Credit-Induced Boom and Bust*

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First Draft

Abstract

Can an increase in the supply of credit induce a boom and bust in house prices and real economic activity? This paper exploits the federal preemption of national banks from local anti-predatory laws to gauge the causal effect of the supply of credit on the real economy. Specifically, we exploit the heterogeneity in the market share of national banks across counties as of 2003, as well as heterogeneity in states anti-predatory laws to instrument for the outward shift in the supply of credit. We first show that if we compare counties in the top versus the bottom decile of presence of national banks in states with anti-predatory laws, the preemption regulation resulted in an 11% increase in annual loan issuance. Our estimates show that to a 10% increase in annual loan issuance correspond a 12% total increase in house prices and a 2% increase in employment in the non-tradable sectors, followed by a bust of similar magnitude in the subsequent years. Finally we show that the increase in the supply of credit reduced mortgages' delinquency rates during the boom years, but resulted in higher delinquency rates during the bust years.

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1 Introduction

The Great Recession was preceded by a large expansion of credit and followed by a collapse in housing prices and consumption, which took more than three years to return to its level just prior to the recession. The resulting employment decline experienced during the Great Recession was greater than that of any recession of recent decades, with unemployment peaking at 10% in October 2009. What is the role of financial markets in generating these severe fluctuations? Specifically, does an outward shift in the credit supply during the expansionary phase of the business cycle explain the observed disruptions in the real economy?

This paper investigates how an increase in credit supply to riskier borrowers is responsible for the boom and bust cycle in housing prices and economic outcomes observed during the Great Recession. This question is important for understanding how financial markets affect the real side of the economy and how the supply of credit might amplify fluctuations. However, identifying the causal effect of credit is challenging because of omitted variables and reverse causality. The latter concern is especially important: counties that experience higher growth are going to increase their consumption and drive house prices up, but are also going to have higher demand for credit. As a result, house price and employment increases will be strongly correlated with the supply of credit, even if credit has no direct effect on house prices and consumption.

In this paper we attempt to estimate the causal effect of an increase in credit supply on economic outcomes by taking advantage of important changes to banking regulation in the U.S. during the early 2000s. In particular, starting in 1999 several states have adopted anti-predatory laws (APL) that implemented several restrictions on the terms of their mortgage loans to riskier borrowers, such as requiring verification of borrowers' repayment ability, as well as including limits on fees, rates and prepayment penalties. However, in 2004 the Bush administration through the Office of the Comptroller of the Currency (OCC), in an effort to increase home ownership, enacted a preemption rule, which barred the application

of state anti-predatory laws to national banks. In other words, national banks and their mortgage lending subsidiaries became exempt from state anti-predatory lending laws and state enforcement. In contrast, mortgage brokers and independent non-depository lenders, along with state-chartered depository institutions and their subsidiaries, were required to comply with the provisions in state anti-predatory lending laws.

This setting offers a great opportunity to exploit variation across states and across different types of lenders to investigate the role of shocks to the credit supply. Key to our identification strategy is the possibility to compare economic outcomes in states with and without APL, in particular before and after the OCC preemption rule was enacted, but taking advantage of the substantial heterogenous presence of national banks in different counties. Specifically, counties with a high fraction of loans originated by national banks in APL states before 2004 were subject to a positive credit supply shock after the OCC regulation, as the national banks were able to grant loans to riskier borrowers in those counties, while other financial institutions were not allowed to do so. However, states with APL might differ from states without APL, and counties with a higher presence of national banks might be subject to different shocks than counties with a predominant presence of local banks. To control for these differences, we compare counties within states with APL taking out the difference between counties with higher OCC lenders and counties with lower OCC lenders in non-APL states, that is, we employ a triple differences-in-difference estimator to gauge the effect of credit increase on the real economy. This allows us to sharply identify the effect of the preemption on the availability of lending to riskier borrowers, and then to use this as an instrument for the supply of credit during the period preceding the Great Recession.

There are four primary findings. First, we begin by showing that if we compare counties in the top versus the bottom decile of presence of national banks in states with anti-predatory laws the OCC preemption resulted in a 11% increase in annual loan issuance. To control for different county characteristics in all specifications we include county fixed-effects as well as year fixed-effects. We also include a number of different controls such as the county median

income and population, as well as the elasticity measure proposed by Saiz (2010) to control for the increase in collateral values. This is important because it shows that our instrument is not capturing differences in the counties' propensity to experience house price increases, instead our variation comes from the increase in the supply of credit. Further, when we restrict attention to subprime counties, defined as the counties with a higher than the median fraction of subprime borrowers in 2000, we show that the effect of the preemption on loan origination is about 50% larger. Interestingly, this shows that the preemption regulation significantly increased the availability of credit to riskier borrowers. We then investigate separately the boom period 2003-2005 and the bust period 2007-2009. We confirm that counties with stronger presence of OCC lenders experienced a more significant boom and bust in loan origination. This estimates constitute our first stage regression, as we can now instrument the supply of credit with the interaction between the presence of national banks in APL states.

Second, using this as an instrument for the supply of credit, we estimate the effect of the credit supply on house prices. We find a large effect. A 10% increase in loan origination leads to a 3.5% increase in the house price growth rate, which resulted in a total increase of 12% in house prices. Our estimate of the effect of the supply of credit on house price growth is robust to extensive controls for demographics and income differences across counties. Moreover, all specifications explicitly control for the elasticity of house prices. This means that absent the preemption regulation, a substantial fraction of the increase in house prices and the consequent collapse could have been avoided.

Third, we explore the effect of the increase in supply of credit on the employment in non tradable sectors (as defined by Mian and Sufi (2012)), in order to focus on the sectors that are mostly affected by the local demand. We find that employment rises significantly more in counties with a prominent presence of national banks in APL states, even controlling for several county characteristics. Specifically, our IV estimates suggest that a 10% increase in loan origination leads to a 2% increase in employment in the non-tradable sectors. Consistent

with our credit-induced fluctuation mechanism, we find that the effect doubles in counties with a higher fraction of subprime borrowers. Moreover, by restricting attention to the boom and bust period we find that the predicted increase in lending are associated with more pronounced boom and bust.

Finally, we provide evidence on the quality of loans originated by national banks in the boom period. Interestingly, we find that counties with a higher fraction of loans originated by OCC lenders in APL states experienced significantly lower delinquencies during the boom period, but at the same time a sharper increase in delinquencies during the bust period. In other words, if we compare counties in the top versus the bottom decile of presence of national banks in states with anti-predatory laws the OCC preemption resulted in a 15% decrease in delinquencies during the boom period, and in a 30% more delinquencies during the Great Recession. Interestingly, this shows that the increase in lending allowed households to avoid late payments during the boom years, but aggravated their financial situation during the bust, making them more fragile to the downturn. In this case as well we find that the results are even stronger when we restrict attention to subprime counties.

To check the robustness of our results we show several additional results. First, we compute for each county the fraction of loans securitized, and use this as a proxy for the banks' incentives to increase lending due to securitization. We show that all of our results are completely unaffected, which suggests that our instrument is not correlated with the increase in securitization experienced during the pre-crisis period. Second, to show that the increase in employment is indeed driven by the increase in local demand due to the increase in lending, we show that the predictive lending increases are not associated with employment in the tradable sectors. Third, we eliminate the states with the highest delinquency rates and most pronounced housing bubble, Arizona and Nevada, and show that our results are not driven by those states.

1.1 Related Literature

To the best of our knowledge, this is the first paper that is able to estimate the causal effect of an increase in credit supply on housing prices and real economic activity, showing that an outward shift in credit supply generates a distinct boom and bust pattern.

