stability of our findings. These exercises address potential concerns related to treatment timing, standard errors clustering, and omitted macroeconomic factors.

5.7.1 Treatment date adjustment

Our first set of robustness tests focuses on the choice of the treatment date in our analysis. In the baseline specification, we define the implementation date of the Gramm-Leach-Bliley Act (GLBA) as the treatment date. However, Galchus and Vibhakar (2002) documents that Arkansas bankers delayed their response to the GLBA until a decisive court ruling clarified its enforceability in October 2021. The relevant court ruling, Johnson v. Bank of Bentonville, provided legal certainty regarding the implementation of the GLBA in Arkansas. To account for this potential delay in the policy's impact, we adjust our treatment date to reflect the post-court ruling period, setting Post GLBA = 1 in Equation 1 for observations after 2001Q4. We re-estimate our main regressions using this adjusted treatment date and present the results in Panel A of Table 9. The results remain consistent with our baseline findings, reinforcing the robustness of our conclusions.

5.7.2 Standard errors clustering

Finally, we examine the potential impact of different clustering levels in our standard error estimations. In our baseline analysis, we cluster standard errors at the state level, which accounts for within-state correlations in the data. However, clustering at the state level may lead to biased inference if shocks are correlated across time or institutions. To address this concern, we conduct two additional robustness checks:(i) Double clustering at the state × year level, which accounts for both within-state and within-year correlations. (ii) Bank-level clustering, which adjusts for potential

within-bank serial correlation in lending decisions. The results, displayed in Panel B and C of Table 9, remain consistent across all clustering specifications, confirming that our findings are not sensitive to the choice of clustering level.

5.7.3 Macroeconomic conditions

To further ensure that our results are not driven by state-level economic differences, we introduce additional state-level control variables, including state GDP, price index, and other macroeconomic indicators. By controlling for these economic factors, we isolate the effect of interest rate ceiling from broader economic conditions that could influence bank lending and liquidity creation. The results, displayed in Panel D of Table 9, remain robust, indicating that our baseline findings are not sensitive to variations in state-level economic conditions. [5]

These robustness tests reinforce the validity of our main results, demonstrating that our conclusions regarding the effects of interest rate ceiling removal are not driven by the choice of treatment date, sample selection, regional economic conditions, or standard error clustering choices.

6 Conclusion

This paper provides new evidence on how interest rate (de)regulation affects liquidity creation, bank competition, and the transmission of monetary policy. Using the repeal of Arkansas's long-standing interest rate ceiling, we show that relaxing binding interest rate ceilings has important and heterogeneous implications for banks and for the broader banking market.

Our results demonstrate that deregulation does not impact all banks in the same way. Smaller institutions, often lacking the scale, operational capacity, or risk-management expertise to adjust effectively to a deregulated environment, experience constrained liquidity creation following the removal of the ceiling. In contrast, larger banks benefit from increased pricing flexibility, enabling them to expand lending and generate more liquidity. These asymmetric outcomes highlight the

importance for policymakers of considering how interest rate (de)regulations interact with institutional size and capability. We also find that the repeal of Arkansas's interest rate ceiling reduced market power among banks that had previously operated under the protection of the cap. Incorporating market power considerations into the design and evaluation of interest rate ceilings is

[5]One may also ask whether the removal of the interest rate ceiling had broader real-economy effects. However, identifying causal effects in these aggregates is challenging due to confounding events, such as state-level policy changes and industry-specific shocks that could mask the impact of the removal. For completeness, Figure A.1 in the Online Appendix compares the movements of per capita personal income and the unemployment rate across Arkansas and other states over time, we do not observe pronounced changes in the years immediately following the removal.

therefore essential to understanding their broader effects.

Our analysis further shows that interest rate ceilings introduce frictions into monetary policy transmission. Prior to deregulation, Arkansas banks were less responsive to Federal Reserve rate movements because the ceiling constrained their ability to adjust loan pricing. After the ceiling's removal, lending responded more strongly to monetary policy, suggesting that tight interest rate caps can weaken the central bank's ability to influence credit conditions. Finally, we document that financial strength plays an important role in shaping banks' responses to deregulation. Banks with stronger capital positions and higher profitability were better placed to expand lending following the repeal, highlighting the value of regulatory frameworks that promote robust capitalization to enhance resilience during policy transitions.

Importantly, our results also speak directly to ongoing policy debates on interest rate regulation (Franey and King, 2024; Nova, 2024). Recent proposals in the U.S. to cap credit card interest rates have renewed attention to the role of interest rate ceiling in shaping credit supply and consumer protection. While these initiatives target consumer lending, they underscore the continued relevance of understanding how interest rate ceilings can affect bank behavior and financial stability. Our findings suggest that policymakers evaluating such proposals should carefully weigh their intended benefits against the potential for unintended consequences within the banking sector, including those related to competition, liquidity creation, and monetary policy effectiveness.

References

Acharya, V. V. and Steffen, S. (2015). The “greatest” carry trade ever? understanding eurozone bank risks. *Journal of Financial Economics*, 115(2):215–236.

Adrian, T., Estrella, A., and Shin, H. S. (2019). Risk-taking channel of monetary policy. *Financial Management*, 48(3):725–738.

Ashcraft, A. B. (2006). New evidence on the lending channel. *Journal of Money, Credit and Banking*, pages 751–775.

Benmelech, E. and Moskowitz, T. J. (2010). The political economy of financial regulation: Evidence from us state usury laws in the 19th century. *The journal of finance*, 65(3):1029–1073.

Berger, A. N. and Black, L. K. (2011). Bank size, lending technologies, and small business finance. *Journal of Banking & Finance*, 35(3):724–735.

Berger, A. N. and Bouwman, C. H. (2009). Bank liquidity creation. *The review of financial studies*, 22(9):3779–3837.

Berger, A. N. and Roman, R. A. (2017). Did saving wall street really save main street? the real effects of tarp on local economic conditions. *Journal of Financial and Quantitative Analysis*, 52(5):1827–1867.

Bernanke, B. S. and Gertler, M. (1995). Inside the black box: the credit channel of monetary policy transmission. *Journal of Economic perspectives*, 9(4):27–48.

