# Credit-Induced Boom and Bust*

Marco Di Maggio
Harvard Business School and NBER
mdimaggio@hbs.edu

Amir Kermani
Berkeley and NBER
kermani@berkeley.edu

October 2, 2016

**Abstract**

This paper exploits the federal preemption of national banks in 2004 from local laws against predatory lending to gauge the effect of the supply of credit on the real economy. First, the preemption regulation resulted in an 11% increase in annual lending in the 2004-2006 period, which is associated with a 3.3% rise in annual house price growth rate and a 2.2% expansion of employment in the non-tradable sectors. These effects are followed by a sharp decline in subsequent years. Furthermore, we show that the increase in the supply of credit reduced delinquencies during the boom years but increased them in bust years.

*We thank the editor and two anonymous referees for comments that greatly improved the paper. We also thank Daron Acemoglu, Andreas Fuster, Dwight Jaffee, Benjamin Keys, Ross Levine, Chris Mayer, Adair Morse, Tomasz Piskorski, Giorgio Primiceri, Amiyatosh Purnanandam, Christina Romer, David Romer, Jacob Sagi, Philip Schnabl, Anna Scherbina, Adi Sunderam, James Vickery, Nancy Wallace, and seminar participants at the 2014 NBER Summer Institute Monetary Economics and Real Estate meetings, the Macro-Finance Society meeting in Boston, the 12th Annual Rothschild Caesarea conference, the 2015 FIRS meeting in Reykjavik, the UBC Winter Finance Conference 2015, the 16th Annual Texas Finance Festival, the 10th CSEF-IGIER Symposium on Economics and Institutions, the 2014 Summer Real Estate Symposium, the SF Fed-UCLA conference on Housing and Monetary Policy, the Columbia-NYU Corporate Finance meeting, the Joint Central Bank Conference on Monetary Policy and Financial Stability at Bank of Canada, the Consumer Financial Protection Bureau (CFPB) Research conference, New York Fed, Cornell University, Columbia University, NYU (Stern), Kellogg and UC Berkeley. Katrina Evtimova and John Mondragon provided excellent research assistance. All remaining errors are our own. We are also grateful to the Paul Milstein Center for Real Estate at Columbia Business School for sharing their data.

# 1 Introduction

The Great Recession was preceded by a very rapid expansion of credit that ended in the collapse of house prices and consumption. The resulting job decline was sharper than in any recession of recent decades, with unemployment peaking at 10% in October 2009. What role did the financial markets and banking deregulation play in the boom and bust? Does an outward shift in the credit supply during the business cycle boom explain the subsequent disruptions in the real economy?

This paper inquires into the way in which an increase in credit supply to riskier borrowers drove the boom and bust cycle in house prices and poor economic outcomes during the recession. However, the link between credit growth and outcomes may not be driven by credit supply: counties with faster economic growth have higher consumption and higher house prices, but they might also have greater demand for credit. As a result, house price and employment movements will be strongly correlated with credit supply, even if the latter has no direct effect on real estate prices or consumption.

In this paper we estimate the effect of an increase in credit supply to riskier borrowers on economic outcomes using significant changes to US banking regulation in the early 2000s. Starting in 1999, a number of states adopted anti-predatory-lending laws (APL) restricting the terms of mortgage loans to riskier borrowers. However, in 2004, in an effort to increase home ownership, the Office of the Comptroller of the Currency (OCC) enacted a preemption rule, barring the application of state anti-predatory-lending laws to national banks. In other words, national banks and their mortgage lending subsidiaries were exempted from state APLs and enforcement, while mortgage brokers and independent non-depository lenders, as well as state-chartered depository institutions and their subsidiaries, were still required to comply. This preemption had the effect of increasing credit supply for national banks.

The enactment of the preemption offers an excellent opportunity to identify credit supply shocks. Our identification strategy is to compare economic outcomes in states with and without APLs before and after the OCC preemption rule was enacted. In doing so, we also

take advantage of the substantially uneven presence of national banks in different counties as reflected in the proportion of loans they originated before the law change. In particular, APL-state counties in which a large proportion of loans were originated by national banks before 2004 experienced a positive credit supply shock in the wake of the OCC regulation. In fact, national banks could now grant credit to riskier borrowers with fewer restrictions than other financial institutions.

However, states with APL might differ from those without, and counties with a stronger presence of national banks might be subject to different shocks than those dominated by other type of institutions.[1] To control for these differences, our strategy is to compare counties within APL states, thus excluding differences between counties with more and fewer OCC lenders in non-APL states. Therefore, we exploit both variation across states due to the presence of APLs and variation across counties within states due to the presence of national banks.

Most of the literature takes the existence of the credit shocks as given, and identifies variation in exposures to these shocks during the boom. For instance, Saiz (2010) employs the elasticity of housing supply to identify regions more likely to experience house prices increases; while Mian and Sufi (2009) uses the fraction of subprime borrowers as a proxy for the regions with a higher demand for credit. In contrast, we measure the credit shock itself more directly.

We present four main findings. First, comparing counties in the top and bottom deciles of presence of national banks in states with anti-predatory-lending laws, we show that the OCC preemption resulted in an increase of 11-15% in annual loan issuance.[2] These results hold even if we control for several county characteristics in all specifications, as well as county and year fixed-effects. To shed light on how this effect varied over time, we examine the boom

[1] For instance, securitization was more important for independent mortgage companies which allowed them to grow faster during the securitization boom.

[2] We emphasize that these estimates are the result of a local general equilibrium effect, because even if the initial shock increased the credit available to subprime borrowers, prime borrowers might have increased their demand for credit as well. For instance, subprime borrowers' higher demand for houses, by increasing collateral values, would indirectly increase the credit available to prime borrowers.

period 2003-2005 and the bust period 2008-2010 separately. We show that the counties with a greater presence of OCC lenders in states with APLs had a more pronounced boom-bust cycle in loan origination. These estimates constitute our first stage regression; now we can instrument the supply of credit with the interaction between the presence of national banks in APL states and the post indicator for the period after 2004 when the preemption was enacted.

Second, using our instrument for the supply of credit to riskier borrowers, we show that the supply of credit had a substantial impact on house prices. A 10% increase in loan origination leads to a 3.3 percentage points increase in the growth rate of house prices, which cumulated to a total increase of 10% in house prices during the 2004-2006 period. In addition to driving the boom, our instrument also significantly predicts the bust in housing prices. Our estimate is robust to extensive controls for demographics and income differences.

Third, we explore the effect of the increase in credit on employment in non-tradable sectors: non-tradables are a natural focus because they are affected mainly by local demand. We show that employment expands significantly more in counties with a large presence of national banks in APL states. Specifically, our IV estimates suggest that a 10% increase in loan origination leads to a 2% increase in employment in non-tradable sectors. And focusing solely on the boom and bust period, the predicted increase in lending is associated with a stronger boom and a sharper bust.

Fourth, we examine the effect of the expansion of credit on loan delinquencies. In counties with more loans originated by OCC lenders,we show that in APL states delinquency rates were significantly lower during the boom but surged in the bust period. Comparing counties in the top and bottom deciles of presence of national banks in APL states, the OCC preemption diminished delinquencies by about 30% during the boom and increased them by a similar amount during the Recession. Our interpretation is that the increase in lending enabled households to avoid defaults during the upswing by relaxing their borrowing constraints, but aggravated their financial situation during the downturn, making them more fragile.

We show that these four findings apply in different degrees across counties, in a way that is consistent with our credit supply interpretation. Specifically, if our findings are driven by the relaxation of the borrowers' credit constraints, we should then expect our findings to be stronger in regions where borrowers face tighter financial constraints. We show this to be true: our proxies to capture the extent of these constraints are the fraction of subprime borrowers in a county; a measure of house affordability, i.e. the ratio of median house price to median income; and the elasticity of housing supply. In all three instances, the results show that the preemption significantly increased the availability of credit to riskier and more constrained borrowers, which confirms our posited mechanism of credit-induced fluctuation. Finally, analyzing loan-level data we show that the introduction of the OCC preemption rule resulted in a significant increase in the issuance of "high-cost loans" and mortgages with debt-to-income ratios in the top tercile by OCC lenders.[3] These findings provide further evidence corroborating the mechanism behind our main results.

**Related Literature**. Our findings contribute to the debate about the origins of the crisis. Mian and Sufi (2009) show that zip codes with a higher fraction of subprime borrowers experienced unprecedented relative growth in mortgage credit and a corresponding increase in delinquencies. However, Adelino et al. (2015) have recently argued that the middle-class and high-FICO borrowers also played a significant role in the mortgage crisis. We complement these studies by exploiting an exogenous shock to credit supply to show that banking deregulation played a significant role in the mortgage crisis, by allowing lenders to issue riskier mortgages.[4]

The magnitude of the estimated effects of an increase in the credit supply on the economy is in line with recent research. Favara and Imbs (2015), for instance, using the relaxation of

[3] "High-cost loans" are defined as loans with an annual percentage rate 3 percentage points or more above the Treasury rate for first-lien mortgages with comparable maturities. Mortgages with debt-to-income (DTI) ratios in the top decile usually exhibit DTI above 4.

[4] There has been abundant evidence of changes in lending during the years preceding the crisis due to different reasons. There are studies on the weakened lending standards (Jiang et al. (2014), Agarwal et al. (2014), Haughwout et al. (2011), Chinco and Mayer (2014) and Barlevy and Fisher (2010)), on the increase in misrepresentations and fraud (Ben-David (2011), Garmaise (2014), Piskorski et al. (2013) and Griffin and Maturana (2014)), on the failure of ratings models and the rapid expansion of non-agency securitization markets (Rajan et al. (2010), Purnanandam (2011), Nadauld and Sherlund (2013) and Keys et al. (2010)).

geographical restrictions on bank expansion across state lines show that between one-third and one-half of the increase in house prices from 1994 to 2005 can be explained by the expansion in mortgage credit supply.[5] Landvoigt et al. (2015), instead, provide a structural approach and conclude that "cheaper credit for poor households was a major driver of prices, especially at the low end of the market." We show that the increase in loan origination resulting from the preemption of anti-predatory lending laws can explain about 20-30% of the increase in house prices, which corroborates the interpretation that the expansion of credit to riskier borrowers was an important factor driving the boom.[6] Furthermore, our results need to be understood as the result of a local general equilibrium effect: as a direct effect of the preemption rule, riskier borrowers are able to have access to cheaper credit. However, they can bid up house prices further relaxing the collateral constraints of less risky borrowers, who can themselves borrow more and bid up house prices.[7]

Section 2 gives background on the US credit market and regulation. Section 3 provides details on the data sources. Section 4 explains the research design and how it is made operational. Section 5 describes and interprets the main results. Section 6 presents the heterogeneity of treatment effects across regions to provide further evidence of our credit-supply mechanism. Section 7 provides an estimate of the aggregate impact of our results. Section 8 concludes.

# 2 Regulatory Framework

## 2.1 Mortgage Regulators

In the United States, residential mortgage lenders are regulated by national and local agencies. Specifically, national banks, Federal thrift institutions and their subsidiaries are super-

[5] See also Jayaratne and Strahan (1996) and Rice and Strahan (2010) for the description of this instrument.

[6] We also contribute to the literature on credit booms and financial crisis (Jorda' et al. (2011), Schularick and Taylor (2012) and Rajan and Ramcharan (2012)).

[7] Other papers on the interplay between credit, house prices and employment include Adelino et al. (2012), Mian et al. (2013), Mian and Sufi (2014), Greenstone and Mas (2012), Chodorow-Reich (2014), Kleiner and Todd (2007), Chaney et al. (2012), Ivashina and Scharfstein (2010), Cornett et al. (2011), Huang and Stephens (2011), Berrospide and Edge (2010), Goetz and Valdez (2010), and Dagher and Fu (2011).

vised by the OCC or the Office of Thrift Supervision (OTS). State banks and state-chartered thrift institutions are supervised by either the Federal Reserve System, the Federal Deposit Insurance Corporation (FDIC) or by their chartering state. Credit unions are supervised by the National Credit Union Administration (NCUA), while non-depository mortgage companies are regulated by the Department of Housing and Urban Development (HUD) and the Federal Trade Commission.

Mortgage companies might potentially shop for the most lenient regulator. However, Agarwal et al. (2012) show that federal regulators are significantly less lenient, downgrading supervisory ratings about twice as frequently as state supervisors, while banks under federal regulators report higher nonperforming loan ratios, more delinquent loans, higher regulatory capital ratios, and lower ROA. Banks accordingly have an incentive to switch from Federal to state supervision, if they are allowed to do so. Moreover, Rosen (2005) explores switching in regulatory agencies between 1970 and 2003, and finds that in the early part of the period most of the switches were due to new banking policies, such as the easing of the ban on interstate banking, whereas after the initial period the main reason for switching was merger with a bank chartered at a different level. Further, the banks that switched tended to be small banks with assets of less than $1 billion. In any case, the granularity of our dataset allows us to track the banks that changed regulatory agencies, so that we can address any further concerns related to this issue.

## 2.2 Anti-predatory laws

The dual banking system generated conflicting regulations when several states passed anti-predatory-lending laws and the OCC issued a preemption rule for national banks. In 1994, Congress had passed the Home Ownership and Equity Protection Act (HOEPA) which imposed substantive restrictions on terms and practices for high-priced mortgages, based either on APR or on total points and fees. This regulation aimed to redress abusive high charges for refinancing and home equity loans. However, the thresholds for classifying mortgages as

predatory or "high cost" were very high, which significantly reduced the applicability of the restrictions; these "high cost" mortgages, in fact, accounted for just 1 percent of subprime residential mortgages; they represented the most abusive sector of the subprime mortgage market (Bostic et al. (2008)).

Many states later adopted stronger anti-predatory regulations than federal law requires.[8] Anti-predatory laws seek to prevent unfair and deceptive practices such as steering borrowers into loans with a higher interest rate than they could qualify for, making a loan without considering repayment ability, charging exorbitant fees, or adding abusive subprime early repayment penalties, all of which can increase the risk of foreclosure significantly.[9] The first comprehensive state APL law was enacted in North Carolina in 1999, and targeted at the subprime mortgage market. As of January 2007, 20 states and the District of Columbia had APL laws in effect. Table A1 reports the states that adopted an APL and the dates these laws were in effect.

APLs have potentially different kinds of effects on mortgage market outcomes. On the one hand, the laws might ration credit and raise the price of subprime loans. On the other, they might serve to allay consumer fears about dishonest lenders and ensure that creditors internalize the cost of any negative externalities from predatory loans, which could increase the demand for credit.

There is strong recent evidence that anti-predatory laws affected lenders' origination behavior in the subprime market. Ding et al. (2012), for instance, find that they are associated with a 43% reduction in early repayment penalties and a 40% decrease in adjustable-rate mortgages; they are also correlated with a significant reduction in the riskier borrowers' probability of default. In subprime regions (those with a higher fraction of borrowers with FICO scores below 680) these effects are even stronger.

Using 2004 HMDA data, Ho and Pennington-Cross (2006) find that subprime loans

[8] Table A.1 provides the list of states that adopted an anti-predatory law.

[9] Agarwal and Evanoff (2013) provide evidence of unscrupulous behavior by lenders – such as predatory lending – during the housing boom of the 2000s. They show that lenders steered higher-quality borrowers to affiliates that provided subprime-like loans, with APR between 40 and 60 basis points higher.

originated in states with laws against predatory lending had lower APRs than in unregulated states. Ho and Pennington-Cross (2008) provide additional evidence, focusing on border counties of adjacent states with and without APL to control for labor and housing market 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 fewer subprime originations. More recently, Agarwal et al. (2014) estimate the effect on mortgage default rates of a pilot anti-predatory policy in Chicago that required "low-credit-quality" applicants and applicants for "risky" mortgages to submit their loan offers from state-licensed lenders for third-party review by HUD-certified financial counselors. This policy significantly affected both the origination rates and the characteristics of risky mortgages.[10]

Finally, the anti-predatory laws are likely to have had significant impact on the banks' incentives for securitization. In fact, credit rating agencies stated explicitly that after the APLs were enacted they began to require credit enhancement from lenders who might have been in violation of state APLs: "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".[11] Evidence of this is also provided by Keys et al. (2010) who study the effect of securitization on lenders' screening decisions and exploit the passage and subsequent repeal of anti-predatory laws in New Jersey (2002) and Georgia (2003) that varied the ease of securitization. They find strong evidence that the incentives to screen the borrowers significantly increased during a period of strict enforcement of anti-predatory lending laws.