There is an emerging literature on the effects of the housing price booms on real economic activity that is related to this paper, the most related papers are Mian and Sufi (2009), and Kermani (2012). First, Mian and Sufi (2009) show that Zip codes with a higher fraction of subprime borrowers experienced an unprecedented relative growth in mortgage credit. Kermani (2012), instead, provides a theory which links the decline in consumption and housing wealth in many economic sub regions to the very increase in consumption and housing wealth in the area and emphasizes that this cycle results naturally from the interplay between expanding credit, consumers keen on front-loading their consumption, and the endogenous relaxation of credit constraints. Our paper makes two significant advances relative to these contributions: (1) by exploiting an exogenous variation in the supply of credit to estimate the effects on house prices allows us to control for local economic shocks that might create a spurious correlation between entrepreneurial rate and local house prices, and (2) the nature of our data allows us to track not only the effect of credit on house prices, but also on employment and delinquency rates.

Other related papers that study the interplay between credit, house prices and consumption include Mian et al. (2011), Mian et al. (2011), Greenstone and Mas (2012), and Adelino et al. (2012). Mian et al. (2011) exploit the difference between judicial and non-judicial foreclosure states as an instrument for foreclosures, and show that foreclosures lead to a significant decline in house prices and residential investment.[1] With a similar emphasis on

[1] Other related papers are Favara and Imbs (2010) and Kleiner and Todd (2007). Favara and Imbs (2010) employs the the passage of the Interstate Banking and Branching Efficiency Act (IBBEA) in 1994 to show that the deregulation triggered an increase in the demand for housing, that is, house prices rose because the supply of credit increased in deregulating states. In contrast, we identify an increase in credit supply due to the preemption rule of 2004, and its role in generating a boom and bust cycle on both house prices and employment. Kleiner and Todd (2007), instead, find that the requirement in many states that mortgage

consumption to ours, Mian et al. (2011) show that Zip codes with more levered households have a higher marginal propensity to consume out of housing wealth. The importance of the credit channel has recently been highlighted by Greenstone and Mas (2012), which assesses the role of the supply of credit from banks to small businesses in affecting the employment decline observed during the Great Recession. In contrast, we are able to instrument variations in lending with regulatory changes to show the effect of the increase in lending on the boom and bust experienced in several sectors of the economy. Finally, Mian and Sufi (2012) show that job losses in the non-tradable sector between 2007 and 2009 are significantly higher in high-leverage counties that experienced sharp demand declines, while Adelino et al. (2012) exploits changes in the conforming loan limit as an instrument to gauge the effect of lower cost of financing on house prices. We employ the same differentiation of Mian and Sufi (2012) between tradable and non tradable sectors to show that the increase in lending, boosted local demand which in turn increased employment in non tradable sectors.

This paper also contribute to the growing number of papers studying the effects of the decline in lending during the Great Recession. Ivashina and Scharfstein (2010), for instance, document that new loans to large borrowers fell by 79% between the second quarter of 2007 and the fourth quarter of 2008. They argue that it is in large part "supply-driven", because of the decline in banks' access to short-term debt following the failure of Lehman. Using Community Reinvestment Act data, Huang and Stephens (2011) and Berrospide and Edge (2010) show that multi-market banks' exposure to markets with housing busts affected the supply of small business loans within all MSAs. Goetz and Valdez (2010) find evidence that differences in liability structure of small U.S. commercial banks, particularly the use of "non-core" financing, affected lending patterns during the 2008 crisis. Dagher and Fu (2011) shows a positive correlation between the presence of non-bank mortgage originators and the increased foreclosure filing rates at the onset of the housing downturn.

brokers maintain a minimum net worth is associated with fewer brokers, fewer subprime mortgages, higher foreclosure rates, and a greater percentage of high-interest-rate mortgages.

Finally, Rajan and Ramcharan (2012) examine the farm land price boom (and bust) in the United States that preceded the Great Depression, and show that credit availability likely had a direct effect on inflating land prices. Moreover, areas with higher ex ante credit availability suffered a greater fall in land prices, and experienced higher bank failure rates. We show, instead, that the credit supplied by national banks during the expansionary phase of the business cycle is able to explain the large increase in housing price, employment and consumption and their subsequent collapse.

The remainder of the paper is organized as follows. Section II provides some background on the US credit market and its regulation. Section III provides details on the data sources. Section IV explains the research design and how it is operationalized. Section V outlines the main results and interprets the findings. Section VI discusses several robustness checks and Section VII concludes.

2 Regulatory Framework

2.1 Dual banking system

In the United States, residential mortgage lenders are regulated by national and local regulatory agencies. Specifically, national banks, Federal thrifts, and their subsidiaries are supervised by the OCC or the OTS, respectively. In contrast, state banks and thrifts chartered at the state level are supervised by either the Federal Reserve System (FRS) or the Federal Deposit Insurance Corporation (FDIC) or by their chartering state. Credit unions, instead, are supervised by the National Credit Union Administration (NCUA), while non-depository independent mortgage companies are regulated by the Department of Housing and Urban Development (HUD) and the Federal Trade Commission. One potential concern is the possibility for banks to switch regulatory agency.

The inconsistencies generated by this dual system have been the subject of a recent

study by Agarwal et al. (2012). The authors show that federal regulators are significantly less lenient, downgrading supervisory ratings about twice as frequently as state supervisors. Moreover, under federal regulators, banks report higher nonperforming loans, more delinquent loans, higher regulatory capital ratios, and lower ROA.

Then, banks have the incentive to switch from Federal to state supervision, if allowed to do so. Rosen (2005) explores the switching in regulatory agencies between 1970 and 2003. He shows that most of these switches were in the early periods due to new banking policies, such as the lessening of prohibitions of interstate banking. He finds that the main reason for switching after the initial period is a merger with a bank chartered at a different level. However, he provides evidence that the banks who switch tend to be small banks with total assets less than one billion. These findings corroborates the validity of our identification strategy. However, the granularity of our dataset allow us to track the banks that changed regulatory agencies in our sample, which gives us the opportunity to address any further concerns related to this issue.

2.2 Anti-predatory laws

This dual banking system generated conflicting regulations when several states passed anti-predatory laws and the OCC issued a preemption rule for national banks. In 1994, Congress passed the Home Ownership and Equity Protection Act (HOEPA) which imposed substantive restrictions on lending terms and practices for mortgages with high prices, based on either the APR or the total points and fees imposed. This regulation aimed to address abusive practices in refinances and home equity loans with high interest rates or high fees. However, very high thresholds used to classify mortgages as predatory or "high cost;" significantly reduced the applicability of these restrictions, in fact, these "high cost mortgages" only accounted for one percent of subprime residential mortgages, targeting the most abusive sector of the subprime mortgage market (Bostic et al. (2008)).

In subsequent years, many states adopted stronger anti-predatory lending regulations than federal law requires. Anti-predatory laws try to address different forms of unfair and deceptive practices such as lenders steering borrowers into a higher interest rate loan than they could qualify for, making a loan without considering the borrower's repayment ability, charging borrower exorbitant fees, or adding abusive subprime prepayment penalties, all of which might significantly increase the risk of foreclosure. The first comprehensive state law was passed in 1999 by North Carolina, and it aimed at preventing predatory mortgage lending in the subprime mortgage market. As of January 2007, 29 states and the District of Columbia had anti-predatory laws in effect.

The anti-predatory laws can potentially have different effects on the mortgage market outcomes. On the one hand, the laws might ration credit and increase the price of subprime loans. On the other hand, the regulation might be essential to allay consumer fears about dishonest lenders and ensure that creditors internalize the cost of any negative externalities from predatory loans, which might boost the demand for credit.

There is a strong body of evidence that has recently shown that anti-predatory laws had an important role in the subprime market. Ding et al. (2012), for instance, finds that anti-predatory laws are associated with a 43% reduction in prepayment penalties, and a 40% decrease in adjustable-rate mortgages. Moreover, they find that anti-predatory laws are also correlated with a significant reduction in the riskier borrowers' likelihood to default. These effects are even stronger for subprime regions, i.e. the ones with higher fraction of borrowers with FICO scores below 620.