Blades, H. C. and Lynch, G. C. (1976). *Credit Policies and Store Locations in Arkansas Border Cities: Merchant Reactions to a 10 Percent Finance Charge Ceiling*. Credit Research Center, Krannert Graduate School of Management.

Bodenhorn, H. (2007). Usury ceilings and bank lending behavior: Evidence from nineteenth century new york. *Explorations in Economic History*, 44(2):179–202.

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

Brunnermeier, M. K. and Sannikov, Y. (2016). The i theory of money. Technical report, National Bureau of Economic Research.

Bryant, J. (1980). A model of reserves, bank runs, and deposit insurance. *Journal of banking & finance*, 4(4):335–344.

Carlson, M., Shan, H., and Warusawitharana, M. (2013). Capital ratios and bank lending: A matched bank approach. *Journal of Financial Intermediation*, 22(4):663–687.

Carter, D. A. and McNulty, J. E. (2005). Deregulation, technological change, and the business-lending performance of large and small banks. *Journal of Banking & Finance*, 29(5):1113–1130.

Cole, R. A., Goldberg, L. G., and White, L. J. (2004). Cookie cutter vs. character: The micro structure of small business lending by large and small banks. *Journal of financial and quantitative analysis*, 39(2):227–251.

Collins, J. T. and Sonstegaard, M. H. (1999). “ hey buddy can ya’spare a dime?”: Arkansas usury laws revisited. *Arkansas Business and Economic Review*, 32(3):7.

Cornett, M. M., McNutt, J. J., Strahan, P. E., and Tehranian, H. (2011). Liquidity risk management and credit supply in the financial crisis. *Journal of financial economics*, 101(2):297–312.

De la Torre, A., Per´ıa, M. S. M., and Schmukler, S. L. (2010). Bank involvement with smes:

Beyond relationship lending. *Journal of Banking & Finance*, 34(9):2280–2293.

Den Haan, W. J., Sumner, S. W., and Yamashiro, G. M. (2007). Bank loan portfolios and the monetary transmission mechanism. *Journal of Monetary Economics*, 54(3):904–924.

Desjardins, D., Dionne, G., and Kon´e, N. (2022). Reinsurance demand and liquidity creation: A search for bicausality. *Journal of Empirical Finance*, 66:137–154.

Diamond, D. W. and Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. *Journal of political economy*, 91(3):401–419.

Donaldson, J. R., Piacentino, G., and Thakor, A. (2018). Warehouse banking. *Journal of Financial Economics*, 129(2):250–267.

Duchin, R. and Sosyura, D. (2014). Safer ratios, riskier portfolios: Banks response to government aid. *Journal of Financial Economics*, 113(1):1–28.

Duqi, A., McGowan, D., Onali, E., and Torluccio, G. (2021). Natural disasters and economic growth: The role of banking market structure. *Journal of Corporate Finance*, 71:102101.

Elliehausen, G., Hannon, S., and Miller Jr, T. W. (2021). A new look at the effects of the interest rate ceiling in arkansas.

Fern´andez-Amador, O., G¨achter, M., Larch, M., and Peter, G. (2013). Does monetary policy determine stock market liquidity? new evidence from the euro zone. *Journal of Empirical Finance*, 21:54–68.

Franey, J. and King, R. (2024). Trump suggests capping annual credit card interest rates at 10% — but critics fear ‘price controls. *New York Times*.

Galchus, K. E., Martin, C. G., and Vibhakar, A. P. (1989). A history of usury law in arkansas: 1836-1990. *UALR LJ*, 12:695.

Galchus, K. E. and Vibhakar, A. (2002). A continuing history of arkansas’s usury law: On the verge of extinction. *UALR L. Rev.*, 25:819.

Gambacorta, L. (2008). How do banks set interest rates? *European Economic Review*, 52(5):792–819.

Hill, A. K. S. (2002). State usury laws: Are they effective in a post-glba world. *NC Banking Inst.*,

6:411.

Honigsberg, C., Jackson Jr, R. J., and Squire, R. (2017). How does legal enforceability affect consumer lending? evidence from a natural experiment. *The Journal of Law and Economics*, 60(4):673–712.

Humphrey, D. B. and Pulley, L. B. (1997). Banks' responses to deregulation: Profits, technology, and efficiency. *Journal of Money, Credit, and Banking*, pages 73–93.

Illueca, M., Norden, L., and Udell, G. F. (2014). Liberalization and risk-taking: Evidence from government-controlled banks. *Review of Finance*, 18(4):1217–1257.

Imbens, G. W. and Rubin, D. B. (2015). *Causal inference in statistics, social, and biomedical sciences*. Cambridge university press.

Imbens, G. W. and Wooldridge, J. M. (2009). Recent developments in the econometrics of program evaluation. *Journal of Economic Literature*, 47(1):5–86.

Kashyap, A. K. and Stein, J. C. (1995). The impact of monetary policy on bank balance sheets. In *Carnegie-rochester conference series on public policy*, volume 42, pages 151–195. Elsevier.

Kashyap, A. K. and Stein, J. C. (2000). What do a million observations on banks say about the transmission of monetary policy? *American Economic Review*, 90(3):407–428.

Kick, T. and Prieto, E. (2015). Bank risk and competition: Evidence from regional banking markets. *Review of Finance*, 19(3):1185–1222.

Kim, D. and Sohn, W. (2017). The effect of bank capital on lending: Does liquidity matter? *Journal of Banking & Finance*, 77:95–107.

Kishan, R. P. and Opiela, T. P. (2000). Bank size, bank capital, and the bank lending channel. *Journal of Money, credit and banking*, pages 121–141.

Levine, R. (1991). Stock markets, growth, and tax policy. *The journal of Finance*, 46(4):1445–1465.

Loutskina, E. (2011). The role of securitization in bank liquidity and funding management. *Journal of Financial Economics*, 100(3):663–684.

Loutskina, E. and Strahan, P. E. (2009). Securitization and the declining impact of bank finance on loan supply: Evidence from mortgage originations. *The Journal of Finance*, 64(2):861–889.