We follow this literature employing the measure constructed by Ding et al. (2012), which considers only the states that passed anti-predatory laws that were not just small-scale home

[10] For a theoretical model of predatory lending see Bond et al. (2009).

[11] Available at http://www.iflr.com/Article/2026825/Predatory-lending-and-RMBS-securitizations-in-the-US.html.

ownership and equity protection acts implemented to prevent local regulation.

## 2.3 Preemption Rule

On January 7, 2004 the OCC adopted sweeping regulations preempting, with regard to national banks, a broad range of state laws that sought to regulate the "terms of credit." The measure preempted laws that regulate loan terms, lending and deposit relationships or 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 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 have a permissible "incidental" effect only if they are part of "the legal infrastructure that makes it practicable" for national banks to conduct their federally-authorized activities and "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, property acquisition and transfer, taxation, and zoning.[12]

Specifically, the OCC preempted all regulations pertaining the terms of credit, including repayment schedules, interest rates, amortization, payments due, minimum payments, loan-to-value ratios, the aggregate amount that may be lent with real property as security or term to maturity, including the circumstances under which a loan may be called due and payable

[12]For instance, New Century mentioned in its 2004 10-K filing the following: "Several states and cities are considering or have passed laws, regulations or ordinances aimed at curbing predatory lending practices. In general, these proposals involve lowering the existing federal HEPA thresholds for defining a "high-cost" loan, and establishing enhanced protections and remedies for borrowers who receive such loans. [...] Because of enhanced risk and for reputational reasons, many whole loan buyers elect not to purchase any loan labeled as a "high cost" loan under any local, state or federal law or regulation. This would effectively preclude us from continuing to originate loans that fit within the newly defined thresholds. [...] Moreover, some of our competitors who are, or are owned by, national banks or federally chartered thrifts may not be subject to these laws and may, therefore, be able to capture market share from us and other lenders. For example, the Office of the Comptroller of the Currency issued regulations effective January 7, 2004 that preempt state and local laws that seek to regulate mortgage lending practices by national banks." (available at http://www.sec.gov/Archives/edgar/data/1287286/000119312505052506/d10k.htm pag. 45).

after a certain time or upon a specified external event.

Then, starting in 2004 the subprime mortgage market in states with anti-predatory laws was no longer a level playing field: national banks were significantly less constrained by APLs in providing credit to riskier borrowers.

# 3 Data

We collect data on the new mortgage loans originated every year from 1999 to 2011 through the Home Mortgage Disclosure Act (HMDA) dataset for loan applications, which records the final status (i.e. denied, approved or originated), reason for borrowing (i.e. home purchase, refinancing or home improvement), loan amount, race, sex, income, and home ownership status. We aggregate HMDA data up to the county level and compute the fraction of loans originated by lenders regulated by the OCC. We augment this dataset with information on the fraction of securitized loans by county from Blackbox Logic, a private company that provides a comprehensive, dynamic dataset with information on 21 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.

As a regional measure of home prices, we use the CoreLogic monthly Home Price Index (HPI) at the county level. This index follows the Case-Shiller weighted repeat-sales methodology to construct a measure of quality-adjusted market prices from 2000 to 2013. They are available for several property categories. We use the single family combined index, which pools all single family structure types (condominiums, detached houses, etc.).

To control for heterogeneity in counties' propensity to experience housing increases due to other factors, we use the elasticity measure proposed by Saiz (2010) and adopted commonly in the literature. To further complement our data concerning the financial conditions of the different counties, we employ data from Equifax, which provides county-level information on loan amounts, mortgage delinquency rates and the fraction of households with FICO scores under 680.

To determine 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 (2014)). Finally, to control for local credit demand, we also add Census-based county-level data on demographics, income, and business statistics.

Table 1 provides the summary statistics for our main variables, dividing them between static characteristics, as the one we compute in the pre-period, and the changes for the boom and the bust periods, which are used in the cross-sectional analysis. The first point to notice is that there is a significant variation in the fraction of loans originated by OCC lenders, as it varies from 5 percent up to 88 percent. Second, we have information for the elasticity of housing supply only for a subset of counties, as it is computed only for the largest ones. In our analysis, we are going to show that our results hold both for the whole sample and for the more restricted sample of counties for which the elasticity measure is available. Finally, we can also notice that loan amounts as well as employment and house price growth are on average positive during the boom period, 2003-2005, and negative in the bust period 2008-2010. We will confirm these trends exploiting the regulatory changes adopted in the early 2000s to establish a casual link between an outward shift in the credit supply to riskier borrowers and real economic activity.

# 4 Research Design

We start our analysis by exploiting *within county* variation in credit supply by distinguishing loans originated by financial institutions regulated by the different agencies. Specifically, Table 2 shows a regression of home purchase mortgages originated in different counties by financial institutions regulated by the different agencies. Formally, we estimate the following specification:

$$Log(\text{Loan Amount})_{a,i,t} = \lambda_{ia} + \eta_t + \beta_1 APL_{g,t} \times Post_{2004} \times OCC + \beta_2 OCC \times Post_{2004} + \beta_3 APL_{g,t} \times OCC + \beta_4 APL_{g,t} \times Post_{2004} + \beta_5 OCC_{2004} + \beta_6 APL_{g,t} + \varepsilon_{a,i,t} \quad (1)$$

where $APL_{g,t}$ is an indicator variable equal to 1 if state $g$ has an anti-predatory-lending law in place at time $t$ and zero otherwise, the $Post$ indicator which is 1 after the preemption rule and an $OCC$ indicator equal to one if the originator is regulated by the OCC - and so exempt from APL. We have seven different observations, one for each agency indexed by $a$, for each county $i$.

Columns (1) and (2) of Table 2 display the level: as can be seen, there is a significant increase in loans originated by national banks in APL states after 2004, even after controlling for year and agency times county fixed effects as well as county-year fixed effects. The county-year fixed effects capture potential shocks that affect only a subset of financial institutions in each county, e.g. independent mortgage lenders, as well as any other regional shocks. Column (3) shows the effects on lending growth controlling for county and year fixed effects, while Column (4) includes also county-year fixed effects, which absorb any time-varying unobserved heterogeneity such as changes in credit demand and in expectations about house prices. In all the specifications, national banks in APL states increased their lending by about 10% after the preemption rule. Overall, the results in Table 2 suggests that lenders regulated by the OCC lent more in APL states after the enactment of the preemption regulation.

Next, following several recent works showing that firms are not fully able to recover the lost capital when their bank decreases commercial lending; we exploit the inter-county heterogeneity in exposure to national banks.[13] Figure 1, displaying the distribution of the fraction of mortgage loans originated by OCC lenders among counties, shows that the importance of national banks does in fact vary significantly.

Moreover, the fraction of loans originated by national banks is also persistent over time.

[13] See, for instance, Khwaja and Mian (2008), Faulkender and Petersen (2006), Sufi (2009), Leary (2009), Lemmon and Roberts (2010), and Chava and Purnanandam (2011).

Figure 2 shows the relation between the fraction of OCC lenders at year 2005 (after the preemption) and at 2003 (before the preemption) for APL and non-APL states. In both cases the correlation over time is greater than 0.9. This high correlation reassures us that using the presence of national banks in 2003 is a good predictor of their presence in subsequent years. Although the share of national banks might be correlated with other relevant market characteristics, we effectively use it as a fixed and exogenous characteristic of the county.

To examine in detail our source of variation, Panel A of Table 3 reports coefficient estimates of cross-sectional regressions relating the presence of national banks to several county characteristics. *Fraction OCC* is the fraction of purchase loans originated by OCC lenders in 2003, while $APL_{g,2004}$ is an indicator variable equal to 1 if state $g$ has an anti-predatory-lending law in place by 2004 and zero otherwise.[14] While the fraction of loans originated by national banks is not correlated with the county's median income (Column 1), it is correlated with several other important features of the local economy. For instance, less populated counties (Column 2) and those with more elastic housing supply (Column 3) and fewer subprime borrowers (Column 4) are also regions with a higher fraction of loans originated by national banks.

However, these correlations do not differ significantly in states with and without anti-predatory laws, as shown by the lack of significance of the coefficient on the interaction $Fraction\ OCC \times APL_{g,2004}$. In other words, while the fraction of loans originated by national banks is correlated with other important characteristics of the county that may independently have an effect on the credit supply, this correlation does not vary by whether the state adopted an anti-predatory law or not.[15] Panel B of Table 3 shows that the share of national banks is not correlated with the *trends* in county characteristics. This suggests exploiting both the fraction of OCC loans and the presence of anti-predatory laws as source of variation to assess the impact of the preemption rule on the credit supply.

[14] Table A.4 shows that our results hold even when we use a continuous measure for the strength of the APL as provided by Bostic et al. (2008).

[15] Panel B of Table A.2 also shows that the share of OCC lenders and the presence of APL are not correlated with the branching deregulation recently studied by Favara and Imbs (2015).

Specifically, the main estimation methodology employed here is a triple difference estimator (DDD). The reason for this empirical methodology is twofold. First, the potential problem with difference-in-differences (DD) alone between counties with larger and smaller fractions of OCC lenders is that the estimation might be contaminated by changes in local mortgage market conditions, a possible causal factor in the relative local presence of national banks. Moreover, during this period independent mortgage companies had different source of funding than national banks.

A different approach to DD analysis could be to take the counties with higher fractions of OCC lenders in a non-APL state as the control group. But this approach too is problematic, insofar as changes in the availability of credit in counties with a large proportion of national banks might differ systematically between states due to, say, income and wealth differences, rather than the preemption policy. Furthermore, the states that decided to enact an APL might have done so precisely in response to local credit market conditions.

A more robust analysis than either of these DD approaches can be obtained by using as control groups both a different state and a different group within the same APL state.[16] Specifically, we run the following regression

$$\begin{aligned} Log(\text{Loan Amount})_{i,t} &= \lambda_i + \eta_t + \beta_0 APL_{g,t} + \beta_1 APL_{g,t} * Post_{2004} + \beta_2 OCC_{2003} * Post_{2004} \\ &+ \beta_3 OCC_{2003} * APL_{g,t} + \beta_4 APL_{g,t} * Post_{2004} * OCC_{2003} + \Gamma X_{i,t} + \varepsilon_{i,t}, \end{aligned} \quad (2)$$

where $i$ denotes the county, $g$ the state, and $t$ the year of the loan. We measure the county's exposure to the preemption regulation as the fraction of purchase loans originated by OCC lenders in 2003 ($OCC_{2003}$), i.e. in the pre-period. $Post_{2004}$ is a dummy equal to 1 after 2004, the year of the preemption rule, and $APL_{g,t}$ is equal to 1 if state $g$ has an anti-predatory-lending law in place at time $t$. $X_{i,t}$ is a vector of controls at county level, such as population, income, and the elasticity of house prices. What we are interested in is $\beta_4$, namely the

[16] Table A.7 shows that our results are robust to the exclusion of the "sand states", i.e. California, Florida, Nevada and Arizona.

coefficient of the triple interaction.[17]

The DDD estimate begins with the change over time in averages for the counties with higher fractions of national banks in the APL state; we then net out the change in means for counties with high fractions of OCC lenders in the non-APL state and the change in means for the counties with low fractions of OCC lenders in the APL state. This strategy is designed to control for two potentially confusing factors: ex ante differential incentives of lenders in different states to supply credit in counties with high fractions of OCC lenders (regardless of preemption) and changes in the mortgage market in all the counties of the APL state (possibly due to other state-wide policies affecting the propensity to lend or changes in the state economy affecting the soundness of lenders).

However, in Section 5.4 we also report the results from a simpler DD estimation, which exploits only variation between counties with a different presence of national banks focusing on states that passed an anti-predatory law. In this case, we are going to control for county characteristics that might be correlated with the presence of national banks as the ones shown in Table 3. In Section 5.4 we also show a placebo test considering states without anti-predatory laws and show that there are no significant effects of the preemption.

Now we can present our estimation results. Table 4 shows the results of (2) estimated on different subsamples. In Columns (1)-(2) we run a panel regression with the log of loan amounts as dependent variable controlling for year and county fixed-effects, and for log of median income and population for the years 2000-2006. The results show that a more substantial presence of national banks in APL states is associated with larger increases in lending. The coefficients for the interaction between fraction of OCC lenders and the Post indicator and between APL and the Post indicator are negative, because lenders without deposit base, such as independent mortgage companies and thrifts, grew faster due to the rise of securitization. Moreover, the passage of APLs made those states less subject to the origination of subprime loans as they banned some of the riskier mortgage practices (Keys

[17] Table A.8 show that our results remain significant even when we cluster the standard errors at the state level.

et al. (2010)).

Columns (3)-(5) restrict to the sample of counties for which we have the elasticity of housing prices and estimate the same regression with and without controlling for that and its interaction with the Post indicator. In this case, the magnitude of our main coefficient increases as the elasticity of housing supply is available only for the biggest and urban counties. As shown in Table 3, the fraction of loans originated by national banks in 2003 is negatively correlated with the fraction of subprime borrowers. Therefore, it is not surprising that controlling for the fraction of subprime borrowers, which is an important predictor of the lending boom, changes the coefficient on $OCC_{2003} * Post_{2004}$, but not the coefficient on the triple interaction. Column (5) also include the interaction of Post with the fraction of loans originated by the lenders regulated by HUD in 2003, e.g. independent mortgage lenders, and show very similar results.

To obtain an estimate of the magnitude of our coefficients, we start by noticing that the fraction of loans originated by OCC lenders varies by 0.2 from the top to the bottom decile. Hence, the counties in the top decile of presence of national banks in APL states showed on average 11%-15% (which depends on which coefficient we employ for the calculation) higher annual loan issuance after the preemption than those in the bottom decile.[18]

To further check that the differential impact on credit expansion and real economic activities across counties is not driven by differential trends among the counties, and to introduce our main results to be presented in the next section, Figure 3 (Panels A-D) graph the time-series coefficients of the following regressions:

$$\begin{aligned} Log(\mathrm{Y})_{i,t} &= \lambda_i + \eta_t + \sum_{\tau \neq t_0} \beta_{1\tau} APL_{2004} \mathbf{1}_{(\tau=t)} + \sum_{\tau \neq t_0} \beta_{2\tau} OCC_{2003} \mathbf{1}_{(\tau=t)} + \\ & \sum_{\tau \neq t_0} \beta_{3\tau} APL_{2004} * OCC_{2003} \mathbf{1}_{(\tau=t)} + \Gamma X_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{3}$$

where $Y$ is a vector including our dependent variables: the log of loan amount, the house

[18] Table A.3 further shows that our result stems from an increase in loan origination from in-state commercial banks, which is consistent with our interpretation that the local national banks responded to the preemption rule.

price growth, the log of the total number of employees in the non-tradable sector and the fraction of delinquent loans. $\mathbf{1}_{(\tau=t)}$ is a dummy variable equal to 1 for year $t$, and $X_{i,t}$ contains all the other main controls such as the change in the population, change in median income and the elasticity of the supply of houses. We have normalized the coefficient $\beta_{2003}$ – the year preceding the preemption rule – to zero. Note that $APL_{2004}$ is time-invariant and equals one for the states that passed an APL by 2004 and zero otherwise. To keep the sample constant over time, we have excluded the states that implemented an APL after 2004 (i.e. Wisconsin, Rhode Island and Indiana).