Using 2004 HMDA data, Ho and Pennington-Cross (2006) find that subprime loans originated in states with APLs had lower APRs than loans in unregulated states. Further evidence is provided by Ho and Pennington-Cross (2008). They focus on border counties of adjacent states with and without anti-predatory laws to control for labor and housing markets characteristics, and using a legal index, they examine the effect of APLs on the probability of subprime applications, originations, and rejections. They find that stronger regulatory

restrictions reduced the likelihood of origination and application. Similarly, Elliehausen et al. (2006) using a proprietary database of subprime loans originated by eight large lenders from 1999 to 2004, find that the presence of a law was associated with a decrease in total subprime originations.

Finally, the anti-predatory laws had likely an important effect on lenders' securitization incentives. In fact, the credit rating agencies clearly stated that after the APLs were enacted, they started requiring credit enhancement from lenders that could be in violation of state predatory laws: "To the extent that potential violations of APLs reduce the funds available to repay RMBS investors, the likelihood of such violations and the probable severity of the penalties must be included in Moody's overall assessment".[2]

We are going to follow this literature in considering only the states that passed anti-predatory laws pertaining purchase loans, and that were not just mini HOEPA implemented to prevent local regulation.

2.3 Preemption Rule

On January 7, 2004 the OCC adopted sweeping regulations preempting a broad range of state laws attempting to regulate the "terms of credit" from applying to national banks' activities. The OCC determined that the preemption pertains to those laws that regulate loan terms, lending and deposit relationships and require a state license to lend. The final rule also provided for preemption when the law would "obstruct, impair, or condition a national bank's exercise of its lending, deposit-taking, or other powers granted to it under federal law", either directly or through operating subsidiaries. The new regulations effectively barred the application of all state laws to national banks, except where (i) Congress has expressly incorporated state-law standards in federal statutes or (ii) particular state laws have only an "incidental" effect on national banks. The OCC has said that state laws will be deemed to

[2] Available at https://www.moodys.com.

have a permissible, "incidental" effect only if such laws (i) are part of "the legal infrastructure that makes it practicable" for national banks to conduct their federally-authorized activities and (ii) "do not regulate the manner or content of the business of banking authorized for national banks," such as contracts, torts, criminal law, the right to collect debts, acquisition and transfer of property, taxation, and zoning.

Specifically, the OCC preempted all regulations pertaining the following:

- Loan-to-value ratios;
- The terms of credit, including schedule for repayment of principal and interest, amortization of loans, balance, payments due, minimum payments, or term to maturity of the loan, including the circumstances under which a loan may be called due and payable upon the passage of time or a specified event external to the loan;
- The aggregate amount of funds that may be loans upon the security of real property;
- Security property, including leaseholds;
- Access to, and use of, credit reports;
- Disclosure and advertising, including laws requiring specific statements, information, or other content to be included in credit application forms, credit solicitations, billing statements, credit contracts, or other credit-related documents;
- Processing, origination, servicing, sale or purchase of, or investment or participation in, mortgages;
- Rates of interest on mortgage loans;

This means that starting in 2004 the subprime mortgage market in states with anti-predatory laws was an unleveled playing field, as national banks were the only mortgage institutions able to provide credit to riskier borrowers without limitations on the terms of credit.

3 Data and Summary Statistics

We collect data on the flow of new mortgage loans originated every year through the "Home Mortgage Disclosure Act" (HMDA) data set from 1999 through 2011. HMDA is available at the loan application level. It records each applicant's final status (denied/approved/originated), purpose of borrowing (home purchase/refinancing/home improvement), loan amount, race, sex, income, and home ownership status. We aggregate HMDA data up to the county level and computed the fraction of loans originated by lenders regulated by the OCC. We obtain data on the fraction of securitized loans by counties from Blackbox Logic. BlackBox is a private company that provides a comprehensive, dynamic dataset with information about twenty-one million privately securitized Subprime, Alt-A, and Prime loans originated after 1999. These loans account for about 90% of all privately securitized mortgages from that period.

Our county–level house price data from 1999 to 2011 come from Zillow.com which combines the underlying transactions data with a hedonic adjustment model that assigns values to homes based on characteristics of the home, specifically, it is a function of the size of the home, the number of bedrooms, and the number of bathrooms. We use the elasticity measure proposed by Saiz (2010) to control for heterogeneity in the county propensity to experience housing bubbles. The New York Fed Consumer Credit Panel provides, instead, county level information on loan amounts, mortgage delinquency rates and the fraction of households with FICO scores below 620.

To study how the credit expansion affected employment, we extracted the employment data from the County Business Pattern, which allows us to differentiate between tradable and non tradable sectors (following the classification of Mian and Sufi (2012)). We also add county–level data on demographics, income, and business statistics through the Census.

4 Research Design

This paper's research design is based on the observation that the preemption regulation have significantly affected the availability of credit to subprime borrowers, especially in counties where the presence of national banks was already predominant. Our identification strategy exploits the heterogeneity in counties' exposure to national banks, under the testable assumption that riskier households can only incompletely substitute for the reduction in the supply of credit from their state-chartered bank affected by the APL. We believe that it is plausible that a lending supply shock to a subset of banks in a region can affect aggregate lending in that area since households cannot easily substitute across banks in different regions. This hypothesis will be tested directly in the first stage of estimation. Figure 1 shows the distribution of the fraction of loans originated by OCC lenders across counties. It shows that indeed the importance of national banks in the mortgage market varies significantly across counties.

Specifically, our estimation methodology is a triple difference estimator (DDD). The potential problem with just using a difference-in-differences (DD) is that other factors unrelated to the state's new APL might affect the availability of credit in counties with a higher fraction of OCC lenders relative to counties with a smaller fraction of OCC lenders, for example, changes in the local mortgage market conditions. A different DD analysis would be to use another state as the control group and use the counties with a higher fraction of OCC lenders from the non-APL state as the control group. Here, the problem is that changes in the availability of credit in counties with a high fraction of national banks might be systematically different across states due to, say, income and wealth differences, rather than the preemption policy. A more robust analysis than either of the DD analyses described above can be obtained by using both a different state and a control group within the APL state. Specifically,

we run the following regression

$$\begin{aligned} Log(\text{Loan Amount})_{i,t} &= \lambda_i + \eta_t + \beta_1 APL_{g,t} * Post_{2004} + \beta_2 OCC_{2003} * Post_{2004} \\ &\quad + \beta_3 OCC_{2003} * APL_{g,t} + \beta_4 APL_{g,t} * Post_{2004} * OCC_{2003} + X_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{1}$$

where i denotes the county, g the state, and t the year of origination of the loan. We measure the county $i's$ exposure to the preemption regulation with the fraction of loans originated by OCC lenders in 2003. $Post_{2004}$ is a dummy variable equal to 1 after 2004, when the preemption rule was enacted, whereas $APL_{g,t}$ is equal to 1 if the state has enacted an anti-predatory law in state g at time t. $X_{i,t}$ is a vector of controls at the county level such as population, income, and the elasticity of house prices. The coefficient of interest is β_4, the coefficient on the triple interaction.

The DDD estimate starts with the time change in averages for the counties with higher fraction of national banks in the APL state and then nets out the change in means for counties with a high fraction of OCC lenders in the non-APL state and the change in means for the counties with a low fraction of OCC lenders in the APL state. The hope is that this controls for two kinds of potentially confounding trends: ex ante differential incentives of lenders to supply credit in counties with high fraction of OCC lenders across states (that would have nothing to do with the preemption policy) and changes in the mortgage market of all counties in the APL state (possibly due to other state policies that affect everyone's propensity to lend, or state-specific changes in the economy that affect lenders' soundness).