Lukongo, O. E. B. and Miller Jr, T. W. (2022). The cost of rate caps: Evidence from arkansas. *Journal of Financial Research*, 45(4):881–909.

Lynch, G. C. (1968). Consumer credit at ten per cent simple: The arkansas case. *U. Ill. LF*, page 592.

Malliaropulos, D. and Migiakis, P. (2023). A global monetary policy factor in sovereign bond yields. *Journal of Empirical Finance*, 70:445–465.

Mishkin, F. S. (1996). Understanding financial crises: a developing country perspective.

Morais, B., Peydr´o, J.-L., Rold´an-Pe˜na, J., and Ruiz-Ortega, C. (2019). The international bank lending channel of monetary policy rates and qe: Credit supply, reach-for-yield, and real effects. *The Journal of Finance*, 74(1):55–90.

Nova, A. (2024). Trump's 10*CNBC*.

Penick, E. M. (1953). The impact of usury law on banks in arkansas. *Ark. L. Rev.*, 8:420.

Peterson, R. L. (1983). Usury laws and consumer credit: A note. *The Journal of Finance*, 38(4):1299–1304.

Peterson, R. L. and Falls, G. A. (1981). *Impact of a ten percent usury ceiling: EmpirIcal evidence*. Citeseer.

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

Temin, P. and 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.

Thakor, A. and Edison, G. Y. (2024). Funding liquidity creation by banks. *Journal of Financial Stability*, 73:101295.

Vandenbrink, D. et al. (1982). The effects of usury ceilings. *Economic Perspectives*, 6(1):44–55.

Wesson, S. (2001). A cost-benefit analysis of the arkansas usury law and its effects on arkansas

residents and institutions. In *Academic Forum*, pages 2000–01.

White, J. J. (1999). Usury trompe l'oeil, the. *SCL Rev.*, 51:445.

Yeager, T. J., Yeager, F. C., and Harshman, E. F. (2004). The financial modernization act: Evolution or revolution? *FRB of St. Louis Supervisory Policy Analysis Working Paper*, (2004-05).

7 Tables and figures

Table 1: Summary statistics

Variable Mean Std. Dev. Min. Max. N Arkansas 0.0238 0.1526 0 1 378992 Post-GLBA 0.5830 0.4931 0 1 378992 Big bank 0.0542 0.2265 0 1 378992 CatFat 0.255 0.1753 -0.1749 0.6805 378992 CatNonFat 0.2016 0.1489 -0.1896 0.5378 378992 LC-Assets 0.0354 0.1406 -0.3153 0.3561 378992 LC-Liabilities 0.1662 0.0661 0.0048 0.3432 378992 Total loans(ln) 11.052 1.1638 8.8944 14.8624 378992 Individual loans(ln) 8.5803 1.2987 5.1705 12.7735 378992 C&I loans(ln) 9.0399 1.3835 5.7961 13.1925 378992 Mortgages(ln) 10.4946 1.3224 7.5267 14.3247 378992 Interest margin(%) 1.0032 0.1899 0.5081 1.579 378992 Charge-off ratio(%) 0.067 0.2815 -19.6887 66.1839 378992 Deposits (ln) 11.3867 1.0588 9.6704 14.9485 378992 Total assets(ln) 11.5389 1.0828 9.8453 15.2963 378992 RoA(%) 1.1123 0.7918 -3.9198 3.1131 378992 Interest expense ratio(%) 0.6937 0.2372 0.1603 1.1501 378992 Interest income ratio(%) 1.7005 0.2903 0.9524 2.3574 378992 Equity ratio(%) 10.378 3.2662 5.7526 25.0994 378992 Z-score(ln) 3.8449 0.9456 0.9301 6.0282 378992 Lerner index 0.2216 0.1081 -0.4744 0.4725 377711 Unemployment Rate(ln)

1.5184 0.2352 0.8329 2.1282 345007 Real Total Gross Domestic Product(ln) 12.5168 0.9515 9.9048 14.5592 312188 Per Capita Personal Income(ln) 10.2927 0.1806 9.8193 11.0026 345007 Fed fund rate (%) 4.2654 1.7673 0.9800 6.53 378992 No. of branch per state (ln) 7.04 0.9838 4.8598 8.8974 612 No. of bank per state (ln) 6.3863 1.461 2.4849 9.4031 612 Big bank market share (%) 41.1409 28.1071 0 100 612

Notes: This table provides descriptive statistics for the variables used in the empirical analysis. (ln) denotes that a variable is measured in natural logarithm. (%) denotes that a variable is measured in percentage. Variable descriptions are in Table A.1 of the Online Appendix.

Table 2: Pairwise test

Non-AR AR ND

Mean SD Mean SD ND

△CatNonFat 0.002 0.029 0.001 0.033 0.01 △CatFat 0.002 0.032 0.002 0.034 0.01 △LC-Assets 0.003 0.029 0.003 0.036 0.00 △LC-Liabilities -0.001 0.015 -0.002 0.015 0.02 △Total loans(ln) 0.029 0.078 0.029 0.082 -0.00 △Individual loans(ln) 0.019 0.139 0.024 0.111 -0.03 △C&I loans(ln) 0.031 0.169 0.037 0.164 -0.02 △Mortgages(ln) 0.033 0.090 0.032 0.086 0.01 △Lerner index 0.000 0.075 0.002 0.068 -0.01 △ Interest margin (%) -0.003 0.095 -0.000 0.089 -0.02 △ Deposits(ln) 0.022 0.076 0.023 0.070 -0.01 Total assets(ln) 11.322 1.020 11.348 0.843 -0.02 RoA(%) 1.165 0.719 1.172 0.633 -0.01 Interest expense ratio(%) 0.826 0.149 0.868 0.130 -0.21 Interest income ratio(%) 1.882 0.183 1.835 0.158 0.19 Equity ratio(%) 10.276 3.172 10.390 3.048 -0.03 Z-score(ln) 3.849 0.942 3.921 0.913 -0.05 Non-interest income ratio (%) 0.204 0.158 0.190 0.148 0.06 Interest margin(%) 1.054 0.186 0.966 0.138 0.38 Charge-off ratio (%) 0.066 0.298 0.058 0.201 0.02

Notes: This table reports statistics of relevant co-variates in the paper. Following Imbens and Wooldridge (2009) and Imbens and Rubin (2015), an absolute normalized difference (ND) smaller than 0.25 indicates no significant difference between the groups. Variable descriptions are in Table A.1 of the Online Appendix.

