

# Deregulation, Competition and the Race to the Bottom\*

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## Abstract

We exploit the OCC’s preemption of national banks from state laws against predatory lending as a quasi-experiment to study the effect of deregulation and its interaction with competition on the supply of complex mortgages (loans with prepayment penalties, interest-only payments, and negative amortization). Following the preemption ruling, national banks significantly increased their origination of loans with prepayment penalties and negative amortization features by comparison with lenders not regulated by OCC and lenders in states without predatory lending laws. Further, we highlight a competition channel: in counties where OCC-regulated lenders had larger market shares prior to the preemption, even non-OCC lenders responded by increasing their use of these riskier terms to the extent permitted by the state predatory-lending laws. Overall, our evidence suggests that the deregulation of credit markets triggered a “*race to the bottom*” among financial institutions, working through competition between lenders.

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# 1 Introduction

The financial deregulation of the last two decades has been the subject of heated political and academic debate, insofar as it may have played an important role in creating a permissive lending environment. In fact, critics maintain that regulators incentivized laxer underwriting standards in order to encourage the origination of increasingly marginal loans, whereas effective regulation of lending practices could have prevented aggressive lenders from abusing vulnerable borrowers by offering riskier and more complex mortgages.<sup>1</sup> Moreover, it is not clear that this market could regulate itself. On the one hand, market forces and lenders' reputation concerns may discipline banks' behavior, but on the other, fiercer banking competition could induce lenders to "race to the bottom" by originating even riskier loans to preserve their market shares in the short term.

Hence, in this paper we address the following questions empirically: how does financial deregulation affect the credit supply and the use of complex loans features? How does banking competition shape its effects? One of the major difficulties in empirically identifying the effects of deregulation on the types of mortgages banks originate is that policy interventions usually affect all lenders at once, making it impossible to distinguish between the direct effects of the policy and other confounding factors affecting mortgage originations, such as changes in demand. This paper overcomes these problems by exploiting the 2004 pre-emption of state laws against predatory lending for lenders regulated by the Office of Comptroller and Currency as an exogenous shock to the competitive landscape. Specifically, this shock expanded the set of loans that OCC-regulated lenders were allowed to originate but did not alter the set permitted to other lenders. The pre-emption ruling creates an ideal environment to test for the effects of deregulation by providing us with a clean set of

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<sup>1</sup>President Barack Obama justified the need for a Consumer Financial Protection Agency with the argument that predatory lending by unregulated mortgage brokers was one of the causes of the financial crisis: "Part of what led to this crisis were not just decisions made on Wall Street, but also unsustainable mortgage loans made across the country. While many folks took on more than they knew they could afford, too often folks signed contracts they didn't fully understand offered by lenders who didn't always tell the truth" (White House news release, September 19, 2009, available at [www.whitehouse.gov/the\\_press\\_office/Weekly-Address-President-Obama-Promotes-Tougher-Rules-on-Wall-Street-to-Protect-Consumers](http://www.whitehouse.gov/the_press_office/Weekly-Address-President-Obama-Promotes-Tougher-Rules-on-Wall-Street-to-Protect-Consumers)). .

affected banks, i.e. those regulated by the OCC, and a set of unaffected banks, i.e. those regulated by the state regulators as well as by the Department of Housing and Urban Development (HUD). We can exploit this to see how lenders respond to deregulation and detect the possible spillover effects on other lenders due to intensified competition.

There is a growing household finance literature on the demand-side determinants of the different loan contracts observed in the data. This literature takes important steps towards understanding what types of borrowers take on different forms of debt, such as adjustable rate mortgages (ARM), fixed rate mortgages (FRM) and interest-only mortgages (IO).<sup>2</sup> Much less is known about the supply side, however. The 2004 deregulation, by affecting different types of originator differentially, offers a unique chance to determine whether the supply of these mortgages changed significantly in the run-up to the crisis. Moreover, thanks to the granularity of our data the compositional changes in credit supply and demand can be distinguished, by accounting for both observed and unobserved time-varying county heterogeneity through county-by-month fixed effects.