These event studies highlight two main points. First, that in the pre-period there was no difference in credit supply, house prices, employment and delinquency rates among counties with different fractions of OCC lenders in states with and without APLs. In other words, the treatment group (counties with a higher fraction of OCC lenders) and the control group (lower fraction) were on parallel trends in the pre-period. Second, Figure 3 show the dynamics of the effects we are going to explore in the next section as captured by the coefficient $\beta_{3\tau}$ in event study specification (3).

All the coefficients become significantly positive right after the implementation of the preemption rule and describe the boom and bust pattern we shall test further in the next sections. For loan amounts, house prices and employment the coefficient picks between 2005 and 2006 and then declines significantly up to the point in which it becomes negative. These results show that the counties with a higher fraction of OCC lenders in states with anti-predatory laws experienced a larger boom and a more severe bust than counties with a lower fraction. Panel D of Figure 3 shows, instead, the dynamics of our main interaction variable on the delinquency rate, which first decreases until 2007, and then the effect becomes more positive starting in 2008. In other words, delinquency rates were first lower for our treatment group up to 2007 and then they became significantly higher with respect to 2007. We are going to analyze these effects and the boom and bust pattern in more details exploiting both the longitudinal and cross section variation in our data.

# 5 Main Results

In this section we examine the effect of the predicted change in the supply of credit to riskier borrowers on house prices, employment, and delinquency rates. Theoretical studies have provided different mechanism through which credit expansion can affect real economic activity. Kiyotaki and Moore (1997), for instance, provides a model in which the dynamic interaction between a borrowing constraint and asset prices turns out to be a powerful mechanism by which the effects of credit shocks get amplified and result in a boom and bust cycle in real economic activity. More recently, Justiniano et al. (2014) provides a model in which a collateral constraint limits households' ability to borrow against the value of real estate, thus affecting their demand for credit, and a lending constraint, instead, limiting the flow of funds from financial institutions to mortgage borrowers. Interestingly, they show that a progressive loosening of the lending constraint, rather than the relaxation of collateral requirements, can explain both qualitatively and quantitatively the boom and bust cycle in the housing market.[19]

These results strongly suggest that a shock to the supply of credit to riskier borrowers can generate large and persistent fluctuations in real economic activity and in the next section we provide evidence supporting this hypothesis.

## 5.1 The Effect of Credit Expansion on House Prices

To estimate the real estate price impact of the credit expansion precisely, controlling for county characteristics, Table 5 gives the results for the following reduced form equation:

$$\begin{aligned} House\ Prices\ Growth_{i,t} &= \lambda_i + \eta_t + \beta_0 APL_{g,t} + \beta_1 APL_{g,t} * Post_{2004} + \beta_2 OCC_{2003} * Post_{2004} \\ &+ \beta_3 OCC_{2003} * APL_{g,t} + \beta_4 APL_{g,t} * Post_{2004} * OCC_{2003} + \Gamma X_{i,t} + \varepsilon_{i,t}, \end{aligned} \quad (4)$$

where $\beta_4$ is the coefficient of interest. Columns (1)-(2) control for year and county

[19] Other recent papers arguing how the expansion of credit to households can result in an endogenous boom and bust in house prices and real economy are Landvoigt (2011) and Kermani (2012).

fixed-effects and then add the change in median income and population, while Columns (3)-(5) restrict to the counties for which we have data on the elasticity measure and control for elasticity times Post as an additional control as well as for the fraction of subprime borrowers and the share of independent mortgage lenders in 2003 times the Post indicator.

In all specifications the coefficient is positive and significant at 1% level. This shows that the predicted increase in credit supply is in fact associated with a rise in house prices. As in the literature, prices rise less in the counties where the supply of houses is more elastic. The rise in house prices is also correlated negatively with the introduction of anti-predatory-lending laws (which should curb lending to subprime borrowers) and positively with changes in income and population.

Since we are ultimately interested in how changes in credit supply affect house prices, we can explicitly instrument the credit supply with our main interaction, since we have already shown that this instrument is not correlated with other county characteristics. In Column (6) we estimate the effect of an increase in lending by two-stage least squares as follows:

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

where the predicted increase in $\widehat{Loan\ Amount}$ is estimated using the first stage regression (2).

This IV estimation implies that a 10 percent increase in the credit supply results in 3.3 percent increase in house price growth between 2003 and 2006, or an overall increase of 10% in prices through a local general equilibrium effect. Equivalently, a comparison between counties in the top and bottom deciles of presence of national banks in states with anti-predatory laws suggests that the preemption regulation resulted in 6% increase in annual house price growth rate. As an additional check we considered the possible weakness of our instrumental variable. We generally find F-statistics above the critical weak identification value of 10 (see Stock (2008)), thus rejecting the hypothesis that the IV is weak.

## 5.2 The Effect of Credit on Employment

We have estimated the effect of the outward shift in credit supply on aggregate employment following Mian and Sufi (2014). We should expect job gains and losses to be more closely correlated with local demand and with household indebtedness in the non-tradable sector, where industries are classified as non-tradable if they are focused in the retail or restaurant business. Moreover, in order to abstract from any direct effect of the residential housing boom and bust, we explicitly remove construction or any other real-estate related sector from our sample. We hypothesize that an expansion of credit availability boosts local demand and consumption, hence employment.

Table 6 shows the main results for the non-tradable sector. Columns (1)-(2), tracing the employment during the years 2000-2006, shows that counties with a higher fraction of national banks enjoyed stronger job creation. After controlling for year and county fixed effects the coefficient remains positive and significant. We check robustness by controlling for various county characteristics in columns (3)-(5), and again the coefficient is still positive, statistically significant and economically substantial.

In column (6) we report the IV results. This estimate implies that a 10% increase in loan issuance is associated with a 2.2% increase in employment in the non-tradable sector. Taken together, these results indicate that the credit boom of the early 2000s accounts for a good part of the pre-crisis increase in employment in the non-tradable sector and also for its subsequent collapse.

## 5.3 The Effect of Credit on Delinquency Rates

We have shown that the counties that were presumably affected more significantly by the preemption regulation, because they have a higher fraction of national banks, experienced a more pronounced boom and bust in both house prices and employment. Now we investigate the effects of the expansion of credit on delinquency rates.

Table 7 reports a formal test of this hypothesis. Columns (1)-(5) report the results from

estimating a reduced form similar to (4) with delinquency rate as dependent variable and controlling for various characteristics of the county such as population, income, the elasticity of housing supply and the fraction of subprime borrowers. Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel.

As expected, we find that income is negatively correlated with delinquency rates. The coefficient of interest on the effect of the interaction between the APL dummy, the presence of national banks and the Post 2004 indicator is positive and significant in all the specifications. In column (6) we instrument the change in the credit supply with our main interaction. The effect is also economically substantial: the increase in annual loan issuance resulted in a .4% reduction in delinquencies the 2004-2006 period, which is a 30% decrease compared to the 1.25% average delinquency rate over the 2004-2006 period.

## 5.4 Difference-in-Differences and Placebo Test

A common issue with difference-in-differences estimations is to rule out the possibility that the results could be driven by changes in the control group, rather than in the treatment group. In our case, this translates to investigate if our findings are generated by variation in the states that adopted APLs and in counties with a more significant presence of national banks, rather than by loan origination by other financial institutions, such as independent mortgage lenders, in states without APLs.

To rule out this possibility, we focus on the states that passed APLs by 2004 and estimate a difference-in-differences regression. Specifically, we run the following regression

$$\begin{aligned} Y_{i,t} &= \lambda_i + \eta_t + \beta_1 Post_{2004} * OCC_{2003} + \beta_2 OCC_{2003} * APL_{g,2004} && (5) \\ &\quad + \beta_3 APL_{g,2004} + \Gamma X_{i,t} + \varepsilon_{i,t}, && (6) \end{aligned}$$

where $i$ denotes the county, $g$ the state, and $t$ the year. Since we only consider the states

that passed an APL by 2004, the coefficient of interest is $\beta_1$, i.e. $Post_{2004}$ and $APL_{g,2004}$ are collinear as $APL_{g,2004}$ changes over time but by 2004 it is equal to one for all the states in this sample.

This test exploits variation between counties, but controls for potential different regional trends due to the rise in securitization, the heterogeneous presence of subprime borrowers or independent mortgage lenders. As hinted in Table 3, including these controls is important because non-OCC lenders relied more on funding from securitization activities and housing supply was less elastic in regions with lower fraction of OCC, which might ultimately affect mortgage origination.

Panel A of Table 8 restricts attention to APL states and reports the results of this robustness check for all the four main variables of interests, controlling for income, population, elasticity of housing supply, and the interaction between the fraction of subprime borrowers and of HUD-regulated lenders and the Post indicator. The coefficient of interest is the interaction between the Post indicator and the fraction of OCC lenders. Although now our sample is reduced by half, Column (1) shows the result for loan amount, which is both statistically and economically significant, and slightly smaller than the one reported in Table 4. Columns (2)-(4) report, instead, the results for house prices, employment in the non-tradable sector and delinquency rates. We show that after 2004 the counties with a higher fraction of national banks in states with APLs are the ones that experienced a more significant increase in house prices and employment and a larger decline in delinquencies.

Panel B of Table 8 provides a valuable placebo test by analyzing our main outcome variables for the states without anti-predatory laws. In fact, we should not expect any differential trends in loan origination and real economic activity when we compare before and after the preemption rule, since this had not impact in these states.[20] We indeed find no significant changes in our outcome variable, which reassures us that our findings are not the result of other changes contemporaneous with the preemption rule that might have impacted

[20] Obviously, there cannot be any coefficient for APL, since we are considering the non-APL states, so the coefficient of interest is the one for the interaction between $Post$ and $FractionOCC$.

counties with a higher presence of national banks.

In sum, following this different approach allows us to further confirm our identification strategy, because it shows that the preemption regulation significantly affected the national banks' lending incentives, which through a local general equilibrium effect, has significantly influenced the local real economic activity. We can then conclude that our results are not driven by potential unobserved changes occurring in states that did not adopt APLs caused by other types of mortgage lenders.

## 5.5 Boom and Bust

Up to now, we have focused on the boom years using a panel approach, we now show the results exploiting the cross-sectional differences across counties highlighting the bust years. Panel A of Table 9 restricts attention to the boom period 2003-2005 (i.e. one year before and one year after the preemption rule) and run a cross-sectional regression with the change in our dependent variables as dependent variable, controlling for the change in median income and population, the share of independent mortgage lenders, the elasticity of house prices as well as the fraction of subprime borrowers (defined by those with a FICO score below 680). By taking changes around the preemption, we are effectively comparing outcomes before and after the preemption rule across regions as in our main specifications.

In all columns we find that our coefficient of interest is positive and both statistically and economically significant. Specifically, Column (1) confirms that credit expanded more in the APL-state counties with a higher fraction of national banks than in other counties. Column (2) and (3) presents the results that house prices and employment in non-tradable sector increased significantly more in the APL-state counties with a higher fraction of national banks than in other counties.[21] Finally, Column (4) shows that delinquency rates were significantly lower in these same counties even after controlling for regional characteristics.

Panel B presents the result for the bust period. Column (1) reports the results for the

[21] This evidence complements the findings of Charles et al. (2013) by showing that other sectors within the non-tradables -in addition to construction - were experiencing a similar increase in employment during the boom period, which masked the general decrease of employment in the manufacturing industry.

2007-2009 period and shows that the counties that increased lending most sharply during the boom are the same ones where lending was cut most during the bust. The counties in the top decile of presence of national banks in APL states showed 21% lower annual loan issuance during the bust period than those in the bottom decile. Column (2) reports the results for the 2008-2010 period, we find the right sign but not significant results. The reason is that most of the decline in loan origination occurred between 2007 and 2008. Columns (3) and (4) show that the counties where house prices increased more significantly and job creation was stronger during the boom are the same ones where house prices and employment fell the most during the bust. These results complement the findings of Greenstone and Mas (2012), Chodorow-Reich (2014), Mian and Sufi (2014) and Adelino et al. (2012) by showing how both a boom *and* a bust in employment can be generated by an increase in mortgages granted to households rather than through loans to small firms.

Column (5) shows that the predicted increases in lending are associated with significantly higher delinquency rates. This evidence suggests that the build-up of debt during the boom made the households more vulnerable in the recession. The effect is even more significant than for the boom period: if we compare counties in the top and bottom deciles of national bank presence in APL states, the OCC preemption resulted in a 30% increase in delinquencies through a local general equilibrium mechanism. In other words, the delinquency rate increased by 1.5% between 2008 and 2010, which is a thirty percent increase with respect to the 4.8% delinquency rate in 2008. Presumably, risky borrowers managed to stay afloat without defaulting thanks to easy credit and the larger increase in house prices during the boom but were severely affected during the bust and defaulted with higher frequency.[22]

Note that while for the boom period we can leverage the effect of the preemption rule to study the financial institutions' incentives to increase their mortgage origination, the results for the bust period cannot rely on it. However, we can show that exactly those counties

[22]Table A.5 show that our results look very similar when we control for the securitization activity in each county. Table A.6, instead, shows that our results stem from lending to households rather than small-businesses since we find no positive expansion of lending as recorded through the Community Reinvestment Act.

experiencing a more significant increase in loan originations are the same for which the decline in loan amount, house prices, employment, as well as the increase in delinquency rates, is the most pronounced. Even though the identification for the bust period is weaker, as we cannot exploit the introduction of the preemption rule, these cross-sectional results show that counties with a stronger presence of national banks experience a more severe boom and bust cycle in real economic activity.

## 5.6 Loan-Level Evidence

In order to provide further evidence supporting the mechanism identified in the previous section, we are going to show that the amount of high-cost loans and mortgages with debt-to-income ratios in the top decile increased significantly in states with anti-predatory laws and in regions with a higher presence of national banks.

To this end, we collected data on high-cost loans from HDMA, these are defined as loans with an annual percentage rate 3 percentage points or more above the Treasury rate for first-lien mortgages with comparable maturities (or 5 points over in the case of junior liens). Data on high-cost loans were first provided in the 2004 HDMA dataset.[23] This allows us to investigate if the introduction of the OCC preemption rule resulted in an increase in the issuance of riskier loans by OCC lenders.[24]

Panel A of Table 10 reports coefficient estimates of weighted least square regressions relating the amount of newly originated high-cost loans by OCC lenders and non-OCC lenders to the passage of anti-predatory laws and the regulatory agency of the loan originator. Since HMDA has reported data on high-cost loans only from 2004 onward, we cannot rely on the DDD identification strategy employed in the preceding sections. Since the sample is

[23] The indicator of subprime lending used before then was based on loans originated by lenders designated as "sub-prime" lenders by the U.S. Department of Housing and Urban Development.

[24] Let us clarify that the measure of high-cost mortgages provided by HDMA is only an imperfect proxy for the "bad loans" originated in the years preceding the crisis. For instance, this measure does not include loans without any documentation or loans that featured teaser rates due to the definition of high-cost loans based on the interest rate spread. Moreover, the issuance of a high-cost loan does not imply that it is in violation of state APL. Even with these limitations, the results of Table 17 provide evidence that corroborates the interpretation of our previous results: after 2004 national banks had the opportunity to significantly increase their lending to riskier borrowers.

from 2004 to 2007, the coefficient on $APL \times Post$ cannot be estimated because it is collinear with $APL$. More importantly, while the identification for the $APL_{g,t}$ is coming from the states that adopted an $APL$ after 2004, the identification for $APL \times OCC$ is coming from the differential loan origination by OCC lenders and non-OCC lenders in states with and without APL. Then, our identification relies on the differential effect of state APL for OCC and non-OCC lenders.

In column (1) we control for year and county time agency fixed effects and we find a positive and significant effect of the anti-predatory laws on OCC lenders' origination strategy of riskier loans. In column (2) we saturate the model with county-year and county-agency fixed-effects in order to control for unobserved time-varying heterogeneity that might bias our results. For instance, different counties might react differently to the introduction of the anti-predatory laws. The results in column (2) alleviate this concern, since we find that both the significance and the magnitude of the effect remains unaffected.