Table 3: Effects On Liquidity Creation

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full			Neighbors		
Dependent variable	CatNonFat	CatFat	CatNonFat	CatFat		
Arkansas × Post-GLBA	-0.017***	-0.013***	-0.016***	-0.017***	-0.028***	-0.028***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
Arkansas × Post-GLBA × Big bank	0.083***	0.065***	0.090***	0.054***	0.078***	
	(0.004)	(0.004)	(0.006)	(0.004)	(0.005)	
Arkansas × Big bank	-0.063***	-0.067***	-0.094***	-0.079***	-0.110***	
	(0.005)	(0.006)	(0.006)	(0.004)	(0.008)	
Post-GLBA × Big bank	-0.005	0.004	0.005	0.013**	0.013**	
	(0.004)	(0.004)	(0.006)	(0.005)	(0.005)	
Big bank	0.008	-0.008	-0.005	-0.006	-0.000	
	(0.005)	(0.006)	(0.006)	(0.008)	(0.011)	
Totat assets(ln)	0.027***	0.035***	0.042***	0.052***		
	(0.003)	(0.004)	(0.008)	(0.010)		
RoA(%)	-0.004***	-0.005***	-0.007***	-0.008***		
	(0.001)	(0.001)	(0.001)	(0.001)		
Interest expense ratio(%)	-0.205***	-0.232***	-0.223***	-0.237***		
	(0.009)	(0.009)	(0.016)	(0.018)		
Interest income ratio(%)	0.191***	0.212***	0.209***	0.222***		
	(0.009)	(0.009)	(0.010)	(0.012)		
Equity ratio(%)	-0.006***	-0.006***	-0.005***	-0.005***		
	(0.000)	(0.000)	(0.001)	(0.001)		
Z_score(ln)	0.000	0.000	-0.001**	-0.001*		
	(0.000)	(0.000)	(0.000)	(0.000)		
Arkansas	-0.055***					
	(0.010)					
Post-GLBA	0.072***					
	(0.003)					
Observations	378992	378992	378992	378992	96448	96448
Year × Quarter FE	No	Yes	Yes	Yes	Yes	Yes
Bank FE	No	Yes	Yes	Yes	Yes	Yes
R^2	0.061	0.850	0.870	0.882	0.874	0.882
Clustering	State	State	State	State	State	State

Notes: This table shows the estimation for equation 1. In Columns (1)–(3), the dependent variable is *CatNonFat*. In Column (4), the dependent variable is *CatFat*. Columns (5) and (6) use *CatNonFat* and *CatFat* as the dependent variables, respectively, and the sample is restricted to banks chartered in Arkansas and its neighboring states. Standard errors clustered at the state level are reported in parentheses. Variable descriptions are in Table A.1 of the Online Appendix. *, **, and *** indicate statistical

significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Impact On Bank Assets And Liabilities

Panel A: Effects on bank assets

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	LC-Assets	Total loans(ln)	Individual loans(ln)	C&I loans(ln)	Mortgages(ln)
Arkansas × Post-GLBA	-0.013***	-0.043***	0.034*	0.016	-0.064***
	(0.002)	(0.007)	(0.019)	(0.015)	(0.013)
Arkansas× Post-GLBA × Big bank	0.044***	0.072***	0.034	0.091***	0.241***
	(0.003)	(0.010)	(0.025)	(0.030)	(0.021)
Arkansas × Big bank	-0.078***	-0.155***	0.053	-0.056	-0.316***
	(0.005)	(0.012)	(0.050)	(0.038)	(0.025)
Post-GLBA × Big bank	0.001	-0.031***	-0.061**	0.005	-0.078***
	(0.003)	(0.010)	(0.025)	(0.035)	(0.022)
Big bank	-0.009*	0.063***	0.060	0.031	0.075***
	(0.005)	(0.012)	(0.043)	(0.033)	(0.025)
Observations	378992	378992	378992	378992	378992
Year × Quarter FE	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
R^2	0.861	0.989	0.932	0.940	0.980
Clustering	State	State	State	State	State

Panel B: Effects on bank liabilities

	(1)	(2)
Dependent variable	LC-Liabilities	Deposits(ln)
Arkansas× Post-GLBA	-0.003***	-0.016***
	(0.001)	(0.003)
Arkansas× Post-GLBA × Big bank	0.020***	0.102***
	(0.003)	(0.014)
Arkansas × Big bank	0.009***	-0.060***
	(0.002)	(0.014)
Post-GLBA × Big bank	0.003	-0.031**
	(0.003)	(0.014)
Big bank	0.003	0.063***
	(0.002)	(0.014)
Observations	378992	378992
Year × Quarter FE	Yes	Yes
Bank FE	Yes	Yes
R^2	0.872	0.994
Clustering	State	State

Notes: This table shows the estimation for equation 1. Panel A focuses on bank assets, the dependent variables in column (1)-(5) is *LC − Assets*, *T otal loans*(*ln*), *Individual loans*(*ln*) *C&I loans*(*ln*) and *Mortgages*(*ln*) respectively. Panel B focuses on bank liabilities, the dependent variables in column (1)-(2) is *LC − Liabilities* and *Deposits*(*ln*) respectively. Standard errors clustered at the state level are reported in parentheses. Variable descriptions are in Table A.1 of the Online Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Heterogeneous Effects By Bank Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	CatNonFat			Total loans		
Arkansas × Post-GLBA	-0.033***	-0.032***	-0.017***	-0.075***	-0.070***	-0.047***
	(0.006)	(0.005)	(0.003)	(0.013)	(0.010)	(0.007)
Arkansas × Post-GLBA × Equity ratio(%)	0.002***	0.003***				
	(0.000)	(0.001)				
Arkansas × Post-GLBA × Z-score(ln)	0.004***	0.007***				
	(0.001)	(0.002)				
Arkansas × Post-GLBA × Charge off ratio(%)	0.010***	0.036***				
	(0.003)	(0.010)				
Observations	378992	378992	378992	378992	378992	378992
Year × Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes				