Our first result derives from differences-in-difference analysis of a sample of loans made in states with laws against predatory lending (henceforth “APL laws”) to show that the preemption of these laws for OCC regulated lenders led them to change the pool of borrowers receiving credit from national banks. Specifically, we analyze various borrower characteristics at origination: FICO score, loan-to-value (LTV) ratio, second liens, and cash-out refinance mortgages. We compare these characteristics before and after the preemption rule in states that passed predatory lending laws. We find that after the preemption, borrowers’ FICO scores average 8-40 points lower, while LTV averages 4.5-6 percentage points higher. Moreover, the likelihood that the property has a second lien is 4% greater, and the loan is 6% more likely to be a cash-out refinance. These results make it clear that the deregulation in 2004 affected the characteristics of the borrowers they began to serve.

Next, we explore whether the preemption of these APL laws for OCC regulated lenders

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<sup>2</sup>See [Campbell \(2006\)](#) for a survey of this literature. A more detailed discussion of the literature is provided in the next section.

led them to increase loans with more complex terms, such as prepayment penalties, negative amortization, adjustable rate and long prepayment penalty terms. Our most conservative estimate shows that following the preemption ruling OCC-regulated lenders were about 14% more likely than other lenders to make mortgage loans with prepayment penalties. Compared with the unconditional probability of about 30% in our sample, this represents an economically significant increase. These prepayment penalties are particularly important, as they are necessary to make other features profitable, such as negative amortization, teaser rates and balloon payments. To capture fluctuation in credit demand, our main specification includes county-by-month fixed effects. Moreover, our results are robust to a triple differences-in-difference specification, which also uses as a control group loans originated in states with no predatory lending laws. That is, this relaxes our identification assumption by requiring only that in the absence of the preemption the difference between OCC and non-OCC lenders be similar between states with and without predatory lending laws. Overall, these findings support the thesis that the deregulation crucially shaped the supply of complex mortgages.

Having established that the deregulation had a direct effect on the supply of riskier mortgages and on the pool of borrowers with access to credit from national banks, we can now ask whether it also had an *indirect* effect on the non-OCC lenders. Intuitively, the deregulation altered the competitive landscape by giving national banks an advantage, as their lending to riskier borrowers was basically unconstrained, while the other financial institutions were still constrained by the predatory lending laws. Hence, we should expect non-OCC lenders to try to defend their market shares by offering loans with features catering to the same pool of borrowers without violating the law, such as interest-only and deferred amortization mortgages. This effect should be stronger in markets where OCC lenders have a more dominant position.

We test this hypothesis, using the fraction of loan volume originated by OCC lenders in

the pre-period as proxy for their market dominance.<sup>3</sup> We investigate the non-OCC lenders' response by separately considering the response in counties with different levels of competition from OCC lenders. Consistent with the hypothesis, we find that non-OCC lenders do make mortgage loans with features that were not directly restricted by the law. Specifically, we find that after the preemption ruling non-OCC lenders were 7% more likely to grant adjustable-rate mortgages and 4%-5% more likely to grant interest-only and deferred amortization mortgages. Interestingly, these effects were concentrated in counties where OCC lenders had larger market shares and absent in the counties where they had little market power. Our results indicate that rather than attenuating the effects of deregulation, competition may have led even the banks that were not directly affected to turn to riskier and more complex mortgages.

Since complex mortgages are characterized by a lack of mortgage amortization which leads to higher LTVs, greater reliance on loans that might prove unfeasible when house prices drop, we might also observe an effect on defaults. And in fact, we find that after the preemption the mortgages originated by non-OCC lenders were 3.5% more likely to default in more competitive counties, a result concentrated among their complex mortgages. This is evidence for the thesis that the deregulation triggered a race to the bottom in mortgage origination, inducing even non-OCC lenders to compete with loans with higher default probability. The results are robust to several borrower characteristics and to the current loan-to-value ratio in addition to county-by-time fixed effects.

Finally, we run additional robustness checks. First, to show that the results are not contaminated by differences in the borrowers' characteristics for the loans originated by OCC and non-OCC lenders, we employ a nearest-neighbor matching method to assign to each loan originated by an OCC lender one originated by a non-OCC lender. We use quarter of origination, zip code, and all the main characteristics at origination, such as FICO score, LTV, documentation and size of the loan. We confirm the effect of the preemption rule on

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<sup>3</sup>In a robustness check we also show that similar results hold when we proxy for competition by computing the Herfindahl-Hirschman index using data on deposits from the FDIC.