Table 2 reports the result of regressing the mortgages originated in different counties for purchase a house on the interaction between $APL_{g,t}$, the Post indicator and an indicator OCC which is equal to one if the originator of the loan is regulated by the OCC, and is then exempt from complying with the anti-predatory laws. Column 1 looks at the level and show that there is a significant increase in loan originated by national banks in APL states after 2004. In columns 2 and 3 we investigate the effects on the lending growth controlling for

county fixed effects, and county times agency fixed effects respectively. In both specifications, we find that national banks located in states with APL increased their lending significantly. These results suggest that lenders regulated by the OCC significantly increased their lending after the preemption regulation in states with anti-predatory laws.

Table 3, instead, shows the results of 1 estimated on different subsamples. In column (1) we restrict attention to the boom period 2003-2005 and run a cross-sectional regression with the log of the change in loan origination between 2003 and 2005 being our dependent variable. We control for the change in median income and population over the same period and for the elasticity of house prices. We find that our coefficient of interest is positive and both statistically and economically significant. This means that counties in APL states with a higher fraction of national banks have experienced a larger expansion of credit than other counties. Columns (2)-(4) estimate, instead, the same regression but on the yearly changes of loan amounts, controlling in turn for year and county fixed-effects, log of the median income and population, and for the elasticity of housing prices and its interaction with the Post indicator. We consistently find that the presence of national banks in APL states is associated with larger increases in loan origination.

Since the preemption regulation affects mainly the subprime market, in column (5) we restrict attention to the counties with FICO scores below 620 in 2000 above the median of 24%. Consistently with the hypothesis that after the preemption rule the national banks had the opportunity to significantly expand their supply of credit to riskier borrowers, we find that the coefficient is about 50% larger than when we consider the whole sample of counties. Finally, in column (6) we examine the bust period, 2007 through 2010, where the dependent variable is the change in loan origination in that period, and find that the same counties that increased lending during the expansionary phase of the business cycle are the ones where lending is cut the most during the bust period. We find that if we compare counties in the top versus the bottom decile of presence of national banks in states with anti-predatory laws the OCC preemption resulted in a 11% increase in annual loan issuance.

This results show that the preemption rule had a significant effect on the credit supply of national banks in APL states. To further check that the differential effects of the expansion of credit across counties are not driven by differential trends among the counties, Figure 1 depicts the time-series coefficients of the following regressions:

$$Log(\text{Loan Amount})_{i,t} = \sum_{\tau \neq t_0} \beta_\tau APL_{g,t} * Post_{2004} * OCC_{2003} \mathbf{1}_{(\tau=t)} + \gamma_t + \phi_i + \Gamma_{i,t} + \varepsilon_{g,t},$$

where $\mathbf{1}_{(\tau=t)}$ is a dummy variable equal to 1 for year t, and $\Gamma_{i,t}$ contains all the other main effects. I have normalized the coefficient β_{2004} corresponding to the preemption rule to zero. This event study shows that in the pre-period there was no difference in credit supply among counties with different fraction of OCC lenders that might explain our results. In other words, the treatment group (counties with a higher fraction of OCC lenders) and control group (lower fraction) were on parallel trends in the pre-period.

5 Main Results

In this section we present the main results of the paper by looking at the effect of the predicted change in the supply of credit on house prices, consumption, and delinquency rates.

5.1 The Effect of Credit Expansion on House Prices

We start by showing in Figure 2 the house price growth in counties in states with and without APL and for counties in the top quantile and the bottom quantile in terms of the fraction of loans originated by national banks. The Figure shows that the house price in counties with the highest concentration of national banks in APL states exhibits the largest increase in house prices during the boom year 2003-2006, but also experience the largest drop in the subsequent year 2007-2010. These results suggest a strong relationship between the county

exposure to national banks and the house prices pattern.

To precisely estimate the effect of the credit expansion on house prices, controlling for different characteristics of the counties, we present in Table 4 the results from the following reduced form

$$\begin{aligned} House\ Prices\ Growth_{i,t} &= \lambda_i + \eta_t + \beta_1 APL_{g,t} * Post_{2004} + \beta_2 OCC_{2003} * Post_{2004} \\ &+ \beta_3 OCC_{2003} * APL_{g,t} + \beta_4 APL_{g,t} * Post_{2004} * OCC_{2003} + X_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{2}$$

with β_4 being our coefficient of interest. In columns (1)-(3) we start controlling for year and county fixed-effects and then add the change in median income and population and the elasticity measure times Post as additional controls. In all three specifications the coefficient is positive and significant. This shows that predicted increase in credit supply are indeed associated with an increase in house prices. Intuitively, we also find that in counties with more elastic supply of houses we find that the house prices increases less than in other counties. House prices growth is also negatively correlated with the introduction of the APL, as this would reduce the amount of lending to subprime borrowers, while changes in income and population are positively associated with house price growth.

Interestingly, we confirm in column (4) that the effect on house prices is even larger for counties with a larger fraction of subprime borrowers. This shows that a large fraction of the house appreciation is due to the increase in credit available to riskier borrowers, who would not have had the possibility to purchase a house.

In column (5) we estimate the effect of an increase in loan amounts using two stage least squares as follows:

$$\text{House Growth}_{i,t} = \widehat{Loan\ Amount}_{i,t} + \lambda_i + \gamma_t + X_{i,t} + \varepsilon_{i,t}$$

where the predicted increase in loan amount $\widehat{Loan\ Amount}$ is estimates using the first

stage regression 1. We find that the effect is insignificantly larger, as the coefficient increase by about 40 percent. This IV estimation allows us to argue that a 10 percent increase in the credit supply results in 3.5 percent increase in house prices growth over the 2003-2006 period. This leads to a total increase of house prices by 12%.

As an additional check we assessed the issue of possible weakness of our instrumental variable. We generally observe F statistics above Stock (2008) weak identification critical values, rejecting the hypothesis that the IV is weak. We also verified that all our results were robust to weak instruments by employing the approach in Moreira (2009), which produces tests and confidence sets with correct size when instruments are arbitrarily weak for the just-identified case of a single endogenous variable.

5.2 The Effect of Credit on Employment

In this section, we implement the methodology of Section 3 to estimate the effect of the outward shift of the credit supply on aggregate employment. We should expect that job losses in the non-tradable sector will be correlated with the local demand and then with the credit supply, while job losses in the tradable sector will be uncorrelated with household indebtedness.

Table 5 shows the main results on employment in the non-tradable sector. In column (1) we investigate the change in employment during the boom years 2003-2005. We find that counties with a higher fraction of national banks experienced a greater increase in employment during those years. We then look in column (2) at the effect on employment controlling for year and county fixed-effects, and the coefficient is still positive and significant. We check the robustness of our results by controlling for various county characteristics in columns (2)-(4). The coefficient remains positive and both statistically and economically significant.

In column (5) we restrict attention to subprime counties and find that the coefficient

doubles in magnitude. This result suggests that a 10% increase in annual loan issuance induces a 3% increase in employment in counties with riskier borrowers. In column (6) we instrument the increase in credit supply and find that the coefficient is 35% larger than the OLS estimates. The instrumental variables estimate implies that a ten percent increase in loan issuance is associated with a 2% increase in employment in the non-tradable sector. These results together show that the credit boom experienced during the early 2000s can account for a large fraction of the increase in employment and consumption pre-crisis, but also for their subsequent collapse.

5.3 The Effect of Credit on Delinquency Rates

In the previous sections we have documented that counties that are more exposed to the preemption regulation, because of a higher fraction of national banks or for a larger subprime population, experienced larger boom and bust in house prices, employment and consumption. In this section we provide evidence that one of the mechanism that aggravate the fluctuations in those counties rely on the quality of borrowers that increased their leverage during the boom period, and their propensity to default.