In the same spirit, Panel B reports coefficient estimates of weighted least square regressions relating the average debt-to-income ratio of newly originated loans (Columns 1 and 2) and the amount of newly originated loans with debt-to-income in the top tercile by OCC lenders and non-OCC lenders (Columns 3 and 4) to the passage of Anti-Predatory laws and the regulatory agency of loan originator.[25] One advantage of investigating this type of mortgages is that we can exploit our DDD identification strategy as we have data pre-2004. We find that the average debt-to-income ratio for the loans originated by national banks increase by almost 10%, even after controlling in the most conservative specification for county-year fixed effects. Columns (3) and (4) show that even in the most conservative specification, when we control for the county-time fixed effects, OCC lenders increased the origination of high-DTI mortgages by 8-9 percent. This result further confirm that the passage of the preemption rule allowed OCC lenders to increase the issuance of riskier loans.[26]

[25] We thank the discussant Benjamin Keys for suggesting this test to us.

[26] Additional results on the effects of the preemption rule on the origination of riskier mortgages are presented in a related paper by Di Maggio et al. (2015). Specifically, Di Maggio et al. (2015) use more detailed loan-level information to provide further evidence of the microeconomic mechanism underlying our results, and show that the preemption rule increased the propensity of national banks to originate riskier

## 5.7 Evidence from Border Census Tracts

We have controlled for a number of county characteristics, but in order to control for potential unobserved heterogeneity across counties, another approach is to focus on the counties that border on another state. The idea is that geography proximity helps us making sure that these areas are affected by similar shocks and have similar market conditions. Since counties in the West are much larger than in the East, and the sample of counties at state borders is small, we construct our main variables at the level of census tracts, and focus on census tracts belonging to the same metropolitan statistical areas to produce a highly homogeneous and much larger sample.[27]

We consider only census tracts bordering states with and without APL. This means that we can effectively compare the response of two census tracts to the preemption rule, where the only difference is the presence of an anti-predatory law. We have a smaller sample for house prices, because many of these tracts are rural areas for which house price 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 and run our main specification on the 2000-2006 sample.

Table 11 shows the results of the same regression as in (2) for the sample of census tracts on borders and include year, MSAs and census tract fixed effects. Columns (1) and (2) show the results for areas at a maximum distance from the border of 10 miles, while Columns (3) and (4) show the results for a 15 miles maximum distance. Our main interaction coefficient is still highly significant and only slightly smaller than in Tables 4 and 5. These results reassure us that our main findings are not confounded by other unobserved regional heterogeneity.

mortgages featuring prepayment penalties, interest only and adjustable-rate features.

[27] Data at the census tract level are only available for loan amounts and house prices.

# 6 Heterogeneous Effects

In the previous section, we have shown that an increase in lending by national banks due to a regulatory change in the U.S. resulted in a more pronounced boom and bust in house prices, employment and delinquency rates for the average county. However, if the effects we uncover in the data are due to the relaxation of the borrowers' credit constraint, we should then expect them to be stronger for regions where borrowers face tighter financial constraints.

Our first proxy for borrowers' creditworthiness is their FICO score. Specifically, we should expect that counties with a higher fraction of subprime borrowers, those with a FICO score below 680, are more affected than prime counties, as the preemption rule affected in particular the availability of credit to riskier borrowers. Panel A of Table 12 investigates this hypothesis. Odd columns show the results for the boom period when we modify our main interaction variable by including an indicator variable equal to one for counties whose fraction of subprime borrowers is in the top tercile, while prime counties are defined as the ones in the other two terciles.

For the loan amount, the house prices, the employment in the non-tradable sector, and the delinquency rates the results are significantly stronger in subprime counties. This evidence corroborates our hypothesis and suggests that the preemption regulation benefited significantly more the riskier borrowers. Even columns depict, instead, the effect on the bust period. Even in this case, the effects for the loan amount, the house prices, the employment and the delinquency rates are stronger when we compare subprime counties to the prime ones. In other words, subprime counties are also those that experience more severe downturns.

To further explore the heterogeneous effects of the introduction of the preemption regulation and the resulting increase in loan issuance, we exploit another measure of borrowers' financial constraints: house affordability. That is, we modify our interaction by including a dummy variable that is equal to one for counties with a ratio of median house price to median

income in the highest tercile as of 2000. Panel B shows that counties with least affordable housing experienced a larger boom in loan amounts, employment in the non-tradable sector and delinquency rates. Moreover, even columns also show that there is a significant larger impact of the outward shift in the credit supply in regions where borrowers face tighter credit constraints due to higher house prices and/or lower income during the bust period.

Finally, we should expect that the response of house prices is greater for inelastic regions, as these are the regions where prices can be more sensitive to an increase in the demand for housing resulting from an increase in the availability of credit. Panel C confirms this hypothesis by showing that house prices and employment decrease significantly more in inelastic regions, while delinquency rates raise the most in inelastic regions during 2008-2010.

Overall, these additional results provide evidence confirming our proposed mechanism that the relaxation of APL for national banks induced them to lend significantly more to borrowers facing tighter credit constraints.

# 7 Aggregate Implications

In this section, we employ the results of Section 5 to investigate the aggregate effect of an outward shift in the credit supply on the boom and bust cycle in the US by imposing some additional assumptions. Let us emphasize that the computations that follow employ the LATE coefficients presented in the previous sections, but these may differ from the overall average treatment effect. Moreover, the lack of a structural model also does not allow us to fully derive the general equilibrium effects of the credit supply increase, but we can still show how important our mechanism is in explaining the rise and fall in house prices, employment and delinquencies.

The first step in integrating our estimated effect to compute the economy-wide magnitude of our results is to compute the ratio between the coefficients on "Fraction OCC x APL" in the loan amount and in the house prices, employment and delinquency estimations reported

in Tables 4 through 7. This would give us a measure of the elasticity of all these outcome variables with respect to a change in loan issuance. Then, for each county, we compute the increase in loan amount and we normalize it by subtracting the 10% decile increase from all of them. This increase in loan amount times the ratio computed previously gives the main effect of interest for each county, which can then be averaged across counties.

To complete our aggregation exercise, we first need to assume that the local average treatment effect we estimate is equal to the average treatment effect, and then we need to estimate how much of the observed increase in loan amounts is purely due to an increase in the credit supply. From 2003 to 2005, total purchase loan origination amounts increased from $904 billion to $1.37 trillion, and declined to $538 billion in 2009. The first possibility, which relates directly to our local treatment effect, is to compute the loan amount increase for subprime borrowers. Subprime and Alt-A mortgages increased from $40 billion to $185 billion in the period 2003-2005 to decline almost to zero in 2009.[28] Since our estimates are based on the premise that the APLs have relaxed the credit constraint for riskier borrowers, this is a compelling assumption.

However, notice that the initial credit increase might have mainly affected the subprime borrowers, but due to a local general equilibrium effect working through an increase in collateral values, also prime borrowers might have started to borrow more, which would result in an underestimation of the total effect. A different assumption is to consider only the states that passed an APL and compute the increase in mortgage origination coming from those states. In these states, total loans origination increased from $577 billion in 2003 to $833 billion in 2005, to then decline to $334 billion in 2009, whereas subprime loans increased by $90 billion during the same period.

We can now address the following question using our estimated elasticities: how much of the variation in house prices, employment and delinquency rates can be attributed to a direct effect of an outward shift in the credit supply? Under the first scenario, in which

[28] It is worth noticing that these figures are likely to underestimate the increase in subprime mortgages, because they are computed employing the universe of the securitized loans, but not all subprime loans were securitized.

$140 billion out of the $460 billion increase in loan amounts comes purely from subprime loans, the credit channel explains 17% of boom in house prices, 30% in employment in the non-tradable sector and 35% of the reduction in delinquency rates during the boom years 2003-2005. For the bust period 2008-2010, the credit supply channel can explain 22% of decline in house prices, 33% decline in employment and 15% of the increase in delinquency. Finally, when we consider only APL states, which account for roughly 50%-60% of the loan increase in the US, we have that our aggregate effect is about 20% higher.

In sum, we have that the credit supply channel can explain, for instance, between 17% and 30% of the boom and bust cycle in house prices, and at least 30% of the fluctuation in employment and delinquency rates. None of the assumptions discussed above is perfect, but we believe that they can still provide a reasonable range of estimates for the aggregate effects of an outward shift in the credit supply, which shows that indeed a positive shock to the credit supply might have been the cause of a significant portion of the fluctuations observed in the real economic activities.

# 8 Conclusion

This paper exploits major changes in banking regulation that had differential effects on the states with and without anti-predatory-lending laws, and on counties with differing degrees of presence of national banks. This enables us to develop a novel identification strategy for inquiring into the role of the supply of credit to riskier borrowers in helping to generate the boom and bust in house prices and real economic activity in the first decade of the century.

We present four main findings. First, the counties that were more strongly affected by the regulation – i.e. those with a larger presence of national banks in APL states – display significantly greater loan origination, an increase of 11-15% during the 2004-2006 period. Second, house prices rise markedly more in these counties during the boom but they also fall more steeply during the bust. Third, there is evidence that the increase in credit supply affected real economic activity; that is, increases in employment in the non-tradable sector

are associated with the predicted increases in lending to riskier borrowers. Fourth, there is also evidence that the credit boom was preliminary to a rise in delinquency rates when the housing market turned down.

These findings speak to the role played by the regulators during the years preceding the crisis in allowing a more permissive lending environment, and how the deregulation of those years have contributed to the subprime debacle.

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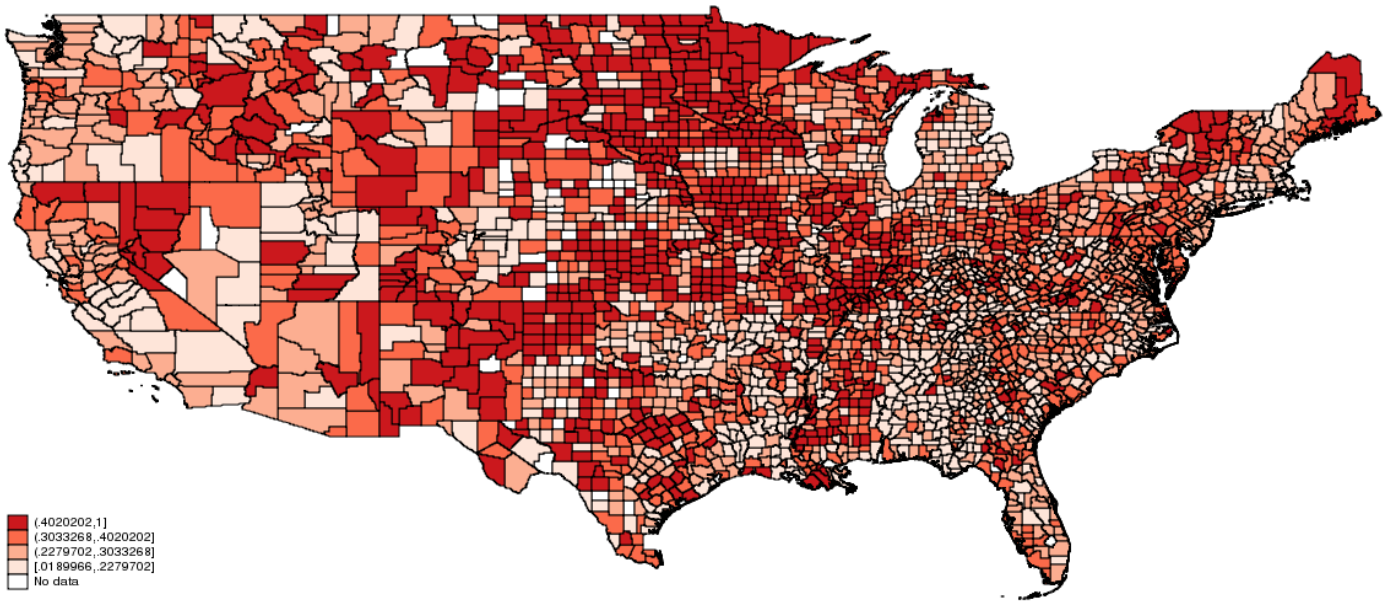


Figure 1- Fraction of Lending Done by National Banks in 2003 in each county.

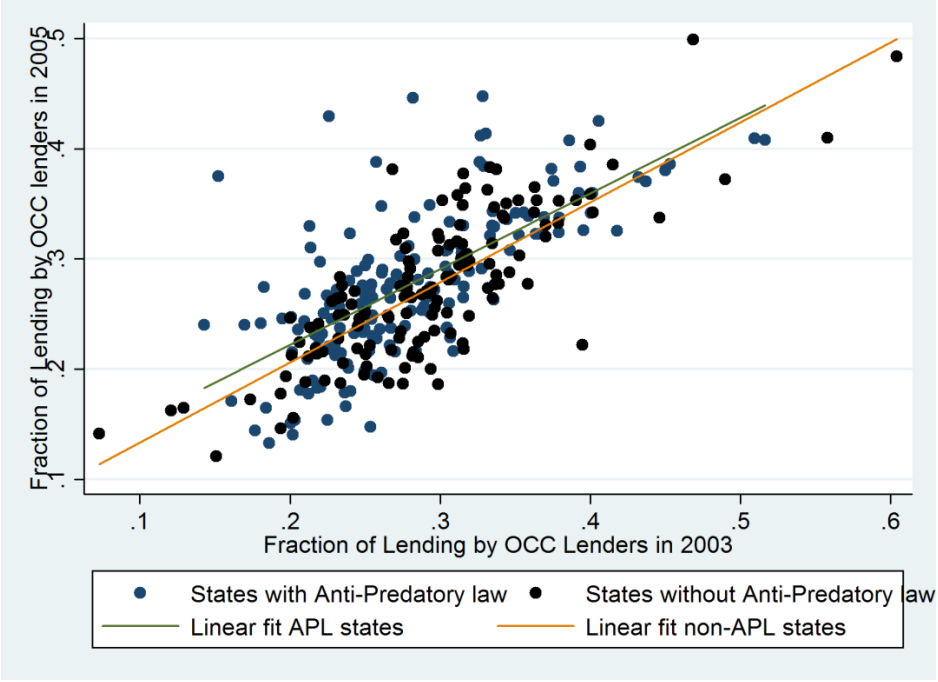


Figure 2 – The Relation between the Fraction of Lending Done by National Banks in 2003 (the year before the preemption rule) and in 2005 (the year after the preemption rule) for each county, differentiating between states with and without APLs.