OCC lenders on this matched sample as well. Second, for further evidence on the mechanism, we also use the Home Mortgage Disclosure Act (HMDA) dataset for loan applications. We show that after the preemption OCC lenders were 5% more likely to securitize their mortgages, which might explain why they were less concerned about granting riskier mortgages. Moreover, they were also more likely to securitize mortgages with high debt-to-income ratios.

Third, one potential concern about our results on the role of competition and the race to the bottom is that they could be driven by changes in counties with low levels of competition. Instead, we show that in the bottom tercile of counties in terms of market concentration, the results do not hold. Another concern might be that more competitive regions in the states without predatory lending laws are different from those in the states with them. To address this concern, we use a propensity score matching procedure to compare high-competition counties across states that are very similar in terms of a number of observable characteristics. We confirm our results on this matched sample too.

Taken together, our findings indicate two main channels through which mortgage deregulation may work its effects. First, it directly increases OCC-regulated lenders' origination of loans with "predatory" features, particularly prepayment penalties, an effect that can explain about 10 percent of the increase in the use of these features. Second, it induces a response also from the lenders still subject to the regulation in the same markets. The picture that emerges is of a competition channel that began with the OCC-regulated lenders, worked its way through the local mortgage market, and obliged the non-OCC regulated lenders to alter their own mortgage terms as a competitive response. These results complement and sheds new light on other mechanisms that have been proposed to explain the rise of riskier mortgages such as the boom in securitization ([Keys et al. \(2010\)](#)).

## 1.1 Related Literature

Our key contribution consists in directly estimating the effect of deregulation on the supply of complex mortgages both through a direct channel, namely the behavior of the deregulated

national banks, and through an indirect one, the response of their non-national competitors.

Our paper relates directly to [Amromin et al. \(2013\)](#), who analyze the demand for complex mortgages, i.e. the type of borrowers who are more prone to take on complex mortgages, during the years preceding the crisis. They show that these loans were chosen by prime, high-earning borrowers seeking to buy houses that were expensive relative to their incomes. However, these borrowers tend to default more often than those with traditional mortgages with similar characteristics, and thus we can think of them as being riskier in nature. A few other papers have analyzed riskier mortgages during the boom period. [Agarwal et al. \(2014b\)](#) test whether predatory lending was a key element in fueling the subprime crisis, investigating the effect of an anti-predatory pilot program in Chicago on mortgage default rates. Similarly, [Agarwal et al. \(2014a\)](#) explore the effects of mandatory third-party review of mortgage contracts on consumer choice including the terms and demand for mortgage credit. [Gurun et al. \(2013\)](#), instead, show evidence that lenders advertise to steer unsophisticated consumers into bad choices by highlighting the initial interest rate and shrouding the reset rate. [Agarwal and Ben-David \(2014\)](#) examines the role of loan officers' incentives, describing a controlled corporate experiment in which loan officers' compensation structure was altered from fixed salary to volume-based pay, and show that the incentives made mortgage origination more aggressive. We complement these findings by showing how the supply side is shaped by changes in the regulatory environment. We also show that when competition is more intense, the lenders not directly affected by the preemption rule tend to adjust not only the interest rate but also a variety of other mortgage features.

Two recent papers have investigated different policy interventions in the mortgage market. First, we share the focus on the effect of policy changes on the competitive landscape with [Amromin and Kearns \(2014\)](#), who explore whether market competitiveness affects mortgage interest rates by exploiting the introduction of the Home Affordable Refinancing Program (HARP), which gave lenders that were servicing eligible loans substantial advantages over their competitors. They show a significant increase in mortgage interest rates, about 15

to 20 basis points, precisely at the HARP eligibility threshold. Second, [Agarwal et al. \(2012\)](#) analyze the effect of the Community Reinvestment Act (CRA) on banks' lending activity. They find that adherence to the act led to an increase in lending by banks; in fact, during the six quarters surrounding the CRA exams lending is 5 percent higher, but these loans default more often. We share the focus on the effect of deregulation on pre-crisis loan origination, but we exploit loan-level data to study how lenders modified key features of their mortgages to remain competitive. We complement these findings by showing that the poor-performing banks were significantly more likely to take advantage of the deregulation.