Figure 3 shows that counties that experienced a larger increase in lending are the ones where delinquency rates fall the most during the boom, but significantly increase during the Great Recession. This is consistent with the idea that riskier borrowers were able to maintain their level of indebtedness without defaulting thanks to the amount of credit available during the booms, but were adversely affected in the subsequent years, which led them to default with higher frequency.

We formally test this hypothesis in Table 6. In column (1) we show the results for the cross section of counties, and find that the delinquency rates were significantly lower during the 2003-2006 period in counties with a higher fraction of national banks in APL states, even controlling for changes in population and income. In column (2)-(4) we estimate a similar

reduced form controlling for various characteristics of the county. As expected, we find that income is negatively correlated with delinquency rates, similarly more elastic counties are the ones with lower default rates. The main coefficient of interest is positive and significant in all the specifications. The effect is also economically larger as a 10% increase in annual loan issuance predicts a reduction of 10% in defaults.

Finally, column (6) analyze the period 2007-2010 and shows that predicted increases in lending are associated with a significant increase in delinquency rates. This suggests that all the debt accumulated during the boom made the households more vulnerable to defaults in the recession. This also suggests that national banks were not more capable to identify higher quality borrowers than the other lenders, such as independent mortgage lenders or local banks. The effect is even more significant than for the boom period, as if we compare counties in the top versus the bottom decile of presence of national banks in states with anti-predatory laws the OCC preemption resulted in a 30% increase in delinquencies.

6 Robustness

In this section, we further test the validity of our identification strategy.

6.1 Securitization

One potential concern with the results presented in the previous sections is that the presence of national banks might be correlated with the rise in securitization that occurred during the same period. Alternatively, given the credit rating concerns' about potential violation of the state anti-predatory laws, the inaction of the OCC preemption rule might have also increase the national banks' possibility to securitize loans, even if independent mortgage lenders rather than national banks were the key players in the securitization market. In other words, we try address the following question: can our result be explained by the rise in the securitization rather than by an outward shift in the credit supply?

To control for such concern, we collected data from BlackBox Logic which is the largest provider of data on securitized loans. The database covers 90 percent of the entire universe of securitized loans, and we aggregated this data at the county level. This gives us a reliable measure of securitized loans that varies at the county level.

Table 7 presents the main estimation of the paper, but adds as an additional control this measure of securitization. We find that all of our results are robust to such inclusion: both the magnitude and the statistical significance is unchanged. This suggests that our instrument is not picking up variation in the mortgage originators' incentives to securitize loans. Our instrument is then capturing a different source of variation that works through the national banks' lending incentives, which contributed to the credit boom experienced in the 2003-2006 period.

6.2 Evidence from States borders

In order to control for potential unobserved heterogeneity across counties, we can restrict attention to the state borders. Since counties in the West coast are much larger than counties on the East coast, and the sample size of the counties close to the state borders is small, we construct our main variables at the census tracts level. This allow us to have a very homogeneous sample as census tracts are very similar in terms of size across the whole U.S. and a much larger sample size.

We consider only census tracts pairs in different states whose minimum distance is about 10 miles. We have a sample of 4600 census tracts for the results on loan amounts, while we have house price data for only 540 census tracts close to state borders. The reason why we do not have more data on house prices for more census tracts is because many census tracts at the border are rural area, whose house prices indexes are not available. In order to run our triple-difference estimator we compute the fraction of loans originated by national banks in 2003 in each census tract.

Table 8 shows the results of the same regression as in 1 but by including border times time fixed effects and census tracts fixed effects. This allows us to control for any trend specific to the border and for unobserved and time-invariant heterogeneity across census tracts. Interestingly, we find that our main interaction coefficient is still highly significant and its magnitude is just slightly lower than the one in Table 3. This further validates our triple difference estimator, because in principle if the assumptions underlying it are valid, the magnitude should not depend upon the sample we consider.

6.3 Focusing on APL states

Since the implementation of anti-predatory laws is not random, one of our main concerns is to control for heterogeneity between states that decided to enact such a law, and the ones that did not. Our triple-difference methodology is partly motivated by such a concern, moreover, the previous results show that even restricting attention to the state-borders we find similar effects. However, we can run an additional robustness check: we can restrict attention our analysis to states that eventually passed an anti-predatory law. In other words, our treatment group includes the states that passed an anti-predatory law between 2000 and 2004, and the control group is the set of states that implemented these regulations afterwards.

If the main concern is that states with APL are fundamentally different from non-APL states, this test should show that even without using this variation, but just the different timing of the adoption, our results hold. Obviously, we are not saying that the timing is exogenous, but we do believe that this additional test might still be useful in showing that the variation we are employing is not coming from the heterogeneity across states, but from the preemption rule and its effects on the national banks' credit supply.

Table 9 shows the results for the four dependent variables of interest. In all specifications, we control for time and county fixed effects. Column 1 shows that the effect on loan amounts is both economically and statistically significant. Column 2 analyze the impact of our main

interaction variable on house prices, and it shows that counties with a higher fraction of national banks experience a larger house prices increase compared to counties with a lower fraction of national banks, within states that passed at some point an anti-predatory law. Column 3 investigates a similar specification for the employment in the non-tradable sector. The sign and the magnitude are very similar to the main specifications, but the coefficient is not significant. Finally, column 4 analyzes the pattern of delinquency rates, and it shows that very similar results to our main specification hold for this restricted sample.

7 Conclusion

In this paper we have exploited an important change in banking regulation which had differential effects on states that enacted anti-predatory laws versus the ones without such laws, and on counties with a different presence of national banks. This provides us with a novel identification strategy that allows us to investigate the role of the supply of credit on the boom and bust in house prices and real economic activity experienced by the U.S.

We uncover four main findings. First, counties that are more affected by the new regulation, that is, the one with stronger presence of national banks in APL states, are the ones where there is a significantly higher origination of loans, an increase of 11% per year. Second, house prices rise significantly more in these same counties, but they also experience a more significant drop during the bust periods. Third, we provide evidence that this increase in the supply of credit had a significant effect on the real economic activity, as employment in the non-tradable sector increases are associated with the predicted increases in lending to riskier borrowers. Forth, we also provide evidence that such a credit boom led to an increase in delinquency rates at the onset of the housing downturn.

These results sheds novel lights on the effect of a credit boom on the real economy, and shows that an outward shift in the supply of credit may lead to more severe fluctuations.

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Table 1
Summary Statistics

The table reports descriptive statistics for the main variables employed in our analysis. Loan Amount is computed using HDMA data, and denotes the value of mortgages to purchase a home by mortgage lenders in the period 2000-2011. Data on Population and Income are from the Census. House prices are from Zillow.com and are aggregated at the county level. % of HH with Fico below 620 in 2000 denotes the fraction of households with subprime FICO scores in each county. Delinquency rates denotes the fraction of households that are more than 90 days late in their mortgage payments in each county. Both the data on FICO scores and on Delinquency Rates come from Equifax. The Fraction of OCC lenders in 2003 is the share of loans originated by all the mortgage lenders regulated by The Office of the Comptroller of the Currency (OCC) as of 2003, and is computed using data from HDMA.