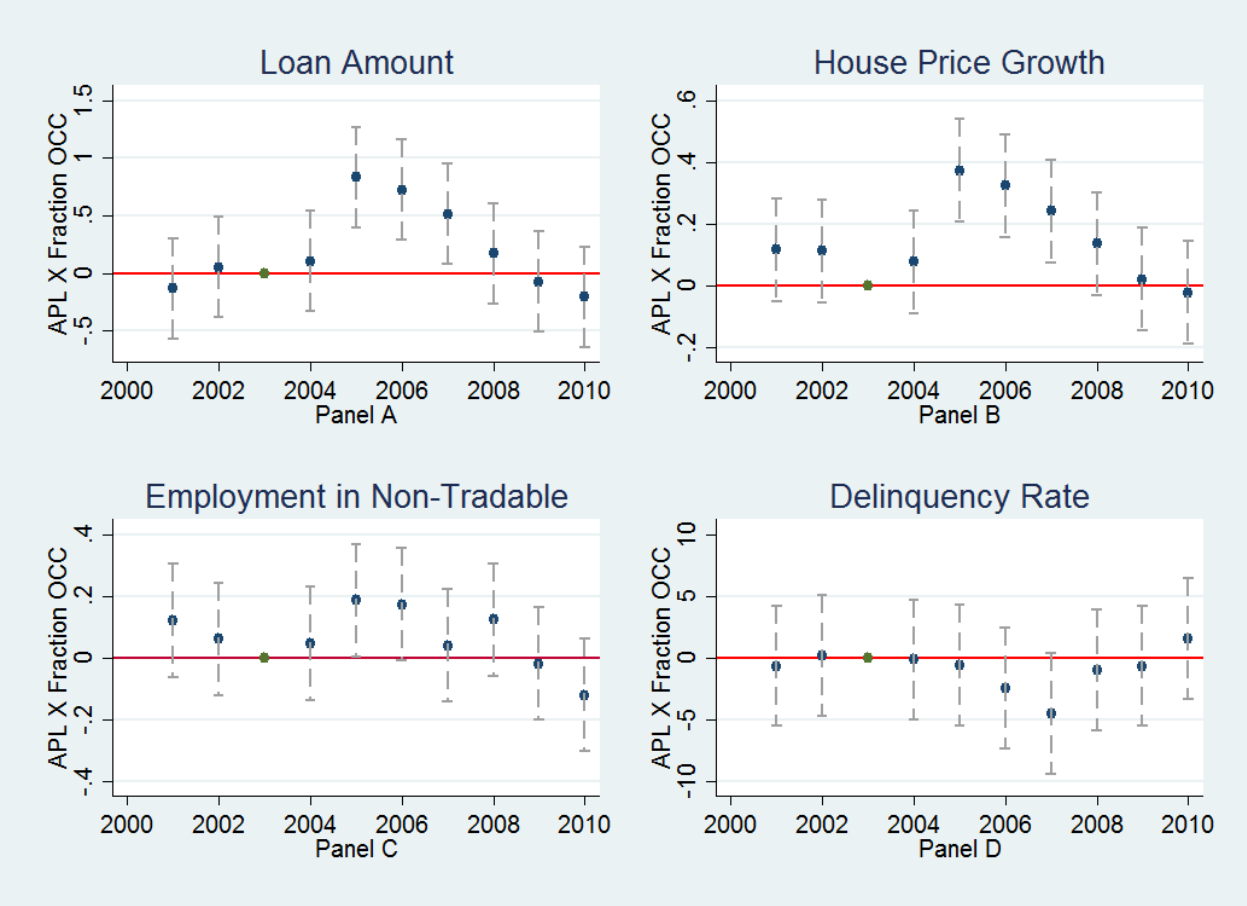


Figure 3- This figure plots the coefficient between an indicator for the presence of APL, the fraction of loans originated by OCC lenders and a yearly dummy for the four main dependent variables. The coefficient for the year preceding the preemption rule, 2003, is normalized to zero.

# 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 CoreLogic and are aggregated at the county level. 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. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). 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.

| | | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|---|
| | | *N* | *Mean* | *Standard Deviation* | *Min* | *Max* |
| *Static Characteristics* | Fraction of OCC lenders in 2003 | 2,219 | 0.31 | 0.13 | 0.05 | 0.88 |
| | Elasticity of housing supply | 770 | 2.36 | 1.25 | 0.6 | 12.15 |
| | Log Median Income in 2003 | 2,219 | 10.54 | 0.23 | 9.82 | 11.44 |
| | Log Population in 2003 | 2,219 | 10.66 | 1.12 | 9.04 | 15.84 |
| | Fraction Borrowers with FICO<680 in 2003 | 2,219 | 0.47 | 0.11 | 0.2 | 0.8 |
| *Change from 2003-2005* | Log Median Income | 2,220 | 0.06 | 0.04 | -0.15 | 0.28 |
| | Log Population | 2,219 | 0.03 | 0.04 | -0.32 | 0.20 |
| | Fraction of Loans Securitized | 2,211 | 0.14 | 0.08 | -0.68 | 0.76 |
| | Log Loan amounts | 2,219 | 0.36 | 0.23 | -0.77 | 1.82 |
| | House prices | 679 | 0.22 | 0.15 | -0.28 | 1.09 |
| | Log Employment in non-tradable sector | 760 | 0.04 | 0.11 | -0.40 | 0.94 |
| *Change from 2008-2010* | Log Median Income | 2,220 | -0.01 | 0.05 | -0.28 | 0.21 |
| | Log Population | 2,220 | 0.01 | 0.02 | -0.07 | 0.13 |
| | Log Loan amounts | 2,220 | -0.27 | 0.22 | -1.27 | 1.07 |
| | House prices | 714 | -0.08 | 0.10 | -0.49 | 0.16 |
| | Log Employment in non-tradable sector | 765 | -0.06 | 0.07 | -0.33 | 0.32 |

# 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 preemption 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 purchasing a house aggregated for each regulatory agency at county level for each year. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t 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 sample includes years from 2000 to 2006. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | *Log of loan amount* | *Log of loan amount* | *Log (Loan Amounts / Loan Amounts in 2000)* | |
| APLg,t × Post × OCC | 0.0920*** | 0.0899*** | 0.11*** | 0.11*** |
| | (0.0246) | (0.0246) | (0.03) | (0.03) |
| APLg,t | -0.00653 | | -0.01 | |
| | (0.0154) | | -0.02 | |
| APLg,t × OCC | -0.0104 | -0.00962 | -0.00 | -0.00 |
| | (0.0165) | (0.0165) | (0.02) | (0.02) |
| APLg,t × Post | -0.0939*** | | -0.10*** | |
| | (0.0188) | | (0.02) | |
| OCC × Post | -0.0764*** | -0.0747*** | -0.09*** | -0.09*** |
| | (0.0143) | (0.0142) | -0.02 | -0.02 |
| OCC | | | 0.05*** | 0.05*** |
| | | | -0.01 | -0.01 |
| County-Agency Fixed Effects | Yes | Yes | | |
| Year Fixed Effects | Yes | | Yes | |
| County Fixed Effects | | | Yes | |
| County-Year Fixed Effects | | Yes | | Yes |
| Observations | 120,218 | 120,034 | 89,170 | 89,170 |
| R-squared | 0.980 | 0.985 | 0.34 | 0.33 |

# Table 3

**Presence of National Banks as Source of Variation**

Panel A reports coefficient estimates of cross-sectional regressions relating the presence of national banks to several county characteristics. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "$APLg_{,2004}$" is equal to 1 if state *g* has an anti-predatory-lending law in place by 2004 and zero otherwise. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. Panel B reports coefficient estimates of cross-sectional regressions relating the presence of national banks to several trends in county characteristics. Change in Loan amount is based on HMDA and is the change in the amount of loans originated for purchasing a house aggregated at county level from 2001 to 2003. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. All regressions are weighted by the the population of each county. Asterisks denote significance levels (***=1%, **=5%, *=10%).

**Panel A**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | *Median Income in 2000* | *Population in 2000* | *Elasticity of Housing Supply* | *Fraction of Subprime in 2000* |
| $APL_{g,2004}$ × Fraction OCC | -0.20 | -1.94 | -2.04 | 0.12 |
| | (0.17) | (1.31) | (1.55) | (0.10) |
| $APL_{g,2004}$ | 0.16*** | 1.10** | 0.50 | -0.04 |
| | (0.06) | (0.54) | (0.47) | (0.03) |
| Fraction $OCC_{2003}$ | 0.13 | -3.21*** | 6.04*** | -0.27*** |
| | (0.09) | (0.72) | (1.02) | (0.06) |
| Constant | 10.58*** | 13.15*** | 0.11 | 0.48*** |
| | (0.03) | (0.29) | (0.31) | (0.02) |
| Observations | 2,219 | 2,219 | 770 | 764 |
| R-squared | 0.05 | 0.10 | 0.11 | 0.03 |

**Panel B**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | *Change in Median Income 2001-2003* | *Change in Population 2001-2003* | *Change in Loan Amount 2001-2003* | *Change in House Prices 2001-2003* | *Change in Employment in non-tradable 2001-2003* | *Change in Delinquency 2001-2003* |
| $APLg_{,2004}$ × Fraction OCC | 0.02 | -0.03** | 0.13 | -0.08 | -0.13 | -0.26 |
| | (0.02) | (0.02) | (0.11) | (0.12) | (0.08) | (0.37) |
| $APLg_{,2004}$ | -0.02*** | 0.02*** | -0.04 | 0.06 | 0.04 | 0.07 |
| | (0.01) | (0.01) | (0.04) | (0.04) | (0.03) | (0.13) |
| Fraction OCC | -0.01 | 0.01 | -0.38*** | -0.26*** | -0.09 | 0.54** |
| | (0.01) | (0.01) | (0.07) | (0.07) | (0.06) | (0.25) |
| Constant | 0.03*** | 0.01** | 0.38*** | 0.21*** | 0.04** | -0.20** |
| | (0.00) | (0.00) | (0.03) | (0.02) | (0.02) | (0.09) |
| Observations | 3,075 | 2,219 | 3,078 | 892 | 747 | 2,219 |
| R-squared | 0.06 | 0.02 | 0.03 | 0.09 | 0.02 | 0.00 |

# Table 4

**Preemption of National Banks and Loan Origination**

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans to the preemption 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 purchasing a house aggregated at county level for each year. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Fraction HUD" is the fraction of loans originated by HUD-regulated lenders in 2003 (a.k.a. independent mortgage lenders). The sample includes years from 2000 to 2006. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | *Log of Loan amount* | | | | |
| | *Full Sample* | | *Counties with Elasticity and FICO Measure* | | |
| OCC | 0.449*** | 0.472*** | 0.949*** | 0.915*** | 0.712*** |
| | (0.133) | (0.120) | (0.223) | (0.189) | (0.175) |
| APLg,t × Post | -0.174*** | -0.196*** | -0.324*** | -0.329*** | -0.290*** |
| | (0.0477) | (0.0416) | (0.0703) | (0.0589) | (0.0530) |
| Post × Fraction OCC | -0.537*** | -0.446*** | -0.836*** | -0.668*** | -0.130 |
| | (0.0987) | (0.0877) | (0.173) | (0.149) | (0.126) |
| APLg,t × Fraction OCC | -0.242*** | -0.156 | -0.258 | -0.254 | -0.323** |
| | (0.0935) | (0.101) | (0.170) | (0.158) | (0.161) |
| APLg,t | 0.0546 | 0.0384 | 0.0676 | 0.0841* | 0.191*** |
| | (0.0342) | (0.0363) | (0.0544) | (0.0508) | (0.0692) |
| $\text{Log(Median Income)}_{g,t}$ | | 1.552*** | 1.725*** | 1.731*** | 1.484*** |
| | | (0.142) | (0.157) | (0.143) | (0.156) |
| $\text{Log(Population)}_{g,t}$ | | 1.191*** | 1.196*** | 1.180*** | 1.219*** |
| | | (0.156) | (0.184) | (0.174) | (0.159) |
| $\text{Fraction of Subprime}_{g}$ × Post | | | | 0.804*** | 0.950*** |
| | | | | (0.112) | (0.118) |
| $\text{Elasticity}_{g}$ × Post | | | | | -0.0602*** |
| | | | | | (0.00917) |
| APLg,t × Fraction HUDg | | | | | -0.294** |
| | | | | | (0.133) |
| Post × Fraction HUDg | | | | | 0.357*** |
| | | | | | (0.1000) |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Observations | 21,564 | 15,533 | 5,348 | 5,348 | 5,348 |
| R-squared | 0.020 | 0.147 | 0.233 | 0.233 | 0.272 |
| Number of counties | 3,085 | 2,219 | 764 | 764 | 764 |

# Table 5

**Preemption of National Banks and House Prices**

The table reports coefficient estimates of weighted least square regressions relating house prices to the preemption 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 CoreLogic. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Fraction HUD" is the fraction of loans originated by HUD-regulated lenders in 2003 (a.k.a. independent mortgage lenders). In column 6, "APL × Post × Fraction OCC" is used as an instrument for the log of loan amounts. The sample includes years from 2000 to 2006. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | *House Prices Growth* | | | | | |
| | *Full Sample* | | *Counties with Elasticity Measure* | | | |
| | | | | | | IV |
| APLg,t × Post × Fraction OCC | 0.247*** | 0.215*** | 0.273*** | 0.273*** | 0.231*** | |
| | (0.0547) | (0.0484) | (0.0643) | (0.0643) | (0.0591) | |
| Instrumented Log of Loan Amounts | | | | | | 0.330*** |
| | | | | | | (0.110) |
| APLg,t × Post | -0.107*** | -0.0993*** | -0.120*** | -0.120*** | -0.112*** | -0.0198* |
| | (0.0176) | (0.0158) | (0.0197) | (0.0197) | (0.0181) | (0.0109) |
| Post × Fraction OCC | -0.200*** | -0.166*** | -0.174*** | -0.174*** | -0.0457 | 0.0388 |
| | (0.0388) | (0.0335) | (0.0483) | (0.0483) | (0.0438) | (0.0441) |
| APLg,t × Fraction OCC | -0.117** | -0.0645 | -0.0640 | -0.0640 | -0.0858 | 0.0168 |
| | (0.0597) | (0.0446) | (0.0574) | (0.0574) | (0.0611) | (0.0567) |
| APLg,t | 0.0288 | 0.0206 | 0.0262 | 0.0262 | 0.0548* | -0.00302 |
| | (0.0195) | (0.0155) | (0.0191) | (0.0191) | (0.0301) | (0.0302) |
| Fraction of Subprime$_g$ × Post | | | 0.193*** | 0.193*** | 0.202*** | -0.196 |
| | | | (0.0370) | (0.0370) | (0.0349) | (0.141) |
| Elasticity$_g$ × Post | | | | | -0.0111*** | 0.0153 |
| | | | | | (0.00314) | (0.00980) |
| Log(Median Income)$_{g,t}$ | | 0.200*** | 0.239*** | 0.239*** | 0.200*** | -0.0781 |
| | | (0.0443) | (0.0510) | (0.0510) | (0.0506) | (0.0918) |
| Log(Population)$_{g,t}$ | | 0.219** | 0.162 | 0.162 | 0.170 | -0.0656 |
| | | (0.111) | (0.129) | (0.129) | (0.116) | (0.169) |
| APLg,t × Fraction HUDg | | | | | -0.0735 | -0.00573 |
| | | | | | (0.0547) | (0.0529) |
| Post × Fraction HUDg | | | | | 0.120** | 0.0442 |
| | | | | | (0.0507) | (0.0443) |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 6,244 | 5,322 | 3,258 | 3,258 | 3,258 | 3,258 |
| R-squared | 0.063 | 0.077 | 0.113 | 0.113 | 0.137 | 0.16 |
| Number of counties | 892 | 887 | 543 | 543 | 543 | 543 |