After the crisis, a novel literature emerged relating changes in mortgage market terms to the real economy. For instance, in their seminal paper, [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. Our paper advances this literature by exploiting an exogenous shock to credit supply and the competitive environment, to estimate how significantly the specific contract features offered by financial institutions and the approved borrower characteristics changed.

Our paper also relates to a number of studies that investigate the changes in lending behavior during pre-crisis years. Other papers, such as [Jiang et al. \(2014\)](#), [Agarwal et al. \(2014b\)](#), [Haughwout et al. \(2011\)](#), [Chinco and Mayer \(2014\)](#) and [Barlevy and Fisher \(2010\)](#), have held that the relaxation of lending standards was one of the main causes of the subprime crisis; others, such as [Rajan et al. \(2010\)](#), [Purnanandam \(2011\)](#), [Nadauld and Sherlund \(2013\)](#) and [Keys et al. \(2010\)](#), have highlighted the failure of ratings models and the rapid expansion of non-agency securitization markets as driving factors. We complement these studies with evidence that deregulation might have triggered a race to the bottom among lenders in the years preceding the crisis.

We adopt the identification strategy followed by [Di Maggio and Kermani \(2014\)](#), based on the OCC's introduction of the preemption rule in 2004 and the variation between states with and without anti-predatory laws. However, the present paper differs in both focus and



results. The main results of [Di Maggio and Kermani \(2014\)](#) relate to the real effects of an outward shift of credit supply, and in particular the possibility of inducing a boom and bust economic cycle at county level. The present paper, instead, exploits individual-level data to show the effect of the preemption on the features of national banks' mortgages after its passage. We then investigate the response of the non-OCC regulated banks, such as state banks and credit unions, to show how competition might shape the response to deregulation.

Other related papers on the effect of mortgage deregulation include [Jayaratne and Strahan \(1996\)](#) and [Favara and Imbs \(2015\)](#). [Jayaratne and Strahan \(1996\)](#) show that per capita growth rates in income and output rose significantly following the relaxation of bank branching restrictions in the United States. Like [Favara and Imbs \(2015\)](#), we use deregulation as a quasi-experiment; [Favara and Imbs \(2015\)](#) exploit the passage of the Interstate Banking and Branching Efficiency Act (IBBEA) in 1994 and show that this deregulation triggered an increase in the demand for housing, that is, that house prices rose because of the expanded supply of credit in the deregulating states. The main difference from the current paper is that we document an increase in credit supply due to the preemption rule of 2004, which unlike the 1994 IBBEA targeted subprime lending and riskier borrowers. In other words, the deregulation investigated here expanded the range of mortgage contracts that national banks could offer to subprime borrowers; that is, it is a far different form of deregulation, possibly with radically different implications.<sup>4</sup>

Finally, [Piskorski et al. \(2015\)](#) and [Griffin and Maturana \(2015\)](#) have shown that about one out of every ten loans exhibits some form of asset quality misrepresentation, such as misreported occupancy status of the borrower and unreported second liens. They also provide evidence that good part of this misrepresentation is the work of the financial institutions themselves and not of the borrowers. Our results contribute to this debate by showing that deregulation might significantly heighten the incentive for lenders to issue riskier mortgages,

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<sup>4</sup>Other recent papers on credit supply include [Greenstone and Mas \(2012\)](#), which investigates the importance of the credit channel for employment by assessing the role of bank lending to small businesses, and [Adelino et al. \(2012\)](#), which exploits changes in the conforming loan limit to gauge the effect of cheaper financing on house prices.

especially in highly competitive markets.

The rest of the paper is organized as follows. Section 2 gives background on the US credit market and regulation. Section 3 provides details on the data sources, while Section 4 illustrate our research design. Section 5 provides the first results on the effect of the deregulation on the mortgage terms and on the composition of borrowers. Section 6 investigates a competition mechanism by which non-OCC lenders also changed their mortgage origination behavior. Finally, Section 7 presents several robustness checks, while Section 8 concludes.