Yes Yes Yes Yes Yes R^2 0.870 0.870 0.870 0.989 0.989 0.989 Clustering State State State State State State

Notes: This table presents the estimation for equation 1, replacing the bank size indicator variable with the respective bank characteristics, namely *Equity ratio*(%) in column (1) and (4), *Z − score* in column (2) and (5), and *Charge off ratio* in column (3) and (6). In Columns (1), (2) and (3), the dependent variable is *CatNonF at*. In column (4), (5) and (6) are *T otal loans*(*ln*). Standard errors clustered at the state level are reported in parentheses. Variable descriptions are in Table A.1 of the Online Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Effects On Bank Entry And Exit

(1) (2) (3) (4) (5) (6)
No. of branch per state (ln) No. of bank per state (ln)

Arkansas × Post-GLBA 0.096*** 0.096*** 0.107*** 0.129** 0.129** 0.170*** (0.011)
(0.011) (0.011) (0.048) (0.049) (0.049)
Arkansas 0.059 0.440**
(0.141) (0.210)
Post-GLBA 0.079*** 0.085*
(0.011) (0.048)
Unemployment rate 0.041 0.004 (0.050) (0.217)
Real GDP 0.542*** 2.609*** (0.125) (0.674)

Personal income -0.353* -2.412** (0.199) (0.993)

Observations 612 612 612 612 612 612 Year FE No Yes Yes No Yes Yes State FE No Yes Yes No Yes Yes R^2 0.002 0.998 0.998 0.003 0.969 0.972 Clustering State State State State State State

Notes: This table shows the impact of interest rate ceiling removal on the number of branches and banks headquartered in Arkansas. In Columns (1)–(3), the dependent variable represents the natural logarithm of the number of branches in each state per year. In Columns (4)–(6), the dependent variable represents the natural logarithm of the number of banks headquartered in each state per year. Standard errors clustered at the state level are reported in parentheses. Variable descriptions are in Table A.1 of the Online Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7: Impact on Bank competition

(1) (2) (3) (4)
Lerner index(ln) Interest margin(%) Big bank mkt share(%)

Arkansas × Post-GLBA -0.008*** -0.007*** 0.027*** 5.139** (0.002) (0.001) (0.003) (2.502)
Arkansas × Post-GLBA × Big bank -0.018*** 0.077***
(0.004) (0.009)
Arkansas × Big bank -0.020*** -0.016*
(0.003) (0.009)
Post-GLBA × Big bank 0.016*** -0.044***
(0.004) (0.009)
Big bank -0.018*** 0.006
(0.003) (0.009)

Observations 373781 373781 375060 612 Year × Quarter FE Yes Yes Yes No Bank FE Yes Yes Yes No State FE No No No Yes Year FE No No No Yes R^2 0.627 0.628 0.714 0.773

Clustering State State State State

Notes: This table shows the estimation for equation 1. In Columns (1) and (2), the dependent variable is *Lerner index*(*ln*). In Columns (3), the dependent variable is *Interest margin*(%) In Columns (4), the dependent variable represents the state-level deposit market share of large banks. Standard errors clustered at the state level are reported in parentheses. Variable descriptions are in Table A.1 of the Online Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8: Monetary Policy Transmission

	(1) CatNonFat	(2) CatNonFat	(3) Total loans(ln)	(4) Total loans(ln)
Arkansas × Fed fund rate (%)	0.035***	0.019***	0.035***	0.017***
	(0.003)	(0.002)	(0.003)	(0.002)
Arkansas × Post-GLBA × Fed fund rate (%)	-0.027***	-0.013***	-0.029***	-0.013***
	(0.003)	(0.002)		
Arkansas × Post-GLBA	0.125***	0.060***	0.138***	0.061***
	(0.013)	(0.011)	(0.014)	(0.011)
Post-GLBA × Fed fund rate (%)	0.031***	0.017***		
	(0.003)	(0.003)		
Arkansas	-0.211***	-0.188***		
	(0.014)	(0.013)		
Fed fund rate (%)	-0.034***	-0.036***		
	(0.002)	(0.002)		
Post-GLBA	-0.075***	0.037*		
	(0.017)	(0.019)		
Observations	180,238	180,097	180,238	180,097
Year×Quarter FE	No	Yes	No	Yes
Bank FE	No	Yes	No	Yes
R^2	0.368	0.877	0.289	0.870
Clustering	State	State	State	State

Notes: This table presents the estimation for equation 1, replacing the bank size indicator variable with the federal funds rate (%). In Columns (1) and (2), the dependent variable is *CatNonF at*. The dependent variable in Columns (3) and (4) is *T otal loans*(*ln*). Standard errors clustered at the state level are reported in parentheses. Variable descriptions are in Table A.1 of the Online Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