# Table 6

**Preemption of National Banks and Employment in Non-Tradable Sector**

The table reports coefficient estimates of WLS regressions relating employment in non-tradable sectors to the preemption 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 defined according to Main and Sufi (2014). "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction HUD" is the fraction of loans originated by HUD-regulated lenders in 2003 (a.k.a. independent mortgage lenders). In column 6, "APL × Post × Fraction OCC" is used as an instrument for the log of loan amounts. The sample includes years from 2000 to 2006. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | *Employment in Non-Tradable Sector* | | | | | |
| | *Full Sample* | | *Counties with Elasticity Measure* | | | |
| | | | | | | IV |
| APLg,t × Post × Fraction OCC | 0.207*** | 0.161*** | 0.179** | 0.179** | 0.146** | |
| | (0.0698) | (0.0596) | (0.0707) | (0.0707) | (0.0665) | |
| Instrumented Log of Loan Amounts | | | | | | 0.217** |
| | | | | | | (0.0987) |
| APLg,t × Post | -0.0696*** | -0.0607*** | -0.0715*** | -0.0715*** | -0.0682*** | -0.00730 |
| | (0.0222) | (0.0182) | (0.0210) | (0.0210) | (0.0197) | (0.00995) |
| Post × Fraction OCC | -0.191*** | -0.103** | -0.0859 | -0.0859 | 0.0227 | 0.0473 |
| | (0.0560) | (0.0448) | (0.0538) | (0.0538) | (0.0519) | (0.0431) |
| APLg,t × Fraction OCC | -0.171*** | -0.0902* | -0.0637 | -0.0637 | -0.0956 | -0.0242 |
| | (0.0538) | (0.0482) | (0.0593) | (0.0593) | (0.0585) | (0.0594) |
| APLg,t | 0.0544*** | 0.0343** | 0.0286 | 0.0286 | 0.0667*** | 0.0231 |
| | (0.0172) | (0.0160) | (0.0193) | (0.0193) | (0.0234) | (0.0270) |
| $\text{Log(Median Income)}_{g,t}$ | | 0.287*** | 0.310*** | 0.310*** | 0.296*** | -0.0212 |
| | | (0.0443) | (0.0488) | (0.0488) | (0.0467) | (0.149) |
| $\text{Log(Population)}_{g,t}$ | | 0.893*** | 0.954*** | 0.954*** | 0.925*** | 0.647*** |
| | | (0.0741) | (0.0814) | (0.0814) | (0.0842) | (0.160) |
| $\text{Fraction of Subprime}_{g}$ × Post | | | 0.101*** | 0.101*** | 0.0945** | -0.127 |
| | | | (0.0352) | (0.0352) | (0.0378) | (0.110) |
| $\text{Elasticity}_{g}$ × Post | | | | | -0.00585** | 0.00717 |
| | | | | | (0.00296) | (0.00687) |
| APLg,t × Fraction HUDg | | | | | -0.0921** | -0.0253 |
| | | | | | (0.0411) | (0.0485) |
| Post × Fraction HUDg | | | | | 0.145*** | 0.0730 |
| | | | | | (0.0341) | (0.0462) |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 5,362 | 5,362 | 3,693 | 3,693 | 3,693 | 3,693 |
| R-squared | 0.014 | 0.226 | 0.287 | 0.287 | 0.298 | 0.158 |
| Number of counties | 790 | 790 | 537 | 537 | 537 | 537 |

# Table 7

**Preemption of National Banks and Mortgages Delinquencies**

The table reports coefficient estimates of weighted least square regressions relating the percentage of delinquent mortgages to the preemption 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. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction HUD" is the fraction of loans originated by HUD-regulated lenders in 2003 (a.k.a. independent mortgage lenders). In column 6, "APL X Post X Fraction OCC" is used as an instrument for the log of loan amounts. The sample includes years from 2000 to 2006. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | *Delinquency Rates* | | | | | |
| | *Full Sample* | | *Counties with Elasticity Measure* | | | |
| | | | | | | IV |
| APLg,t × Post × Fraction OCC | -0.874*** | -0.869*** | -1.830*** | -1.830*** | -1.545*** | |
| | (0.328) | (0.309) | (0.442) | (0.442) | (0.431) | |
| Instrumented Log of Loan Amounts | | | | | | -2.170*** |
| | | | | | | (0.583) |
| APLg,t × Post | 0.402*** | 0.420*** | 0.715*** | 0.715*** | 0.642*** | 0.0121 |
| | (0.107) | (0.101) | (0.139) | (0.139) | (0.138) | (0.0589) |
| Post × Fraction OCC | 0.877*** | 0.683*** | 1.010*** | 1.010*** | 0.504* | 0.221 |
| | (0.190) | (0.178) | (0.280) | (0.280) | (0.268) | (0.266) |
| APLg,t × Fraction OCC | 0.0596 | -0.00465 | 0.347 | 0.347 | 0.610 | -0.0908 |
| | (0.282) | (0.284) | (0.391) | (0.391) | (0.397) | (0.317) |
| APLg,t | -0.0520 | -0.0435 | -0.181 | -0.181 | -0.497*** | -0.0820 |
| | (0.0943) | (0.0953) | (0.128) | (0.128) | (0.176) | (0.149) |
| $\text{Log(Median Income)}_{g,t}$ | | -1.930*** | -2.316*** | -2.316*** | -1.846*** | 1.374 |
| | | (0.325) | (0.372) | (0.372) | (0.406) | (0.887) |
| $\text{Log(Population)}_{g,t}$ | | -0.827* | -0.865* | -0.865* | -1.218** | 1.427* |
| | | (0.435) | (0.515) | (0.515) | (0.519) | (0.853) |
| $\text{Fraction of Subprime}_{g}$ × Post | | | -0.843*** | -0.843*** | -1.292*** | 0.770 |
| | | | (0.304) | (0.304) | (0.312) | (0.624) |
| $\text{Elasticity}_{g}$ × Post | | | | | 0.0909*** | -0.0397 |
| | | | | | (0.0220) | (0.0424) |
| APLg,t × Fraction HUDg | | | | | 0.804** | 0.167 |
| | | | | | (0.324) | (0.294) |
| Post × Fraction HUDg | | | | | 0.169 | 0.943*** |
| | | | | | (0.218) | (0.290) |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 15,533 | 15,533 | 5,348 | 5,348 | 5,348 | 5,348 |
| R-squared | 0.007 | 0.022 | 0.074 | 0.074 | 0.094 | 0.061 |
| Number of counties | 2,219 | 2,219 | 764 | 764 | 764 | 764 |

# Table 8

**Difference-in-Differences and Placebo Test**

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in non-tradable sectors, and delinquency rates to the preemption of national banks with weights equal to the population of each county. Panel A restricts attention only to the states that implemented an anti-predatory law by January 2004. Panel B focuses on the states without an anti-predatory law. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. Controls include: the fraction of borrowers with FICO scores below 680 in 2000 for each county; the measure of elasticity of housing supply provided by Saiz (2010); the log of median income, the log of population, the fraction of loans originated by HUD-regulated lenders (a.k.a. independent mortgage lenders) as of 2003 and their interaction with Post. The results are for years 2000 to 2006. All regressions are weighted using the total number of households in a county as weights. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

**Panel A. Difference-in-Differences in States with Anti-Predatory Lending Laws**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | *Log of Loan amount* | *House Prices Growth* | *Employment in Non-Tradable Sector* | *Delinquency Rates* |
| Post × Fraction OCC | 0.581*** | 0.132** | 0.165*** | -0.696* |
| | (0.137) | (0.0610) | (0.0611) | (0.405) |
| APLg,t × Fraction OCC | -0.297* | -0.148* | -0.108* | 0.793* |
| | (0.166) | (0.0800) | (0.0634) | (0.414) |
| APLg,t | 0.145** | 0.0536 | 0.0649** | -0.471** |
| | (0.0686) | (0.0356) | (0.0259) | (0.184) |
| Post | -0.498*** | -0.149*** | -0.0850*** | 0.847*** |
| | (0.0798) | (0.0300) | (0.0289) | (0.257) |
| Year Fixed Effect | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes |
| Observations | 2,359 | 1,820 | 1,719 | 2,359 |
| R-squared | 0.488 | 0.128 | 0.433 | 0.142 |
| Number of counties | 337 | 260 | 252 | 337 |

**Panel B. Difference-in-Differences in States without Anti-Predatory Lending Laws**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | *Log of Loan amount* | *House Prices Growth* | *Employment in Non-Tradable Sector* | *Delinquency Rates* |
| Post × Fraction OCC | -0.113 | -0.0154 | 0.00433 | 0.433 |
| | (0.127) | (0.0430) | (0.0605) | (0.284) |
| Post | -0.259*** | -0.0768** | -0.0793** | 0.537** |
| Year Fixed Effect | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes |
| Observations | 2,555 | 1,743 | 1,681 | 2,555 |
| R-squared | 0.411 | 0.221 | 0.384 | 0.104 |
| Number of counties | 365 | 249 | 243 | 365 |

# Table 9

**Preemption of National Banks and Boom-Bust Cycle**

The table reports coefficient estimates of weighted least square regressions relating the change in newly originated purchase loans to the preemption of national banks with weights equal to the population of each county. Panel A focuses on the period 2003-2005 while Panel B focuses on the period 2007-2009 and 2008-2010. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. "$APLg_{,2004}$" is equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Fraction HUD" is the fraction of loans originated by HUD-regulated lenders in 2003 (a.k.a. independent mortgage lenders). Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

**Panel A. Boom Period**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | | *2003-2005* | | |
| | *Change in Loan Amount* | *Change in House Prices* | *Change in Employment in Non-Tradable Sector* | *Change in Delinquency Rates* |
| $APLg_{,2004}$ × Fraction OCC | 0.736*** | 0.347* | 0.159** | -1.784*** |
| | (0.198) | (0.189) | (0.0737) | (0.503) |
| $APLg_{,2004}$ | -0.327*** | -0.167*** | -0.0584*** | 0.693*** |
| | (0.0634) | (0.0600) | (0.0214) | (0.159) |
| Fraction OCC | -0.233 | -0.0938 | -0.0281 | 1.189*** |
| | (0.145) | (0.141) | (0.0600) | (0.363) |
| Change in Income | 1.551*** | 1.354*** | 0.132** | -1.422*** |
| | (0.164) | (0.160) | (0.0518) | (0.410) |
| Change in Population | 1.760*** | 0.649*** | 0.899*** | -1.407** |
| | (0.253) | (0.205) | (0.102) | (0.585) |
| Fraction of $Subprime_g$ | 0.640*** | 0.176** | 0.0766** | -1.213*** |
| | (0.105) | (0.0733) | (0.0331) | (0.251) |
| $Elasticity_g$ | -0.0455*** | -0.0542*** | -0.00333 | 0.0310 |
| | (0.00842) | (0.00894) | (0.00286) | (0.0194) |
| Fraction $HUD_g$ | 0.273*** | 0.127* | 0.0622** | 0.131 |
| | (0.0976) | (0.0768) | (0.0304) | (0.222) |
| Observations | 764 | 543 | 528 | 764 |
| R-squared | 0.473 | 0.534 | 0.251 | 0.164 |

**Panel B. Bust Period**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | *2007-2009* | *2008-2010* | | | |
| | *Change in Loan Amount* | *Change in Loan Amount* | *Change in House Prices* | *Change in Employment in Non-Tradable Sector* | *Change in Delinquency Rates* |
| $APLg_{,2004}$ × Fraction OCC | -0.856*** | -0.413 | -0.500*** | -0.215** | 5.703* |
| | (0.310) | (0.284) | (0.166) | (0.1000) | (3.312) |
| $APLg_{,2004}$ | 0.279*** | 0.177* | 0.190*** | 0.0660** | -2.401** |
| | (0.104) | (0.0933) | (0.0543) | (0.0317) | (1.126) |
| Fraction OCC | 0.963*** | 0.389** | 0.302** | 0.0201 | -6.836*** |
| | (0.229) | (0.191) | (0.146) | (0.0567) | (2.464) |
| Change in Income | 1.187*** | 0.641** | -0.153 | 0.120 | 1.018 |
| | (0.313) | (0.267) | (0.166) | (0.119) | (2.502) |
| Change in Population | 0.651 | 1.485*** | 1.102*** | 0.480** | -24.07*** |
| | (0.523) | (0.566) | (0.337) | (0.224) | (5.830) |
| Fraction of $Subprime_g$ | -0.879*** | -0.340*** | -0.158** | 0.0673 | 4.667*** |
| | (0.205) | (0.127) | (0.0766) | (0.0487) | (1.559) |
| $Elasticity_g$ | 0.0698*** | -0.0254 | 0.0375*** | 0.00513 | -0.772*** |
| | (0.0164) | (0.0158) | (0.00549) | (0.00336) | (0.119) |
| Fraction $HUD_g$ | 0.163 | -0.233** | -0.258*** | -0.0813** | 2.262* |
| | (0.164) | (0.101) | (0.0820) | (0.0367) | (1.220) |
| Observations | 760 | 764 | 543 | 534 | 764 |
| R-squared | 0.281 | 0.148 | 0.323 | 0.058 | 0.348 |

# Table 10

**Anti-Predatory Laws, National Banks and the Amount of High Cost Loans**

Panel A reports coefficient estimates of weighted least square regressions relating the amount of newly originated high cost loans under OCC lenders and non-OCC lenders to the passage of Anti-Predatory laws and the regulatory agency of loan originator. Loan amounts is based on HMDA and is the amount of high cost loans -loans with more than three percent spread rate - originated for purchasing a house aggregated for each regulatory agency at the county level for each year. Panel B reports coefficient estimates of weighted least square regressions relating the average debt-to-income ratio of newly originated loans (Columns 1 and 2) and the amount of newly originated loans with debt-to-income in the top tercile by OCC lenders and non-OCC lenders (Columns 3 and 4) to the passage of Anti-Predatory laws and the regulatory agency of loan originator. Loan amounts is based on HMDA and is the amount of loans in the top tercile of debt-to-income ratio originated by each agency in each year. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "OCC" is equal to one if the regulating agency is OCC. The sample includes years from 2004 to 2007 (HMDA does not report high-cost loans before 2004). Robust standard errors, clustered at the county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

**Panel A. High-Cost Loans**

| | (1) | (2) |
|---|---|---|
| | *Log of loan amount* | |
| APLg,t × OCC | 0.391*** | 0.386*** |
| | (0.0723) | (0.0751) |
| APLg,t | -0.132*** | |
| | (0.0316) | |
| Year Fixed Effects | Yes | |
| County Fixed Effects | | |
| Agency Fixed Effects | | |
| County-Agency Fixed Effects | Yes | Yes |
| County-Year Fixed Effects | | Yes |
| Observations | 59,398 | 57,589 |
| R-squared | 0.942 | 0.950 |

**Panel B. High-DTI Loans**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | *Average DTI* | *Average DTI* | *Log of loan amount* | *Log of loan amount* |
| APLg,t × Post × OCC | 0.0883*** | 0.0884*** | 0.0930*** | 0.0880*** |
| | (0.0169) | (0.0169) | (0.0290) | (0.0289) |
| APLg,t | 0.0584*** | | 0.0131 | |
| | (0.0153) | | (0.0233) | |
| APLg,t × OCC | -0.0393*** | -0.0393*** | -0.0252 | -0.0233 |
| | (0.0120) | (0.0120) | (0.0193) | (0.0191) |
| APLg,t × Post | -0.0865*** | | -0.127*** | |
| | (0.0177) | | (0.0249) | |
| Post × OCC | 0.0898*** | 0.0898*** | -0.0680*** | -0.0633*** |
| | (0.00840) | (0.00841) | (0.0189) | (0.0187) |
| County-Agency Fixed Effects | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | | Yes | |
| County Fixed Effects | | | | |
| County-Year Fixed Effetcs | | Yes | | Yes |
| Observations | 43,451 | 43,100 | 95,744 | 94,247 |
| R-squared | 0.780 | 0.911 | 0.975 | 0.982 |

# Table 11
## 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 preemption of national banks, with weights equal to the population of the census tract. We restrict attention to tracts within 10 miles (Columns 1 and 2) and 15 miles (Columns 3 and 4) from state borders. The sample is composed of census tracts that belong to the same MSAs bordering states with and without anti-predatory laws. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at census tract level for each year. House prices are from CoreLogic. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003 at the census tract level. In all columns, we control for year, census and MSA fixed effects. Robust standard errors clustered at the MSA level are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | *10 miles* | | *15 miles* | |
| | *Log of loan amount* | *House Prices Growth* | *Log of loan amount* | *House Prices Growth* |
| APLg,t × Post × Fraction OCC | 0.945*** | 0.162*** | 0.720*** | 0.0955** |
| | (0.264) | (0.0425) | (0.247) | (0.0367) |
| APLg,t × Post | -0.260** | -0.0529*** | -0.183** | -0.0427*** |
| | (0.107) | (0.0130) | (0.0865) | (0.0107) |
| Post × Fraction OCC | -0.345* | -0.0745*** | -0.263 | -0.0620*** |
| | (0.186) | (0.0197) | (0.177) | (0.0215) |
| APLg,t × Fraction OCC | -0.518*** | -0.0825** | -0.443*** | -0.0517* |
| | (0.0783) | (0.0323) | (0.0547) | (0.0289) |
| APLg,t | 0.288*** | 0.0111 | 0.252*** | 0.00914 |
| | (0.0785) | (0.00840) | (0.0719) | (0.00690) |
| Year Fixed Effects | Yes | Yes | Yes | Yes |
| Census Tracts Fixed Effects | Yes | Yes | Yes | Yes |
| MSA Fixed Effect | Yes | Yes | Yes | Yes |
| Observations | 17,337 | 10,102 | 28,152 | 17,442 |
| R-squared | 0.880 | 0.659 | 0.880 | 0.665 |