## 2 The Regulatory Framework

### 2.1 Mortgage Regulators

In the United States, residential mortgage lenders are regulated by both national and local agencies. National banks, federal thrift institutions and their subsidiaries are supervised by the OCC or the Office of Thrift Supervision (OTS). State banks and state-chartered thrifts are supervised by the Federal Reserve System, the Federal Deposit Insurance Corporation (FDIC) or their own state banking authority. 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.

Since our identification strategy depends on this classification, it is important to make sure that lenders cannot somehow circumvent their assigned regulator. One particular source of concern is that lending institutions might be able to shop around for the most lenient regulator. [Agarwal et al. \(2012\)](#) show that federal regulators are significantly less lenient, downgrading supervisory ratings about twice as frequently as state supervisors, and that banks under federal regulators report higher nonperforming loan ratios, more delinquent loans, higher regulatory capital ratios, and lower ROA. If they are allowed to, then, banks have an incentive to switch from federal to state supervision, which means that even if this

were possible, it would bias the results against our hypothesis. Moreover, [Rosen \(2005\)](#) and [Rezende \(2014\)](#) explore switching between regulatory agencies between 1970 and 2012, and find that at first most of the switches were due to new banking policies, such as the relaxation of the ban on interstate banking, but after the initial period the main reason was merger with a bank chartered at a different level. Further, the banks that switched tended to be small banks (assets of less than \$1 billion), which are not in our sample as we exclude banks with fewer than 1,000 loans. The only exceptions are JP Morgan and HSBC, which switched from the state to the national regulator in 2004, and to avoid biasing our estimates, we class these two institutions as national lenders prior to 2004 as well.

These findings corroborate our identification strategy. And the granularity of our data allows us to track the banks that changed regulatory agencies, so that we can address any other concerns relating to this issue.

## **2.2 Predatory-lending laws**

This dual banking system generated conflicting regulations when several states passed anti-predatory-lending laws and the OCC issued a preemption rule for national banks. The 1994 Home Ownership and Equity Protection Act (HOEPA) imposed substantial restrictions on terms and practices for high-priced mortgages, based either on APR or on total percentage points of interest and fees. The aim was 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 narrowed the scope for applying 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 stricter predatory lending regulations than federal law requires. Such legislation is intended to prevent various unfair and deceptive practices, such as steering borrowers to loans with a higher interest rate than they could qualify for, making

loans regardless of repayment capacity, charging exorbitant fees, or adding abusive early repayment penalties – all of which can significantly aggravate the risk of foreclosure.<sup>5</sup> The first comprehensive state law against predatory lending, or APL, was passed by North Carolina in 1999, targeted at the subprime mortgage market. As of January 2007, 20 states and the District of Columbia had APL laws in effect.

Potentially, predatory lending laws may have various effects on mortgage market outcomes. They might ration credit and raise the price of subprime loans, or else allay consumer fears about dishonest lenders and ensure that creditors internalize the cost of any negative externalities, which could increase the demand for credit.

There is strong recent evidence that predatory lending laws played an important role 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 significant decrease in adjustable-rate mortgages; they are also correlated with a significant reduction in 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 originated in the states with predatory lending laws 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. Using a legal index, they examine the effect of APLs on the probability of subprime applications, originations, and rejections. They find that more restrictive regulations reduced the likelihood of origination and application. Similarly, [Elliehausen et al. \(2006\)](#), using a proprietary database of subprime loans 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. \(2014b\)](#) estimate the effect on mortgage default rates of a pilot predatory lending

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<sup>5</sup>[Agarwal and Evanoff \(2013\)](#) give 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 offering subprime-like loans, with APR between 40 and 60 basis points higher.

program 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 significantly affected both the origination rates and the characteristics of risky mortgages.<sup>6</sup>

We follow this literature employing the measure constructed by [Ding et al. \(2012\)](#), which considers only the states with predatory lending laws that were not just small-scale home ownership and equity protection acts passed to prevent local regulation.

## 2.3 Preemption Rule

On January 7, 2004 the OCC issued sweeping regulations preempting, for national banks, a broad range of state laws designed to regulate the “terms of credit”: laws regulating loan terms and lending and deposit relationships or requiring a state license to lend. The final rule also mandated preemption where the state 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 Congress has expressly incorporated state-law standards in federal statutes or where the effect of the state laws on national banks is only “incidental.” The OCC has clarified 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.<sup>7</sup>

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<sup>6</sup>For a theoretical model of predatory lending see [Bond et al. \(2009\)](#).