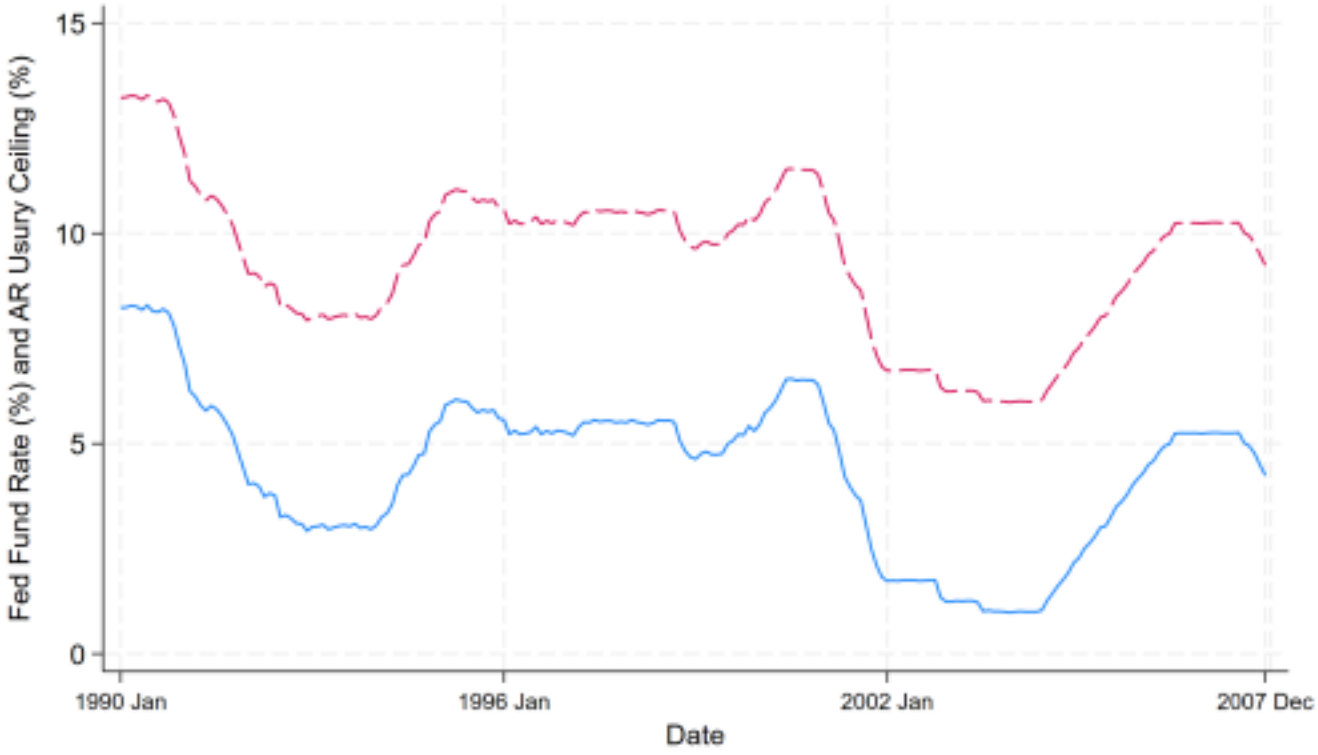
Table 9: Robustness tests

	(1) CatNonFat	(2) LC-Assets	(3) Total loans(ln)
Panel A: court decision			
Arkansas × Post-court decision	-0.021***	-0.017***	-0.058***
	(0.003)	(0.002)	(0.007)
Arkansas × Post-court decision × Big bank	0.059***	0.039***	0.070***
	(0.004)	(0.003)	(0.009)
Observations	378992	378992	378992
Year×Quarter FE, Bank FE	Yes	Yes	Yes
R^2	0.870	0.861	0.989
Clustering	State	State	State
Panel B: Double clustering			
Arkansas × Post-GLBA	-0.016***	-0.013***	-0.043***
	(0.005)	(0.005)	(0.012)
Arkansas × Post-GLBA × Big bank	0.065***	0.044***	0.072***
	(0.012)	(0.010)	(0.027)
Observations	378992	378992	378992
Year×Quarter FE, Bank FE	Yes	Yes	Yes
R^2	0.870	0.861	0.989
Clustering	State x Year	State x Year	State x Year Panel C: Bank-level clustering
Arkansas × Post-GLBA	-0.016***	-0.013**	-0.043***
	(0.006)	(0.005)	(0.012)
Arkansas × Post-GLBA × Big bank	0.065***	0.044***	0.072**
	(0.022)	(0.014)	(0.032)
Observations	378992	378992	378992
Year×Quarter FE, Bank FE	Yes	Yes	Yes
R^2	0.870	0.861	0.989
Clustering	Bank	Bank	Bank
Panel D: State-level controls			

Arkansas × Post-GLBA	-0.011***	-0.008***	-0.034***
	(0.003)	(0.002)	(0.006)
Arkansas × Post-GLBA × Big bank	0.052***	0.035***	0.040***
	(0.004)	(0.003)	(0.009)
Unemployment Rate	-0.013*	-0.006	-0.028*
	(0.007)	(0.006)	(0.015)
Real Total Gross Domestic Product	0.075*	0.063*	0.203**
	(0.042)	(0.037)	(0.080)
Per Capita Personal Income	-0.065	-0.121***	-0.198**
	(0.054)	(0.039)	(0.095)
Observations	311904	311904	311904
Year×Quarter FE	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
R^2	0.881	0.873	0.990
Clustering	State	State	State

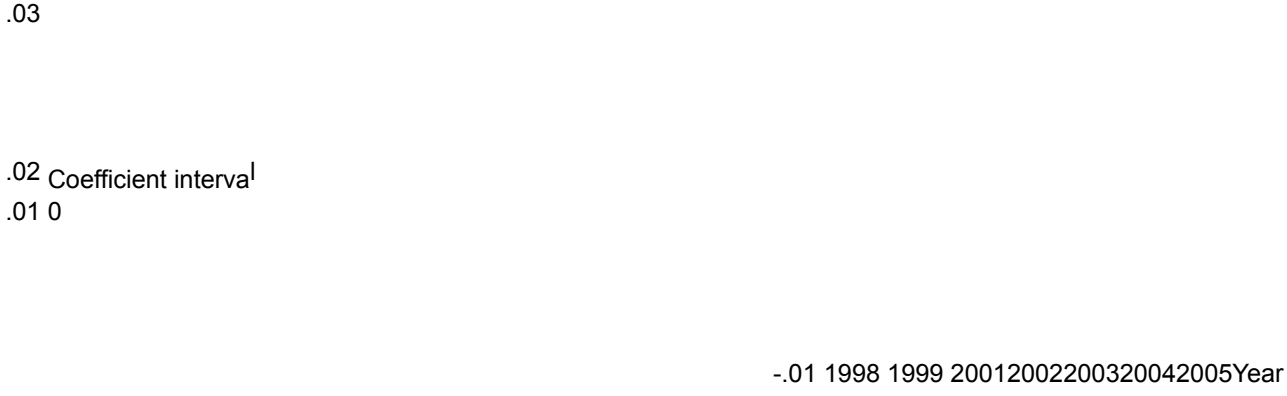
Notes: This table shows the estimation for equation 1. In Columns (1), the dependent variable is *CatNonF at*. The dependent variables in column (2) and (3) are *LC − Assets* and *T otal loans*(*ln*) respectively. In Panel A, we use the court decision affirming the interest rate ceiling removal as the treatment date. Panels B and C present results with standard errors clustered at the State×Year and bank levels, respectively. Panels D present results with state-level control variables. Variable descriptions are in Table A.1 of the Online Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Figure 1: Fed fund rate and Arkansas interest rate ceiling



Notes: This figure presents the Fed fund rate and Arkansas interest rate ceiling in 1990-2007. The solid blue line represent the Fed fund rate, the red dash line shows the interest rate ceiling in Arkansas.