	N	Median	St. Dev.	Min	Max
Log of Loan Amount	26636	10.77421	1.723232	6.206576	17.95071
Log of Population	26636	10.38189	1.126157	8.922658	15.83998
Log of Median Income	4610	10.75382	0.235512	10.09059	11.64571
House prices growth	5071	1.026024	0.087227	0.640367	1.380569
% of HH with Fico below 620 in 2000	9168	0.241948	0.082845	0	0.517787
Delinquency Rates	26636	1.835	2.358905	0	31.69
Fraction of OCC lenders in 2003	26628	0.293318	0.12831	0.045662	0.878042

Table 2

Preemption of National Banks and the Amount of Loans Issued Under Each Regulatory Agency

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated loans under each regulatory agency to the preemtion of national banks were weights equal to population of county. Loan amounts is based on HMDA and is the amount of loans originated for purchainsg a house aggregated for each regulatory agency at county level for each year. "APL" is equal to one if the state has passed anti-predatory law and zero otherwise. "Post" is a dummy equal to one for years after 2004. "OCC" is equal to one if the regulating agency is OCC. The results reported in columns 1 to 3 are for years 2000 to 2006. Robust standard errors , clustered at county level, are below the coefficients in paranthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3
	Log of loan amount	*Loan Amounts / Loan Amounts in 2000*	
APL x Post x OCC	0.09***	0.55***	0.54***
	(0.03)	(0.10)	(0.10)
APL	-0.01	-0.10	
	(0.02)	(0.07)	
APL x OCC	-0.01	-0.11**	-0.10*
	(0.02)	(0.06)	(0.05)
APL x Post	-0.10***	-0.33***	
	(0.02)	(0.09)	
OCC		-0.09***	-0.09***
		(0.02)	(0.02)
Post	0.42***	1.21***	
	(0.02)	(0.08)	
OCC x Post	-0.07***	-0.63***	-0.63***
	(0.02)	(0.08)	(0.08)
Constant	11.52***	1.81***	1.94***
	(0.01)	(0.02)	(0.02)
Time Fixed Effects	Yes	Yes	Yes
County Fixed Effects		Yes	
County-Agency Fixed Effects	Yes		
County-Year Fixed Effetcs			Yes
Observations	90,957	89,170	89,170
R-squared	0.98	0.16	0.14

Table 3
Preemption of National Banks and Boom-Bust in Loan Origination

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans to the preemtion of national banks with weights equal to the population of each county. Loan amounts is based on HMDA and is the amount of loans originated for purchainsg a house aggregated at county level for each year. "APL" is equal to one if the state has passed anti-predatory law and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). The results in columns 2 to 5 are for years 2000 to 2006. Subprime counties are defined as counties with the fraction of subprime borrowers above the median. Robust standard errors , clustered at county level for columns 2 to 5, are below the coefficients in paranthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3	4	5	6
	Change in Loan Amount in 2003-2005	*Log of Loan amount*				*Change in Loan Amount in 2008-2010*
		Full Sample			*Subprime*	
APL X Post X Fraction OCC	1.468***	0.568***	0.513***	0.864***	1.197***	-0.376*
	(0.367)	(0.150)	(0.123)	(0.225)	(0.305)	(0.218)
APL	-0.600***	0.0418	0.0267	0.0339	0.135*	0.152**
	(0.122)	(0.0350)	(0.0364)	(0.0561)	(0.0705)	(0.0729)
APL X Post		-0.214***	-0.212***	-0.304***	-0.378***	
		(0.0520)	(0.0425)	(0.0692)	(0.0920)	
APL X Fraction OCC		-0.210**	-0.127	-0.175	-0.530**	
		(0.0971)	(0.101)	(0.175)	(0.241)	
Post X Fraction OCC		-0.667***	-0.479***	-0.630***	-0.614***	
		(0.117)	(0.0924)	(0.168)	(0.230)	
Fraction OCC	-1.052***					0.499***
	(0.276)					(0.143)
Elasticity	-0.0517***					-0.0225**
	(0.0119)					(0.0112)
Elasticity X Post				-0.0435***	-0.0686***	
				(0.00850)	(0.0111)	
Log(Median Income)			1.540***	1.514***	1.380***	
			(0.144)	(0.171)	(0.241)	
Log(Population)			1.208***	1.281***	1.320***	
			(0.155)	(0.175)	(0.222)	
Change in Median Income	2.104***					
	(0.271)					
Change in Population	3.158***					
	(0.481)					
Year Fixed Effect		Yes	Yes	Yes	Yes	
County Fixed Effect		Yes	Yes	Yes	Yes	
Observations	770	15,533	15,533	5,390	2,758	770
R-squared	0.371	0.027	0.151	0.214	0.276	0.079
Number of counties	770	2,219	2,219	770	394	770

Table 4
Preemption of National Banks and Boom-Bust in House Prices

The table reports coefficient estimates of weighted least square regressions relating house prices to the preemtion of national banks and the increase in the supply of loans induced by the preemption where the weights are given by the population of each county. House prices are from Zillow.com. "APL" is equal to one if the state has passed anti-predatory law and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). The results in columns 2 to 6 are for years 2000 to 2006. In column 6, "APL X Post X Fraction OCC" is used as an instrument for the log of loan amounts. Subprime counties are defined as counties with the fraction of subprime borrowers above the median. Robust standard errors , clustered at county level for columns 2 to 5, are below the coefficients in paranthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3	4	5	6	7
	Change in House Prices in 2003-2005	*House Prices Growth*					*Change in House Prices in 2008-2010*
			Full Sample		*Subprime*	*IV estimate*	
APL X Post X Fraction OCC	0.814**	0.357***	0.330***	0.330**	0.467**		-0.504**
	(0.370)	(0.108)	(0.106)	(0.140)	(0.188)		(0.210)
Instrumented Log of Loan Amounts						0.364***	
						(0.139)	
APL	-0.336***	0.0177	0.0249	0.0241	0.0710	0.0104	0.170**
	(0.115)	(0.0352)	(0.0361)	(0.0489)	(0.0435)	(0.0318)	(0.0680)
APL X Post		-0.124***	-0.120***	-0.114**	-0.170***	0.00250	
		(0.0347)	(0.0346)	(0.0496)	(0.0575)	(0.0232)	
APL X Fraction OCC		-0.117	-0.133	-0.145	-0.185	-0.0897	
		(0.102)	(0.106)	(0.141)	(0.138)	(0.0878)	
Post X Fraction OCC		-0.208***	-0.174***	-0.147	-0.262*	0.186	
		(0.0623)	(0.0605)	(0.0905)	(0.146)	(0.119)	
Fraction OCC	-0.472						0.517***
	(0.290)						(0.186)
Elasticity	-0.0547***						0.0271***
	(0.0172)						(0.00666)
Elasticity X Post				-0.0108*	-0.0170***	0.0103	
				(0.00634)	(0.00543)	(0.0136)	
Log(Median Income)			0.310*	0.340*	-0.0133		
			(0.166)	(0.185)	(0.152)		
Log(Population)			0.493***	0.541***	0.670***		
			(0.117)	(0.132)	(0.177)		
Change in Median Income	2.795***						-0.169
	(0.736)						(0.235)
Change in Population	1.643***						0.484
	(0.324)						(0.449)
Year Fixed Effect		Yes	Yes	Yes	Yes	Yes	
County Fixed Effect		Yes	Yes	Yes	Yes	Yes	
Observations	459	4,057	4,057	2,754	1,261	2,754	478
R-squared	0.476	0.023	0.042	0.046	0.077	-0.045	0.155
Number of counties	459	693	693	472	216	472	478

Table 5
Preemption of National Banks and Boom-Bust in Employment in Non-Tradable Sector