<sup>7</sup>For instance, New Century in its 2004 10-K filing, complaining as follows: “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

Specifically, the OCC preempted all regulations pertaining to 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 collateral and the term to maturity, including the circumstances under which a loan may be called due and payable after a certain time or upon a specified external event.

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

### 3 The Data

We collected data from a variety of sources. The chief one is the ABSNet Loan Database, which covers almost 90% of private-label Residential Mortgage Backed Securities and provides data on the underlying loans and key borrowers' characteristics. The main advantage of this dataset over the other standard datasets used in the literature, such as LPS and Blackbox, is the possibility of identifying the mortgage originator, which is crucial to our identification strategy. This enables us to classify lenders into those who were and were not regulated by federal agencies (respectively "OCC" and "non-OCC" lenders).<sup>8</sup> We consider all first-lien mortgages originated in the pre-period, January 2001 to January 2004, and in the post-period, February 2004 to December 2005, with a final sample of almost 7 million loans.

Another advantage of this fine-grained data is the ability to observe all the specific features of the loans at the date of origination. We exploit this, for instance, by analyzing

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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).

<sup>8</sup>This classification has been graciously provided to us by Nancy Wallace and the Fisher Center for Real Estate and Urban Economics at the Haas School of Business.

how the national banks changed their provision for prepayment penalties, the length of prepayment penalty terms, balloon payments, negative amortization, and interest rates in response to the preemption rule. We find that the ability to impose prepayment penalties enabled lenders to issue more complex mortgages (e.g. with negative amortization or balloon payments), or interest-only and adjustable rates mortgages.

Table 1A and Table 1B give summary statistics for our sample of loans. Of the 7 million loans in the sample, 3.6 million were originated in states that had APL laws. Panel A focuses on the covariates used in our specification, Panel B on the mortgage features at origination. Table 1A shows the statistics for the period before the preemption rule (2001-2004), Table 1B those for the post-period February 2004-December 2006. As our sample comes from private label securitization, which were the way in which a large quantity of subprime and non-conforming loans were securitized, we have an average FICO score of 687 for OCC lenders in the pre-period and slightly lower for other financial institutions. The score declined slightly in the post period, probably reflecting the general deterioration of lending standards. In the pre-period the average LTV was 72% for OCC and 76% for non-OCC lenders. Subsequently, it remained stable for non-OCC lenders but rose to 75.8% for OCC lenders. In addition, some 7% of the loans have a second lien in the pre-period, but 14% for OCC-originated loans. Finally, 40% of the loans have little or no documentation and 15% have private mortgage insurance. Unconditionally, 29% of the loans in our sample have prepayment penalties, a key focus of the analysis; 64% are ARMs and 17% are interest-only.

To obtain further results on the expansion of credit by OCC lenders after the preemption, and also to demonstrate the external validity to our results, we collect data on mortgage loans originated every year through the Home Mortgage Disclosure Act (HMDA) dataset for loan applications. The HMDA dataset records final status of the loan (i.e. denied, approved or originated), reason for borrowing (i.e. home purchase, refinancing or home improvement), whether the loan has been sold to another party (securitized), and other characteristics such as loan amount and borrower's race, sex, income, and home ownership status. We can thus

see whether the securitization decisions have also been affected by the preemption.

## 4 Research Design

By lifting the existing laws against predatory lending, the preemption rule might have induced the OCC lenders to cater to riskier borrowers. This is for at least three reasons. First, one of the most common features of the APL laws is the requirement that loans be consistent with the borrowers' repayment capacity. Hence, the preemption might have induced national banks to lend to borrowers who were hoping for an increase in their future income stream or a sharp appreciation in the value of their house. Second, the preemption also makes it easier for the lenders to securitize, because as we have seen credit rating agencies are more willing to support deals that do not risk violating APL laws. Third, the possibility for OCC lenders to offer more complex mortgages might make lending to riskier and less sophisticated borrowers more profitable, as by shrouding additional fees. Accordingly we test the following hypothesis:

**Hypothesis I:** After the preemption rule, OCC lenders attracted riskier borrowers.

Our identification strategy exploits the preemption rule as a shock to the OCC lenders' ability to grant credit to riskier borrowers, using both a difference-in-difference and a triple differences-in-difference approach. There are advantages to both approaches. For instance, by comparing loans originated by OCC and non-OCC lenders in states that eventually adopted an APL law, before and after the preemption rule, we avoid any confounding factor coming from states that never adopted an APL law. Formally, our differences-in-difference specification is:

$$\begin{aligned}
 Characteristics_{i,c,t} &= \beta_0 + \beta_1 \cdot Post_t \cdot OCC_i + & (DD) \\
 &+ \beta_2 \cdot OCC \cdot APL_{g,t} + \beta_3 \cdot OCC_i + \eta_{c,t} + \epsilon_{i,c,t}
 \end{aligned}$$



where  $Characteristics_{i,c,t}$  are borrowers' attributes at origination,  $OCC_i$  is an indicator for whether the lender originating loan  $i$  was regulated by the OCC;  $APL_{g,t}$  is an indicator for whether the state  $g$  has adopted an APL law at time  $t$  and  $Post_t$  is an indicator equal to 1 after the preemption rule. We include mortgages in all states that adopted an APL law by 2004. Since we also include mortgages originated before the adoption of the APL, to control for this we include the term  $OCC \cdot APL_{g,t}$ .<sup>9</sup> We also include linear and squared agency time trends, which capture the possibility that banks regulated by different regulatory agencies may have followed different trends.

There are two reasons behind a change in the mortgage features. First, keeping the pool of borrowers constant, the preemption removed a constraint for lenders that want to charge prepayment penalties. However, if the pool of borrowers changes significantly following the preemption, then so might mortgage features. For instance, [Mayer et al. \(2013\)](#) sets out a dynamic lending model with costly default in which riskier loans are more likely to exhibit prepayment penalties in equilibrium, because such penalties represent an optimal way for banks to make it more costly for the higher-quality borrowers to refinance when their creditworthiness improves. This suggests the following empirical hypothesis:

**Hypothesis II** Controlling for borrower characteristics, loans by OCC lenders are more likely to have prepayment penalties.

We test this hypothesis by estimating the following differences-in-difference specification:

$$\begin{aligned} Loan\ Features_{i,c,t} = & \beta_0 + \beta_1 \cdot Post_t \cdot OCC_i + \\ & + \beta_2 \cdot OCC \cdot APL_{g,t} + \beta_3 \cdot OCC_i + \beta_4 \cdot X_{i,t} + \eta_{c,t} + \epsilon_{i,c,t} \end{aligned}$$

where  $Loan\ Features_{i,c,t}$  are mortgages characteristics,  $OCC_i$  indicates whether or not the originator of loan  $i$  was regulated by the OCC,  $APL_{g,t}$  indicates whether or not state  $g$

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<sup>9</sup>The main effect  $APL$  is captured by the county-by-month fixed effects.

has an APL law in place at time  $t$ , and  $Post_t$  is a dummy equal to 1 after the preemption rule. We include controls  $X_{i,t}$  to capture heterogeneity across different mortgages: an indicator for inadequate or absent documentation, an indicator for the type of loan (i.e. ARMs, FRMs, etc...), an indicator for private mortgage insurance, LTV ratio, FICO score, a second-lien indicator, and a loan purpose indicator (i.e. cash out refinance, rate refinance or other).<sup>10</sup>

A major concern is that we may not be accounting for time-varying unobserved heterogeneity at the county level. For instance, unobserved fluctuations in local credit demand might drive changes in the origination of these mortgages by OCC lenders. To eliminate these concerns, we include county-by-month fixed effects  $\eta_{c,t}$ , enabling us to capture any other unobserved shock at county-month level. For instance, such fixed effects capture any differential trend in local house prices.  $\beta_1$  is the relevant coefficient as it estimates:

$$[\bar{Y}_{OCC,Post}^{APL} - \bar{Y}_{OCC,pre}^{APL}] - [\bar{Y}_{Non-OCC,Post}^{APL} - \bar{Y}_{Non-OCC,Pre}^{APL}],$$

That is, it compares the pre- and post- preemption difference in outcomes for OCC lenders with that for non-OCC lenders. This methodology effectively exploits only within county variation and has the advantage of being able to show that our results are driven by the differential response to preemption of OCC lenders relative to non-OCC lenders, in the same county, in states with APL.