Figure 2: Dynamic effects of interest rate deregulation



Notes: This figure illustrates the estimated dynamic coefficients and 95% confidence intervals for the effects of the interest rate ceiling on Arkansas-chartered big banks (i.e., those with total gross assets exceeding one billion USD). The dashed line indicates the implementation year, 2000, of the interest rate ceiling removal.

Online Appendix

Table A.1: Variable definitions

Variable	Definition	Source
Arkansas	Dummy Variable=1 if the observation is an Arkansas-chartered bank, 0 otherwise. Authors' calculation	
Post-GLBA	Dummy variable=1 if the observation is within sample period 2000Q1-2002Q4, 0 otherwise. Authors' calculation	
Big bank	Dummy variable if the bank has total gross assets larger than one billion USD. Authors' calculation	
CatFat	Measure of liquidity creation based on "cat fat" metric by Berger and Bouwman (2009).The Authors' calculation measure classifies all activities including loans and off-balance sheet activities divided by total assets.	
CatNonFat	Measure of liquidity creation based on "cat non-fat" metric by Berger and Bouwman (2009). The Authors' calculation measure classifies activities excluding off-balance sheet activities (non-fat) divided by total assets.	
LC-Assets	Liquidity measure on asset side, metric by Berger and Bouwman (2009)	Call Reports
LC-Liabilities	Liquidity measure on liability side, metric by Berger and Bouwman (2009)	Call Reports
Total loans(ln)	Natural logarithm of the amount of total loans	Call Reports
Individual loans(ln)	Natural logarithm of the amount of individual loans	Call Reports
C&I loans(ln)	Natural logarithm of the amount of commercial and industrial loans	Call Reports
Mortgages(ln)	Natural logarithm of the amount of mortgages	Call Reports
Total assets(ln)	Natural logarithm of the amount of total assets of the bank(size)	Call Reports
RoA(%)	The ratio of return over total assets	Call Report
Interest expense ratio(%)	Calculated as the ratio of interest expenses over total assets	Call Report
Interest income ratio(%)	Calculated as the ratio of interest income over total assets	Call Report
Interest margin (%)	Net interest income scaled by total assets (%)	Call Report
Charge-off ratio (%)	Net charge-offs scaled by total assets (%)	Call Report
Equity ratio(%)	The ratio of bank equity over total assets	Call Reports
Z-score(ln)	Natural logarithm of bank Z-score. It is estimated as (ROA+(equity/assets))/sd(ROA); Authors' calculation	
Lerner Index	Measurement of the degree of competition, following the method by Duqi et al. (2021). Authors' calculation	
Unemployment rate(ln)	Natural logarithm of annual unemployment rate	Bureau of Economics Analysis
Real GDP(ln)	Natural logarithm of annual real GDP	Bureau of Economics Analysis
Per capita personal income(ln)	Natural logarithm of annual per capita personal income	Bureau of Economics Analysis
Fed fund rate(%)	Interest rate used for overnight interbank lending in the U.S..	Federal Reserve Board
Number of branches per state (ln)	Natural logarithm of the total number of branches in a state	Summary of Deposits
Number of banks per state (ln)	Natural logarithm of the total number of banks in a state	Summary of Deposits
Big-bank market share (%)	Market share of large banks in the deposit market (%)	Summary of Deposits
CPI	U.S. Consumer Price Index	St. Louis Fed

Table A.2: High inflation period (1976-1981)

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full	Neighbors	Full	Neighbors	Total loans	CatNonFat
Arkansas × CPI	-0.006***	-0.004***	-0.007***	-0.003***	-0.002***	-0.002**
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)
Arkansas	-0.017		0.031***			
	(0.015)		(0.006)			
CPI	-0.007***		-0.009***			
	(0.001)		(0.001)			
Observations	72515	72127	18131	71590	71203	18133
Year FE	No	Yes	Yes	No	Yes	Yes
Bank FE	No	Yes	Yes	No	Yes	Yes
R^2	0.951	0.992	0.989	0.102	0.835	0.805
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	State	State	State	State	State	State

Notes: This table presents results examining Arkansas banks' liquidity creation and lending during the high-inflation period of the 1970s–1980s. The coefficient of the interaction term indicates how inflation affects liquidity creation or lending differently for Arkansas banks compared with other states. In Columns (1)–(3), the dependent variable is *Total, loans*. In Columns (4)–(6), the dependent variable is *CatNonFat*. Columns (3) and (6) report results based on Arkansas banks and their neighboring states, while Columns (1)–(2) and (4)–(5) use the full sample. Standard errors clustered at the state level are reported in parentheses. Variable descriptions are in Table A.1 of the Online Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.3: Alternative Measures Of Exposure To Arkansas

	(1)	(2)	(3)	(4)
Sample	Full		Neighbors	
Dependent variable	CatNonFat			
Post-GLBA × AR branch share	-0.016***	-0.029***		
	(0.003)	(0.005)		
Post-GLBA × Big bank × AR branch share	0.071***	0.058***		
	(0.011)	(0.009)		
Big bank × AR branch share	-0.076***	-0.086***		
	(0.011)	(0.010)		
Post-GLBA × Big bank	0.004	0.004	0.013*	0.013*
	(0.004)	(0.004)	(0.005)	(0.006)
Post-GLBA × AR deposit share	-0.016***	-0.029***		
	(0.003)	(0.005)		
Big bank × AR deposit share	-0.071***	-0.082***		
	(0.006)	(0.005)		
Post-GLBA × Big bank × AR deposit share	0.064***	0.052***		
	(0.005)	(0.004)		
AR branch share	-0.080**	-0.073		
	(0.034)	(0.055)		
AR deposit share	-0.129***	-0.124		
	(0.045)	(0.069)		
Big bank	-0.008	-0.008	-0.007	-0.008
	(0.006)	(0.006)	(0.008)	(0.008)
Observations	377946	377945	96216	96215
Year × Quarter FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
R^2	0.871	0.871	0.875	0.875
Clustering	State	State	State	State