The table reports coefficient estimates of WLS regressions relating employment in non-tradable sector to the preemtion of national banks and the increase in the supply of loans induced by the preemption, with weights equal to the population of each county. Employment data comes from County Business Pattern and non-tradable sectors are definied according to Main and Sufi (2013). "APL" is equal to one if the state has passed anti-predatory law and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). The results in columns 2 to 6 are for years 2000 to 2006. In column 6, "APL X Post X Fraction OCC" is used as an instrument for the log of loan amounts. Subprime counties are defined as counties with the fraction of subprime borrowers above the median. Robust standard errors , clustered at county level for columns 2 to 5, are below the coefficients in paranthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3	4	5	6	7
	Change in Employment in Non-Tradable Sector in 2003-2005	*Employment in Non-Tradable Sector*					*Change in Employment in Non-Tradable in 2008-2010*
			Full Sample		*Subprime counties*	*IV estimate*	
APL X Post X Fraction OCC	0.207**	0.216***	0.165***	0.169**	0.326***		-0.205**
	(0.0817)	(0.0734)	(0.0610)	(0.0750)	(0.109)		(0.0966)
Instrumented Log of Loan Amounts						0.198**	
						(0.0782)	
APL	-0.0718***	0.0523***	0.0330**	0.0231	0.0281	0.0155	0.0616**
	(0.0242)	(0.0175)	(0.0163)	(0.0196)	(0.0275)	(0.0161)	(0.0308)
APL X Post		-0.0731***	-0.0619***	-0.0667***	-0.114***	-0.00692	
		(0.0234)	(0.0186)	(0.0223)	(0.0302)	(0.00652)	
APL X Fraction OCC		-0.169***	-0.0902*	-0.0590	-0.0956	-0.0243	
		(0.0545)	(0.0493)	(0.0613)	(0.0888)	(0.0548)	
Post X Fraction OCC		-0.201***	-0.108**	-0.0830	-0.201**	0.0440	
		(0.0594)	(0.0463)	(0.0598)	(0.0813)	(0.0422)	
Fraction OCC	-0.0991						0.0342
	(0.0644)						(0.0554)
Elasticity	-0.00207						0.00739***
	(0.00284)						(0.00268)
Elasticity X Post				-0.00495*	-0.00668	0.00286	
				(0.00274)	(0.00458)	(0.00406)	
Log(Median Income)			0.289***	0.289***	0.259***	-0.0108	
			(0.0422)	(0.0443)	(0.0724)	(0.123)	
Log(Population)			0.893***	0.958***	0.966***	0.689***	
			(0.0653)	(0.0688)	(0.108)	(0.133)	
Change in Median Income	0.122**						0.115
	(0.0488)						(0.116)
Change in Population	1.041***						0.297
	(0.111)						(0.215)
Year Fixed Effect		Yes	Yes	Yes	Yes	Yes	
County Fixed Effect		Yes	Yes	Yes	Yes	Yes	
Observations	532	5,362	5,362	3,721	1,767	3,721	538
R-squared	0.224	0.015	0.229	0.285	0.313	0.194	0.045
Number of counties	532	790	790	541	259	541	538

Table 6
Preemption of National Banks and Decline and Subsequent Increase in Mortgages Delinquencies

The table reports coefficient estimates of weighted least square regressions relating the percentage of delinquent mortgages to the preemtion of national banks with weights equal to the population of each county. Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "APL" is equal to one if the state has passed anti-predatory law and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). The results in columns 2 to 5 are for years 2000 to 2006. Subprime counties are defined as counties with the fraction of subprime borrowers above the median. Robust standard errors , clustered at county level for columns 2 to 5, are below the coefficients in paranthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3	4	5	6
	Change in Delinquency Rates in 2003-2005	*Delinquency Rates Full Sample*			*Subprime*	*Change in Delinquency Rates in 2008-2010*
APL X Post X Fraction OCC	-1.402***	-1.001***	-0.971***	-1.794***	-2.278***	0.823*
	(0.399)	(0.321)	(0.306)	(0.457)	(0.705)	(0.453)
APL	0.574***	-0.0370	-0.0294	-0.106	-0.182	-0.317**
	(0.122)	(0.0941)	(0.0953)	(0.133)	(0.200)	(0.141)
APL X Post		0.447***	0.455***	0.693***	0.854***	
		(0.104)	(0.0991)	(0.142)	(0.210)	
APL X Fraction OCC		0.0251	-0.0362	0.197	0.372	
		(0.280)	(0.283)	(0.413)	(0.688)	
Post X Fraction OCC		0.932***	0.730***	0.926***	0.857*	
		(0.194)	(0.181)	(0.287)	(0.473)	
Fraction OCC	-1.408***					-0.411
	(0.283)					(0.305)
Elasticity	-1.194***					-0.0638***
	(0.377)					(0.0199)
Elasticity X Post				0.0564***	0.107***	
				(0.0194)	(0.0312)	
Log(Median Income)			-1.897***	-2.004***	-2.068***	
			(0.316)	(0.398)	(0.713)	
Log(Population)			-0.737*	-0.857*	-0.633	
			(0.384)	(0.445)	(0.679)	
Change in Median Income	2.104***					-2.161**
	(0.271)					(0.864)
Change in Population	3.158***					0.0667
	(0.481)					(1.164)
Year Fixed Effect		Yes	Yes	Yes	Yes	
County Fixed Effect		Yes	Yes	Yes	Yes	
Observations	768	15,533	15,533	5,390	2,758	769
R-squared	0.111	0.008	0.023	0.072	0.093	0.011
Number of counties	768	2,219	2,219	770	394	769

Table 7
Robustness Test I: Securitization

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in non-tradable sector, and deliqneuency rates to the preemtion of national banks with weights equal to the population of each county, controlling for the fraction of loans that in each county were securitized. Loan amounts is based on HMDA and is the amount of loans originated for purchainsg a house aggregated at county level for each year. House prices are from Zillow.com. Employment data comes from County Business Pattern and non-tradable sectors are definied according to Main and Sufi (2013). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. Fraction of Securitized loans come from BlackBox Logic, which covers 90% of the securitization market. "APL" is equal to one if the state has passed anti-predatory law and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). The results are for years 2000 to 2006. Subprime counties are defined as counties with the fraction of subprime borrowers above the median. Robust standard errors , clustered at county level for columns 2 to 5, are below the coefficients in paranthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	1	2	3	4
	Log of Loan amount	House Prices Growth	Employment in Non-Tradable Sector	Delinquency Rates
APL X Post X Fraction OCC	0.809***	0.269**	0.165**	-1.701***
	(0.199)	(0.133)	(0.07)	(0.431)
APL X Post	-0.305***	-0.0922**	-0.0647***	0.703***
	(0.0616)	(0.0466)	(0.0207)	(0.132)
APL X Fraction OCC	-0.0882	-0.0424	-0.0517	0.0428
	(0.137)	(0.139)	(0.0491)	(0.415)
Post X Fraction OCC	-0.567***	-0.154*	-0.0657	0.910***
	(0.143)	(0.0833)	(0.0522)	(0.273)
APL	0.00343	-0.0142	0.0118	-0.11
	(0.0423)	(0.0481)	(0.0137)	(0.13)
Fraction of Securitized Loans	0.632***	-0.0549	0.182***	-0.390**
	(0.0894)	(0.115)	(0.0305)	(0.192)
Log(Median Income)	1.232***		0.205***	-1.818***
	(0.154)		(0.0467)	(0.419)
Log(Population)	1.294***		0.959***	-0.879*
	(0.16)		(0.0619)	(0.45)
Elasticity X Post	-0.0155*	-0.0136	0.00298	0.0373*
	(0.008)	(0.0111)	(0.00245)	(0.0198)
Change in Median Income		0.347		
		(0.211)		
Change in Population		0.505***		
		(0.126)		
Year Fixed Effect	Yes	Yes	Yes	Yes
County Fixed Effect	Yes	Yes	Yes	Yes
Observations	5,322	2,733	3,706	5,322
R-squared	0.254	0.05	0.314	0.079

Table 8
Robustness Test II: State Borders

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, and house prices to the preemtion of national banks, with weights equal to the population of the census tract. We restrict attention to tracts within 10 miles from state borders. Loan amounts is based on HMDA and is the amount of loans originated for purchainsg a house aggregated at census tract level for each year. House prices are from Zillow.com. "APL" is equal to one if the state has passed anti-predatory law and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of OCC lenders in 2003 at the census tract level. The results in columns 1 and 2 are for years 2003 to 2005, while the results in columns 3 and 4 are for the changes between years 2007 and 2009. Robust standard errors , clustered at county level for columns 2 to 5, are below the coefficients in paranthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