## Table 12

**Heterogeneous Effects**

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in non-tradable sectors, and delinquency rates to the preemption of national banks with weights equal to the population of each county. Panel A reports how the results vary for subprime counties, which are defined as counties with the fraction of subprime borrowers (FICO <680) in the top tercile, while prime counties are the others. Panel B focus on the counties with least affordable housing which are defined as those with the ratio of median house prices to median income in the top tercile, while the counties with most affordable housing are those in the other terciles. Panel C exploits differences in the housing elasticity, inelastic counties are those with the measure of elasticity of housing supply provided by Saiz (2010) in the lowest tercile, while elastic counties are those in the other terciles. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "$APLg_{2004}$" is equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. In all columns, we control for changes in median income, population and for the elasticity measure. Other interactions are omitted. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

**Panel A. Subprime**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | *Change in Loan Amount in 2003-2005* | *Change in Loan Amount in 2007-2009* | *Change in House Prices in 2003-2005* | *Change in House Prices in 2008-2010* | *Change in Employment in Non-Tradable Sector in 2003-2005* | *Change in Employment in Non-Tradable Sector in 2008-2010* | *Change in Delinquency Rates in 2003-2005* | *Change in Delinquency Rates in 2008-2010* |
| Subprime County × $APLg_{2004}$ × Fraction OCC | 1.344*** | -1.779*** | 0.566* | -1.145*** | 0.288** | -0.354* | -2.066* | 16.99*** |
| | (0.363) | (0.678) | (0.314) | (0.316) | (0.136) | (0.205) | (1.080) | (6.384) |
| Prime County × $APLg_{2004}$ × Fraction OCC | 0.342 | -0.279 | 0.183 | -0.143 | 0.0847 | -0.164 | -1.413*** | -0.237 |
| | (0.241) | (0.308) | (0.227) | (0.144) | (0.0910) | (0.105) | (0.542) | (3.203) |
| Observations | 760 | 760 | 539 | 539 | 525 | 531 | 760 | 760 |
| R-squared | 0.443 | 0.289 | 0.529 | 0.341 | 0.243 | 0.049 | 0.154 | 0.362 |

**Panel B. Housing Affordability**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Least Affordable Housing × $APLg_{2004}$ × Fraction OCC | 2.392** | -6.289** | 0.379 | -1.649*** | 0.518*** | 0.299 | -7.399*** | 52.02*** |
| | (1.178) | (2.649) | (0.617) | (0.575) | (0.187) | (0.392) | (2.187) | (16.48) |
| More Affordable Housing × $APLg_{2004}$ × Fraction OCC | 0.845** | -0.865** | 0.209 | -0.360 | 0.0784 | -0.0420 | -1.954** | 9.125* |
| | (0.368) | (0.428) | (0.270) | (0.275) | (0.101) | (0.0960) | (0.804) | (4.958) |
| Observations | 440 | 440 | 397 | 397 | 372 | 376 | 440 | 440 |
| R-squared | 0.430 | 0.312 | 0.522 | 0.266 | 0.262 | 0.036 | 0.231 | 0.403 |

**Panel C. Elasticity**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Inelastic County × $APLg_{2004}$ × Fraction OCC | 1.478** | -3.283** | 0.994* | -1.444*** | 0.275 | -0.562* | -0.115 | 24.91* |
| | (0.663) | (1.557) | (0.599) | (0.388) | (0.212) | (0.305) | (1.553) | (12.78) |
| Elastic County × $APLg_{2004}$ × Fraction OCC | 0.731*** | -0.578** | 0.322* | -0.301 | 0.198** | -0.143* | -2.132*** | 4.306 |
| | (0.246) | (0.264) | (0.188) | (0.228) | (0.0881) | (0.0816) | (0.554) | (3.113) |
| Observations | 765 | 765 | 540 | 540 | 528 | 534 | 765 | 765 |
| R-squared | 0.396 | 0.262 | 0.521 | 0.275 | 0.251 | 0.075 | 0.139 | 0.392 |

# Table A1

## Anti-Predatory Laws

The table reports the list of states that implemented an Anti-Predatory Law during our sample period and the dates these laws were in effect from Ding et al. (2012).

| State | Date |
|---|---|
| Arkansas | 7/16/2003 |
| California | 7/1/2002 |
| Colorado | 7/1/2003 |
| Connecticut | 1/1/2002 |
| District of Columbia | 5/7/2002 |
| Georgia | 3/7/2003 |
| Illinois | 1/1/2004 |
| Indiana | 1/1/2005 |
| Maryland | 10/1/2002 |
| Massachusetts | 11/7/2004 |
| Michigan | 12/23/2002 |
| Minnesota | 1/1/2003 |
| New Jersey | 11/27/2003 |
| New Mexico | 1/1/2004 |
| New York | 4/1/2003 |
| North Carolina | 7/1/2000 |
| Rhode Island | 12/31/2006 |
| South Carolina | 1/1/2004 |
| Texas | 9/1/2001 |
| West Virginia | 6/8/2000 |
| Wisconsin | 2/1/2005 |

# Table A.2

**Presence of National Banks and APL as Sources of Variation**

Panel A reports coefficient estimates of panel regressions relating the presence of national banks to the presence of anti-predatory laws and the preemption rule between 2002 and 2006. Controls in Column (2) include: the fraction of borrowers with FICO scores below 680 in 2000 for each county; the measure of elasticity of housing supply provided by Saiz (2010); the log of median income, the log of population, the fraction of loans originated by HUD-regulated lenders (a.k.a. independent mortgage lenders) and their interaction with Post. Panel B reports coefficient estimates of cross-sectional regressions relating the presence of national banks (Columns 1-3) and the presence of anti-predatory laws (Columns 4 and 5) and branching deregulation measure employed by Favara and Imbs (2015). Robust standard errors, clustered at county level, are below the coefficients in parenthesis. All regressions are weighted by the the population of each county. Asterisks denote significance levels (***=1%, **=5%, *=10%).

**Panel A**

| | (1) | (2) |
|---|---|---|
| | *Fraction OCC* | |
| AntiPred × Post | 0.0127** | 0.0204*** |
| | (0.00499) | (0.00626) |
| AntiPred | 0.000101 | -0.00551 |
| | (0.00289) | (0.00388) |
| $\text{Log(Median Income)}_{g,t}$ | | 0.139** |
| | | (0.0703) |
| $\text{Log(Population)}_{g,t}$ | | -0.0240 |
| | | (0.0458) |
| $\text{Elasticity}_g$ × Post | | -0.00130 |
| | | (0.00300) |
| $\text{Fraction of Subprime}_g$ × Post | | -0.0627 |
| | | (0.0381) |
| Post × Fraction HUDg | | -0.162*** |
| | | (0.0357) |
| Observations | 21,646 | 5,348 |
| R-squared | 0.718 | 0.712 |

**Panel B**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | *Fraction OCC* | *Fraction OCC* | *Fraction OCC* | *AntiPred* | *AntiPred* |
| Favara and Imbs Deregulation as of 2003 | 0.00048 | 0.00225 | | -0.0528 | |
| | (0.002) | (0.002) | | (0.075) | |
| Favara and Imbs Deregulation change 1998-2003 | | | 0.000611 | | 0.0331 |
| | | | (0.003) | | (0.130) |
| Observations | 1,045 | 684 | 683 | 684 | 683 |

## Table A.3

### Preemption of National Banks and Loan Origination

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans to the preemption of national banks with weights equal to the population of each county. The dependent variable in column (1) is based on HMDA and is the amount of loans originated for purchasing a house aggregated at county level for each year. Columns (2)-(4) use the measure computed by Favara and Imbs (2015) for loans originated by commercial banks. Column (3) reports results for out-of-state-banks without local branches, i.e., lending in a location outside of the state where they are headquartered, and where they have no branch. Column (4) reports regression results for in-state banks, i.e., lending for a property in the state they are headquartered. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Post" is a dummy equal to one for years after 2004. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. Controls include: the fraction of borrowers with FICO scores below 680 in 2000 for each county; the measure of elasticity of housing supply provided by Saiz (2010); the log of median income, the log of population, the fraction of loans originated by HUD-regulated lenders (a.k.a. independent mortgage lenders) and their interaction with Post. The sample includes years from 2000 to 2006. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Our loan amount measure for the sample of counties in Favara-Imbs | Favara-Imbs measure of loan amounts by commercial banks | Favara-Imbs measure for **out of state commercial banks** | Favara-Imbs measure for **in-state commercial bank** |
| APLg,t × Post × Fraction OCC | 0.621*** | 0.451** | -0.855 | 1.507** |
| | (0.192) | (0.199) | (1.368) | (0.676) |
| APLg,t × Post | -0.246*** | -0.211*** | 0.471 | -0.789*** |
| | (0.0594) | (0.0625) | (0.377) | (0.193) |
| Post × Fraction OCC | -0.0975 | 0.0923 | 1.143 | -0.417 |
| | (0.144) | (0.173) | (0.943) | (0.285) |
| APLg,t × Fraction OCC | -0.398** | -0.375 | -1.249 | -1.269*** |
| | (0.172) | (0.240) | (1.153) | (0.471) |
| APLg,t | 0.219*** | 0.0635 | 0.925** | 0.504*** |
| | (0.0751) | (0.103) | (0.428) | (0.189) |
| Year Fixed Effect | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes |
| Observations | 4,104 | 4,104 | 4,104 | 4,104 |
| R-squared | 0.993 | 0.979 | 0.936 | 0.868 |

# Table A.4

**Robustness Test I: Continuous Measure for Anti Predatory Law Strength**

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in the non-tradable sector and delinquency rate to the preemption of national banks, with weights equal to the population of the county. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at census tract level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "APLcontinuous,t" is equal to an indicator equal to 1 if state g has an anti-predatory-lending law in place at time t multiplied by the index provided for the strength of the law by Bostic et al. (2008). "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. 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* |
| APLg,t × Post × Fraction OCC | 0.125*** | 0.0369*** | 0.0344*** | -0.240** |
| | (0.0368) | (0.0133) | (0.0124) | (0.0965) |
| APLg,t × Post | -0.0494*** | -0.0185*** | -0.0137*** | 0.0999*** |
| | (0.0113) | (0.00431) | (0.00361) | (0.0345) |
| Post × Fraction OCC | -0.271* | -0.0666 | -0.0638 | 0.425 |
| | (0.159) | (0.0507) | (0.0537) | (0.408) |
| APLg,t × Fraction OCC | -0.0302 | -0.0118 | -0.0101 | 0.0380 |
| | (0.0305) | (0.0157) | (0.0122) | (0.101) |
| APLg,t | 0.0112 | 0.00472 | 0.00513 | -0.0239 |
| | (0.0119) | (0.00544) | (0.00413) | (0.0359) |
| Year Fixed Effect | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes |
| Observations | 4,998 | 3,144 | 3,486 | 4,998 |
| R-squared | 0.275 | 0.144 | 0.286 | 0.089 |
| Number of counties | 714 | 524 | 507 | 714 |

## Table A.5

### Robustness Test II: 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 sectors, and delinquency rates to the preemption 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 purchasing a house aggregated at county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). 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. "$APLg_{,2004}$" is equal to 1 if state g has an anti-predatory-lending law in place by 2004 and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). In the odd columns we include the change in the fraction of loans securitized (by volume) between 2003 and 2005, while in the even columns we control for the change in the fraction of loans securitized (by volume) between 2002 and 2006. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | *Change in Loan Amount in 2003-2005* | *Change in Loan Amount in 2007-2009* | *Change in House Prices in 2003-2005* | *Change in House Prices in 2008-2010* | *Change in Employment in Non-Tradable Sector in 2003-2005* | *Change in Employment in Non-Tradable Sector in 2008-2010* | *Change in Delinquency Rates in 2003-2005* | *Change in Delinquency Rates in 2008-2010* |
| $APLg_{,2004}$ × Fraction OCC | 0.747*** | -0.880*** | 0.323** | -0.524*** | 0.165** | -0.227** | -1.840*** | 6.354** |
| | (0.191) | (0.319) | (0.156) | (0.147) | (0.0740) | (0.0985) | (0.504) | (2.948) |
| $APLg_{,2004}$ | -0.333*** | 0.297*** | -0.165*** | 0.200*** | -0.0596*** | 0.0703** | 0.717*** | -2.687*** |
| | (0.0610) | (0.109) | (0.0487) | (0.0472) | (0.0215) | (0.0309) | (0.158) | (0.990) |
| Fraction OCCg | -0.326** | 0.888*** | -0.128 | 0.367*** | -0.0544 | 0.0453 | 1.199*** | -7.143*** |
| | (0.142) | (0.207) | (0.118) | (0.127) | (0.0590) | (0.0543) | (0.366) | (1.999) |
| Change in Median Income | 1.254*** | 1.047*** | 1.122*** | 0.125 | 0.0883 | 0.169 | -1.555*** | -1.944 |
| | (0.161) | (0.308) | (0.127) | (0.152) | (0.0558) | (0.119) | (0.408) | (2.468) |
| Change in Population | 1.811*** | 0.651 | 0.601*** | 0.481 | 0.927*** | 0.280 | -1.302** | -17.10*** |
| | (0.253) | (0.565) | (0.175) | (0.312) | (0.0946) | (0.210) | (0.553) | (5.644) |
| $Elasticity_g$ | -0.0228*** | 0.0470*** | -0.0255*** | 0.00142 | -0.00100 | -0.00158 | 0.0324 | -0.283*** |
| | (0.00812) | (0.0172) | (0.00717) | (0.00544) | (0.00303) | (0.00332) | (0.0220) | (0.0896) |
| $Fraction\ of\ Subprime_g$ | 0.545*** | -0.715*** | -0.00131 | 0.0267 | 0.0729** | 0.0923* | -1.201*** | 2.164** |
| | (0.0932) | (0.152) | (0.0675) | (0.0648) | (0.0330) | (0.0482) | (0.249) | (1.088) |
| Securitization boom between 2003-2005 | 0.790*** | | 0.758*** | | 0.0972*** | | 0.167 | |
| | (0.127) | | (0.104) | | (0.0337) | | (0.291) | |
| Securitization boom between 2002-2006 | | -0.339 | | -0.612*** | | -0.136*** | | 9.077*** |
| | | (0.240) | | (0.0834) | | (0.0362) | | (1.508) |
| Observations | 759 | 759 | 539 | 539 | 525 | 531 | 759 | 759 |
| R-squared | 0.520 | 0.294 | 0.623 | 0.489 | 0.255 | 0.078 | 0.168 | 0.468 |