Notes: This table reports the estimation of equation 1 using alternative measures of a bank's exposure to Arkansas. In Columns (1) and (3), exposure is measured by the proportion of branches operated in Arkansas. In Columns (2) and (4), exposure is measured by the deposit market share in Arkansas. The dependent variable in all columns is *CatNonFat*. Columns (1) and (2) use the full sample, while Columns (3) and (4) are restricted to banks headquartered in Arkansas and its neighboring states. Standard errors clustered at the state level are reported in parentheses. Variable descriptions are in Table A.1 of the Online Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and

1% levels, respectively.

Table A.4: Mississippi vs Oklahoma

	(1)	(2)
Control group	Mississippi	Oklahoma
Dependent variable	CatNonFat	
Arkansas × Post-GLBA	-0.011	-0.024**
	(0.003)	(0.001)
Arkansas × Post-GLBA × Big bank	0.039	0.051**
	(0.010)	(0.002)
Arkansas × Big bank	-0.071**	-0.102**
	(0.002)	(0.006)
Post-GLBA × Big bank	0.029***	0.012*
	(0.000)	(0.002)
Big bank	0.005	0.026*
	(0.006)	(0.002)
Observations	13827	22300
Year × Quarter FE	Yes	Yes
Bank FE	Yes	Yes
R^2	0.825	0.851
Clustering	State	State

Notes: This table presents the estimation of equation 1. The dependent variable is *CatNonF at*. In Column (1), the control group consists of Mississippi banks, while in Column (2), the control group consists of Oklahoma banks. Standard errors clustered at the state level are reported in parentheses. Variable descriptions are in Table A.1 of the Online Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.5: Impact on loan quality

	(1)	(2)	(3)
	Charge off$_{t+12q}$	Z-score$_{t+12q}$	RoA$_{t+12q}$
Arkansas × Post-GLBA	0.008	0.012	0.046*
	(0.008)	(0.023)	(0.024)
Arkansas × Post-GLBA × Big bank	-0.028	0.071	-0.092
	(0.019)	(0.078)	(0.104)
Arkansas × Big bank	0.038	0.073	0.073
	(0.036)	(0.086)	(0.089)
Post-GLBA × Big bank	0.031*	-0.135	-0.140*
	(0.014)	(0.074)	(0.064)
Big bank	-0.023	0.052	-0.003
	(0.027)	(0.069)	(0.080)
Observations	78800	78352	78800
Year × Quarter FE	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
R^2	0.118	0.415	0.427
Clustering	State	State	State

Notes: This table shows the estimation for equation 1. In Columns (1), the dependent variable is *Charge off*$_{t+12q}$. The dependent variables in Columns (2) and (3) are $Z-score_{t+12q}$ and RoA_{t+12q} respectively.Standard errors clustered at the state level are reported in parentheses. Variable descriptions are in Table A.1 of the Online Appendix. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Figure A.1: Real impacts of interest rate deregulation

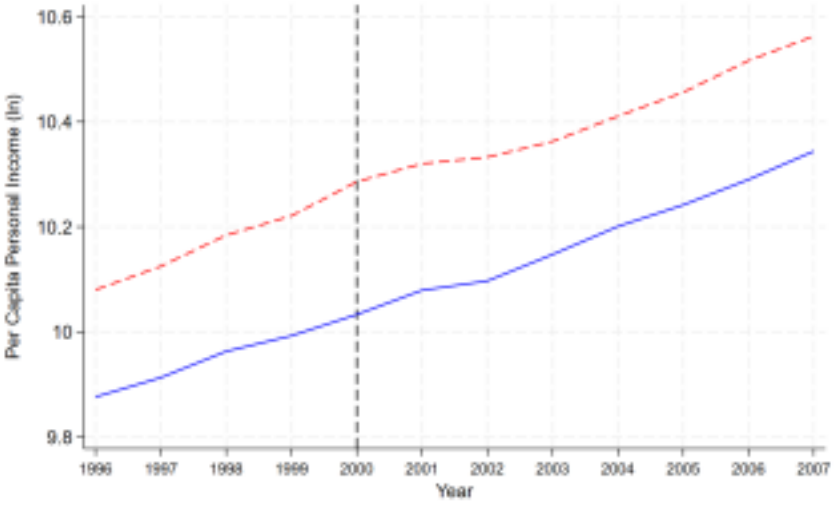


Fig A1.1 Per Capita Personal Income

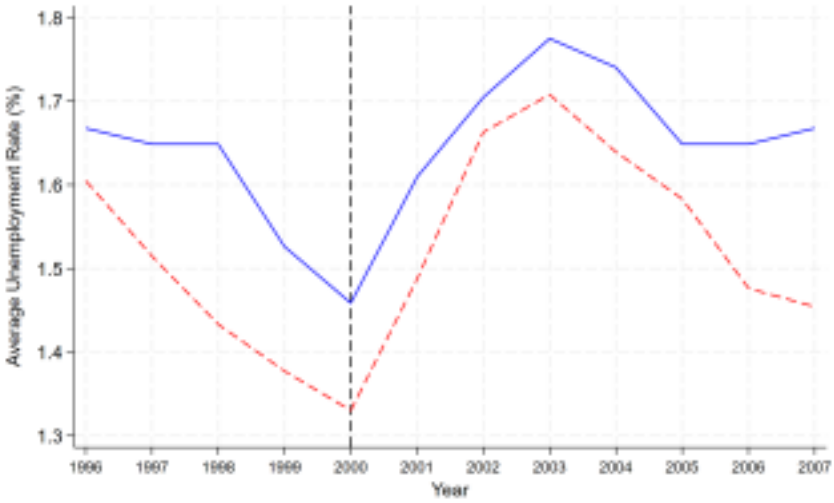


Fig A1.2 Unemployment Rate