VARIABLES	1 *Change in Loan Amount in 2003-2005*	2 *Change in House Prices*	3 *Change in Loan Amount in 2007-2009*	4 *Change in House Prices in 2008-2010*
APL X Post X Fraction OCC	0.236**	0.237***	-0.280**	-0.0434*
	(0.0968)	(0.0439)	(0.116)	(0.0247)
APL	-0.0763**	-0.0807***	-0.00766	-0.0154*
	(0.0313)	(0.0134)	(0.0386)	(0.00860)
APL X Post				
APL X Fraction OCC				
Post X Fraction OCC				
Log(Median Income)				
Fraction OCC	0.0244	-0.00605	0.272***	0.0318
	(0.0580)	(0.0176)	(0.0733)	(0.0227)
Change in County Median Income	0.490***	0.640***		
	(0.146)	(0.0904)		
Constant	0.341***	0.202***	-0.671***	-0.105***
	(0.0226)	(0.0108)	(0.0251)	(0.00755)
Observations	11,567	7,517	11,377	7,451
R-squared	0.114	0.368	0.158	0.398

Table 9
Robustness Test III: Only APL States

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in non-tradable sector, and deliqneuency rates to the preemtion of national banks with weights equal to the population of each county, restricting attention only to the states that at some point in time decided to implement an anti-predatory law. Loan amounts is based on HMDA and is the amount of loans originated for purchainsg a house aggregated at county level for each year. House prices are from Zillow.com. Employment data comes from County Business Pattern and non-tradable sectors are definied according to Main and Sufi (2013). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "APL" is equal to one if the state has passed anti-predatory law and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). The results are for years 2000 to 2006. Robust standard errors , clustered at county level for columns 2 to 5, are below the coefficients in paranthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)
	Log of Loan amount	House Prices Growth	Employment in Non-Tradable Sector	Delinquency Rates
APL X Post X Fraction OCC	0.779***	0.374***	-0.0203	-2.206***
	(0.280)	(0.140)	(0.0681)	(0.661)
APL	0.0326	0.0129	0.0303*	-0.113
	(0.0508)	(0.0471)	(0.0165)	(0.129)
APL X Post	-0.173**	-0.0234	0.00967	0.486***
	(0.0771)	(0.0361)	(0.0184)	(0.184)
APL X Fraction OCC	-0.175	-0.102	-0.0863*	0.245
	(0.166)	(0.138)	(0.0511)	(0.410)
Log(Median Income)	1.679***	0.0868	0.323***	-2.491***
	(0.199)	(0.172)	(0.0468)	(0.473)
Log(Population)	1.148***	0.302***	0.871***	-0.501
	(0.233)	(0.103)	(0.0647)	(0.562)
Elasticity X Post	-0.0328***	-0.00906	-0.00343	0.0311
	(0.0112)	(0.0105)	(0.00334)	(0.0239)
Post X Fraction OCC	-0.567**	-0.176*	0.136**	1.348**
	(0.273)	(0.107)	(0.0674)	(0.611)
Year Fixed Effect	Yes	Yes	Yes	Yes
County Fixed Effect	Yes	Yes	Yes	Yes
Observations	2,842	1,514	2,838	2,842
R-squared	0.238	0.019	0.339	0.068
Number of fips	406	260	406	406

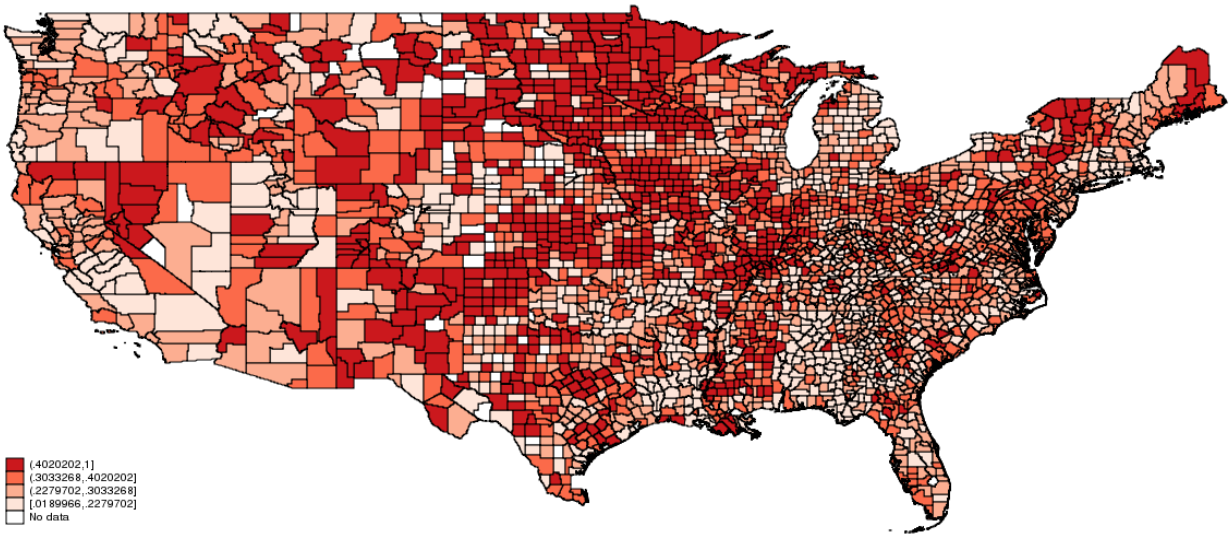

Figure 1- Fraction of Lending Done by National Banks in 2003 for Each County

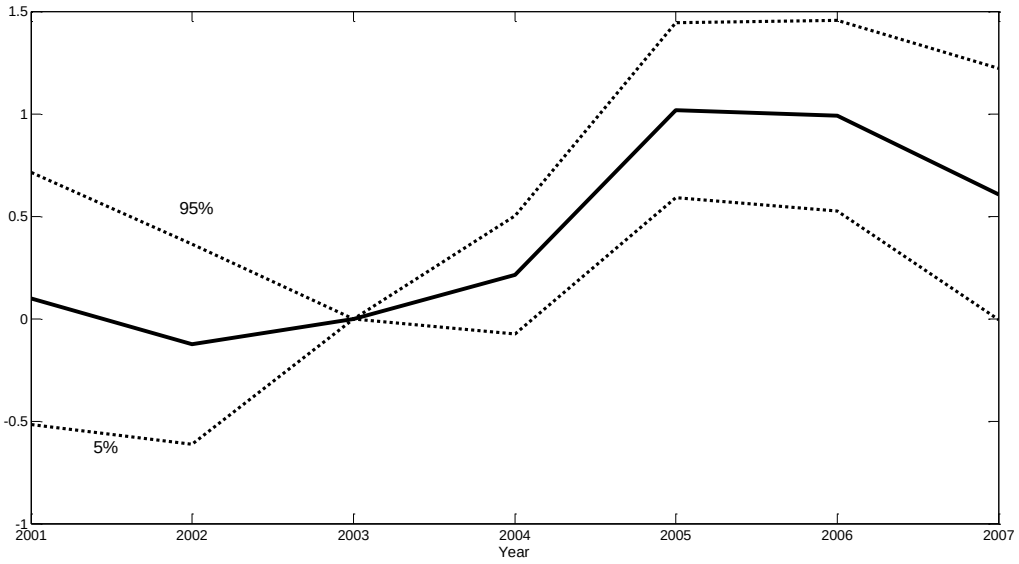

Figure 2- Time Series Coefficient for $\beta(\tau)$ in Equation (1).

Note: Coefficient for 2003 is normalized to zero.