## Table A.6
### Robustness Test III: CRA Lending

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated Community Reinvestment Act (CRA) loans, house prices, employment in non-tradable sectors, and delinquency rates to the preemption of national banks with weights equal to the population of each county. The dependent variable in columns 1 and 2 is the change in CRA lending for the boom and the bust period, aggregated at the county level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. "Elasticity" is a measure of elasticity of housing supply provided by Saiz (2010). "Fraction of Subprime" is the fraction of borrowers with FICO scores below 680 in 2000 for each county. For columns 3-8 we control for the change in CRA lending at the county level. Heteroskedasticity-robust standard errors are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | *Change in CRA Lending in 2003-2005* | *Change in CRA Lending in 2007-2009* | *Change in House Prices in 2003-2005* | *Change in House Prices in 2008-2010* | *Change in Employment in Non-Tradable Sector in 2003-2005* | *Change in Employment in Non-Tradable Sector in 2008-2010* | *Change in Delinquency Rates in 2003-2005* | *Change in Delinquency Rates in 2008-2010* |
| APLg,t × Fraction OCC | -1.147*** | -0.192 | 0.279 | -0.474*** | 0.139* | -0.214* | -1.683*** | 4.580 |
| | (0.274) | (0.253) | (0.198) | (0.183) | (0.0772) | (0.110) | (0.522) | (3.034) |
| Change in CRA lending | | | -0.0208 | 0.115*** | -0.0120 | 0.0299* | 0.118* | -3.221*** |
| | | | (0.0255) | (0.0290) | (0.00972) | (0.0160) | (0.0687) | (0.455) |
| APLg,t | 0.373*** | 0.0600 | -0.144** | 0.176*** | -0.0506** | 0.0634* | 0.674*** | -2.054** |
| | (0.0853) | (0.0891) | (0.0636) | (0.0599) | (0.0226) | (0.0348) | (0.162) | (1.026) |
| Fraction OCC | 0.0214 | 0.720*** | -0.129 | 0.357** | -0.0427 | 0.0492 | 1.172*** | -6.057** |
| | (0.178) | (0.199) | (0.143) | (0.169) | (0.0603) | (0.0643) | (0.370) | (2.465) |
| Change in Median Income | 0.259 | 0.172 | 1.254*** | -0.206 | 0.0972* | 0.106 | -1.368*** | 0.939 |
| | (0.235) | (0.189) | (0.164) | (0.180) | (0.0511) | (0.124) | (0.413) | (2.315) |
| Change in Population | 0.414* | -0.146 | 0.730*** | 0.748** | 0.970*** | 0.352 | -1.210** | -23.50*** |
| | (0.218) | (0.468) | (0.210) | (0.315) | (0.0949) | (0.224) | (0.572) | (5.372) |
| $Elasticity_g$ | -0.0628*** | 0.0631*** | -0.0644*** | 0.0337*** | -0.00712** | 0.00434 | 0.0429** | -0.647*** |
| | (0.0119) | (0.00845) | (0.00971) | (0.00573) | (0.00299) | (0.00336) | (0.0205) | (0.0999) |
| $Fraction\ of\ Subprime_g$ | -0.380** | -0.390*** | 0.217*** | -0.179** | 0.0902*** | 0.0635 | -1.128*** | 3.844*** |
| | (0.154) | (0.122) | (0.0794) | (0.0778) | (0.0329) | (0.0481) | (0.258) | (1.215) |
| Observations | 734 | 736 | 523 | 526 | 510 | 518 | 734 | 736 |
| R-squared | 0.204 | 0.218 | 0.538 | 0.329 | 0.253 | 0.055 | 0.173 | 0.444 |

# Table A.7

**Robustness Test IV: Excluding the Sand States**

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans, house prices, employment in the non-tradable sector and delinquency rate to the preemption of national banks, with weights equal to the population of the county. We exclude the sand states, i.e. California, Florida, Nevada and Arizona. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at census tract level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. Controls include: the fraction of borrowers with FICO scores below 680 in 2000 for each county; the measure of elasticity of housing supply provided by Saiz (2010); the log of median income, the log of population, the fraction of loans originated by HUD-regulated lenders (a.k.a. independent mortgage lenders) and their interaction with Post. Robust standard errors, clustered at county level, are below the coefficients in parenthesis. 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* |
| APLg,t × Post × Fraction OCC | 0.423*** | 0.105** | 0.0679 | -0.960** |
| | (0.161) | (0.0480) | (0.0664) | (0.418) |
| APLg,t × Post | -0.155*** | -0.0589*** | -0.0378* | 0.404*** |
| | (0.0494) | (0.0161) | (0.0204) | (0.143) |
| Post × Fraction OCC | 0.00608 | -0.0238 | 0.0347 | 0.237 |
| | (0.108) | (0.0359) | (0.0504) | (0.269) |
| APLg,t × Fraction OCC | -0.116 | 0.0423 | -0.0105 | -0.0613 |
| | (0.188) | (0.0545) | (0.0530) | (0.371) |
| APLg,t | 0.104 | 0.000216 | 0.0400** | -0.305* |
| | (0.0706) | (0.0244) | (0.0199) | (0.165) |
| Year Fixed Effect | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes |
| Observations | 4,872 | 2,856 | 3,255 | 4,872 |
| R-squared | 0.991 | 0.690 | 0.998 | 0.776 |

# Table A.8

**Robustness Test V: Standard Errors clustered at the State Level**

The table reports coefficient estimates of weighted least square regressions relating the amount of newly originated purchase loans (Panel A), house prices (Panel B), employment in the non-tradable sector (Panel C) and delinquency rate (Panel D) to the preemption of national banks, with weights equal to the population of the county. Loan amounts is based on HMDA and is the amount of loans originated for purchasing a house aggregated at census tract level for each year. House prices are from CoreLogic. Employment data comes from County Business Pattern and non-tradable sectors are defined according to Main and Sufi (2014). Delinquency is defined as at least 90 days late payments and comes from Federal Reserve Bank of New York Consumer Credit Panel. "APLg,t" is equal to 1 if state g has an anti-predatory-lending law in place at time t and zero otherwise. "Fraction OCC" is the fraction of purchase loans originated by OCC lenders in 2003. Controls include: the fraction of borrowers with FICO scores below 680 in 2000 for each county; the measure of elasticity of housing supply provided by Saiz (2010); the log of median income, the log of population, the fraction of loans originated by HUD-regulated lenders in 2003 (a.k.a. independent mortgage lenders) and their interaction with Post. Robust standard errors, clustered at the state level, are below the coefficients in parenthesis. Asterisks denote significance levels (***=1%, **=5%, *=10%).

**Panel A. Loan Amount**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | *Log of Loan amount* | | | | |
| | *Full Sample* | | *Counties with Elasticity and FICO Measure* | | |
| APLg,t × Post × Fraction OCC | 0.449* | 0.472** | 0.950*** | 0.915*** | 0.712*** |
| | (0.257) | (0.228) | (0.364) | (0.295) | (0.252) |
| APLg,t × Post | -0.174* | -0.196** | -0.324*** | -0.329*** | -0.290*** |
| | (0.100) | (0.0830) | (0.125) | (0.106) | (0.0782) |
| Post × Fraction OCC | -0.537*** | -0.446*** | -0.843*** | -0.668*** | -0.130 |
| | (0.187) | (0.166) | (0.298) | (0.245) | (0.156) |
| APLg,t × Fraction OCC | -0.242 | -0.156 | -0.257 | -0.254 | -0.323* |
| | (0.237) | (0.181) | (0.202) | (0.180) | (0.196) |
| APLg,t | 0.0546 | 0.0384 | 0.0673 | 0.0841 | 0.191** |
| | (0.0898) | (0.0777) | (0.0840) | (0.0763) | (0.0832) |
| $\text{Log(Median Income)}_{g,t}$ | | 1.552*** | 1.724*** | 1.731*** | 1.484*** |
| | | (0.227) | (0.239) | (0.220) | (0.212) |
| $\text{Log(Population)}_{g,t}$ | | 1.191*** | 1.196*** | 1.180*** | 1.219*** |
| | | (0.208) | (0.223) | (0.231) | (0.204) |
| $\text{Fraction of Subprime}_{g}$ × Post | | | | 0.804*** | 0.950*** |
| | | | | (0.172) | (0.162) |
| $\text{Elasticity}_{g}$ × Post | | | | | -0.0602*** |
| | | | | | (0.0124) |
| APLg,t × Fraction HUDg | | | | | -0.294 |
| | | | | | (0.245) |
| Post × Fraction HUDg | | | | | 0.357*** |
| | | | | | (0.136) |
| Observations | 21,564 | 15,533 | 5,348 | 5,348 | 5,348 |
| R-squared | 0.020 | 0.147 | 0.194 | 0.233 | 0.272 |
| Number of counties | 3,085 | 2,219 | 764 | 764 | 764 |

**Panel B. House Prices**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | *House Prices Growth* | | | | | |
| | *Full Sample* | | *Counties with Elasticity Measure* | | | |
| | | | | | | IV |
| APLg,t × Post × Fraction OCC | 0.247*** | 0.215*** | 0.273*** | 0.273*** | 0.231*** | |
| | (0.0837) | (0.0690) | (0.0810) | (0.0810) | (0.0784) | |
| Instrumented Log of Loan Amounts | | | | | | 0.330** |
| | | | | | | (0.144) |
| APLg,t × Post | -0.107*** | -0.0993*** | -0.120*** | -0.120*** | -0.112*** | -0.0198 |
| | (0.0297) | (0.0247) | (0.0259) | (0.0259) | (0.0233) | (0.0147) |
| Post × Fraction OCC | -0.200*** | -0.166*** | -0.174** | -0.174** | -0.0457 | 0.0388 |
| | (0.0638) | (0.0525) | (0.0706) | (0.0706) | (0.0604) | (0.0675) |
| APLg,t × Fraction OCC | -0.117 | -0.0645 | -0.0640 | -0.0640 | -0.0858 | 0.0168 |
| | (0.131) | (0.0863) | (0.103) | (0.103) | (0.109) | (0.0835) |
| APLg,t | 0.0288 | 0.0206 | 0.0262 | 0.0262 | 0.0548 | -0.00302 |
| | (0.0430) | (0.0313) | (0.0347) | (0.0347) | (0.0426) | (0.0380) |
| Fraction of Subprime$_g$ × Post | | | 0.193*** | 0.193*** | 0.202*** | -0.196 |
| | | | (0.0572) | (0.0572) | (0.0434) | (0.194) |
| Elasticity$_g$ × Post | | | | | -0.0111*** | 0.0153 |
| | | | | | (0.00352) | (0.0110) |
| Log(Median Income)$_{g,t}$ | | 0.200*** | 0.239*** | 0.239*** | 0.200*** | -0.0781 |
| | | (0.0506) | (0.0679) | (0.0679) | (0.0666) | (0.106) |
| Log(Population)$_{g,t}$ | | 0.219 | 0.162 | 0.162 | 0.170 | -0.0656 |
| | | (0.134) | (0.150) | (0.150) | (0.155) | (0.202) |
| APLg,t × Fraction HUDg | | | | | -0.0735 | -0.00573 |
| | | | | | (0.0729) | (0.0529) |
| Post × Fraction HUDg | | | | | 0.120** | 0.0442 |
| | | | | | (0.0597) | (0.0695) |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 6,244 | 5,322 | 3,258 | 3,258 | 3,258 | 3,258 |
| R-squared | 0.063 | 0.077 | 0.113 | 0.113 | 0.137 | -0.145 |
| Number of counties | 892 | 887 | 543 | 543 | 543 | 543 |

**Panel C. Employment in the Non-Tradable Sector**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | *Employment in Non-Tradable Sector* | | | | | |
| | *Full Sample* | | *Counties with Elasticity Measure* | | | |
| | | | | | | IV |
| APLg,t × Post × Fraction OCC | 0.207*** | 0.161** | 0.179** | 0.179** | 0.146** | |
| | (0.0703) | (0.0651) | (0.0751) | (0.0751) | (0.0735) | |
| Instrumented Log of Loan Amounts | | | | | | 0.217** |
| | | | | | | (0.100) |
| APLg,t × Post | -0.0696** | -0.0607*** | -0.0715*** | -0.0715*** | -0.0682*** | -0.00730 |
| | (0.0276) | (0.0219) | (0.0241) | (0.0241) | (0.0214) | (0.0107) |
| Post × Fraction OCC | -0.191*** | -0.103* | -0.0859 | -0.0859 | 0.0227 | 0.0473 |
| | (0.0563) | (0.0533) | (0.0598) | (0.0598) | (0.0635) | (0.0491) |
| APLg,t × Fraction OCC | -0.171** | -0.0902 | -0.0637 | -0.0637 | -0.0956 | -0.0242 |
| | (0.0847) | (0.0577) | (0.0694) | (0.0694) | (0.0697) | (0.0738) |
| APLg,t | 0.0544* | 0.0343 | 0.0286 | 0.0286 | 0.0667*** | 0.0231 |
| | (0.0305) | (0.0229) | (0.0257) | (0.0257) | (0.0237) | (0.0308) |
| $\text{Log(Median Income)}_{g,t}$ | | 0.287*** | 0.310*** | 0.310*** | 0.296*** | -0.0212 |
| | | (0.0801) | (0.0743) | (0.0743) | (0.0624) | (0.151) |
| $\text{Log(Population)}_{g,t}$ | | 0.893*** | 0.954*** | 0.954*** | 0.925*** | 0.647*** |
| | | (0.0780) | (0.0839) | (0.0839) | (0.0856) | (0.182) |
| $\text{Fraction of Subprime}_{g}$ × Post | | | 0.101** | 0.101** | 0.0945** | -0.127 |
| | | | (0.0433) | (0.0433) | (0.0445) | (0.115) |
| $\text{Elasticity}_{g}$ × Post | | | | | -0.00585 | 0.00717 |
| | | | | | (0.00419) | (0.00701) |
| APLg,t × Fraction HUDg | | | | | -0.0921** | -0.0253 |
| | | | | | (0.0467) | (0.0449) |
| Post × Fraction HUDg | | | | | 0.145*** | 0.0730 |
| | | | | | (0.0406) | (0.0523) |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 5,362 | 5,362 | 3,693 | 3,693 | 3,693 | 3,693 |
| R-squared | 0.014 | 0.226 | 0.287 | 0.287 | 0.298 | 0.158 |
| Number of counties | 790 | 790 | 537 | 537 | 537 | 537 |

**Panel D. Delinquency Rates**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | *Delinquency Rates* | | | | | |
| | *Full Sample* | | *Counties with Elasticity Measure* | | | |
| | | | | | | IV |
| APLg,t × Post × Fraction OCC | -0.874* | -0.869* | -1.830*** | -1.830*** | -1.545** | |
| | (0.495) | (0.447) | (0.654) | (0.654) | (0.614) | |
| Instrumented Log of Loan Amounts | | | | | | -2.170*** |
| | | | | | | (0.742) |
| APLg,t × Post | 0.402** | 0.420*** | 0.715*** | 0.715*** | 0.642*** | 0.0121 |
| | (0.178) | (0.161) | (0.216) | (0.216) | (0.207) | (0.0783) |
| Post × Fraction OCC | 0.877*** | 0.683*** | 1.010*** | 1.010*** | 0.504* | 0.221 |
| | (0.280) | (0.248) | (0.382) | (0.382) | (0.265) | (0.276) |
| APLg,t × Fraction OCC | 0.0596 | -0.00465 | 0.347 | 0.347 | 0.610 | -0.0908 |
| | (0.413) | (0.359) | (0.599) | (0.599) | (0.658) | (0.441) |
| APLg,t | -0.0520 | -0.0435 | -0.181 | -0.181 | -0.497* | -0.0820 |
| | (0.165) | (0.153) | (0.205) | (0.205) | (0.268) | (0.199) |
| $\text{Log(Median Income)}_{g,t}$ | | -1.930*** | -2.316*** | -2.316*** | -1.846*** | 1.374 |
| | | (0.619) | (0.642) | (0.642) | (0.624) | (1.082) |
| $\text{Log(Population)}_{g,t}$ | | -0.827 | -0.865 | -0.865 | -1.218** | 1.427 |
| | | (0.544) | (0.600) | (0.600) | (0.535) | (0.914) |
| $\text{Fraction of Subprime}_{g}$ × Post | | | -0.843* | -0.843* | -1.292*** | 0.770 |
| | | | (0.446) | (0.446) | (0.376) | (0.727) |
| $\text{Elasticity}_{g}$ × Post | | | | | 0.0909*** | -0.0397 |
| | | | | | (0.0222) | (0.0508) |
| APLg,t × Fraction HUDg | | | | | 0.804 | 0.167 |
| | | | | | (0.547) | (0.351) |
| Post × Fraction HUDg | | | | | 0.169 | 0.943*** |
| | | | | | (0.284) | (0.364) |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| County Fixed Effect | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 15,533 | 15,533 | 5,348 | 5,348 | 5,348 | 5,348 |
| R-squared | 0.007 | 0.022 | 0.074 | 0.074 | 0.094 | -0.061 |
| Number of fips | 2,219 | 2,219 | 764 | 764 | 764 | 764 |