The triple differences-in-difference methodology uses as a control set not only the non-OCC loans, but also those in states where the pre-emption presumably had no effect, in that they had no APL laws to begin with. In other words, in this approach we relax our identifying assumption and assume that the difference between OCC and non-OCC lenders' origination behavior in states with and without APL would have been the same in absence

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<sup>10</sup>The  $\beta_2$  term is included to control for the fact that the states which had APL laws in place by 2004 (and thus are included in the sample) implemented these laws at different points in time. Thus,  $\beta_1$  is still a difference in difference estimator (as we are not using loans made in all states, whether or not they had an APL in place). However, to control for the staggered way in which states implemented their APL laws, we include  $\beta_2$ .

of the preemption ruling. Formally, we use the following specification:

$$Y_{i,c,t} = \beta_0 + \beta_1 \cdot Post_t \cdot OCC_i \cdot APL_{g,t} + \beta_2 \cdot Post_t \cdot OCC_i + \beta_3 \cdot OCC_i \cdot APL_{g,t} \text{ (DDD)} \\ + \beta_4 \cdot OCC_i + \beta_5 \cdot X_{i,t} + \eta_{c,t} + \epsilon_{i,c,t}$$

where  $APL_{g,t}$  indicates whether state  $g$  had a predatory lending law in effect at time  $t$ , the month of origination of the loan. We define  $APL_{g,t}$  to be equivalent to the *ineffect* variable of [Ding et al. \(2012\)](#). The omitted terms in (DDD) are absorbed by the county-month fixed effects. The relevant coefficient is  $\beta_1$ . It estimates:

$$\left( [\bar{Y}_{OCC,Post}^{APL} - \bar{Y}_{OCC,pre}^{APL}] - [\bar{Y}_{Non-OCC,Post}^{APL} - \bar{Y}_{Non-OCC,Pre}^{APL}] \right) \\ - \\ \left( [\bar{Y}_{OCC,Post}^{Non-APL} - \bar{Y}_{OCC,pre}^{Non-APL}] - [\bar{Y}_{Non-OCC,Post}^{Non-APL} - \bar{Y}_{Non-OCC,Pre}^{Non-APL}] \right),$$

which effectively compares loans originated by OCC and non-OCC lenders across states with and without APL around the preemption rule. Under both approaches the results are broadly consistent, so that we can be confident that we are capturing the effect of deregulation and not preexisting trends or confounding factors.

## 5 OCC Banks' Response to the Preemption Rule

In this section, we focus on the effect of the deregulation on the OCC lenders' mortgage origination before and after the preemption.

### 5.1 Borrowers' Quality

First we present our main results on the change in the pool of borrowers who get credit from OCC lenders and the features of post-preemption mortgages. Our set of outcome

variables  $Y_{i,c,t}$  comprises credit score, LTV, presence of a second lien and a dummy for cash out refinancing. These features should capture the quality of the borrower at origination, as they can proxy for credit-worthiness, equity in the house, and overall default risk. If the preemption has eased lenders' concerns over repayment capacity, we should observe a significant change along these dimensions after 2004.

Table 2 reports the test of this hypothesis. Column 1 shows that individuals borrowing from OCC lenders have FICO scores about 41 points lower after the preemption. Columns 2 and 3 provide evidence that OCC lenders were also willing to lend to borrowers with less equity in their homes, as the average combined LTV increased by 6 percentage points after the preemption and the probability of having a second lien was 4 points higher. Finally, these borrowers were also 6% more likely to be getting a cash-out refinance. In all of these specifications, we include county-by-month fixed effects to absorb any time-varying unobserved heterogeneity at the county level, such as changes in Overall, the results suggest that the pool of OCC borrowers changed significantly after the passage of the preemption rule.

The results reported in Tables 2 show an exogenous change in loan contracts in states with APL laws, induced by the pre-emption ruling through the channel of the expanded set of options for OCC lenders as against non-OCC lenders. One potential concern with this estimation methodology stems from the assumption that in absence of preemption the two types of lender would have been on parallel trends. However, there might have been other shocks these years with differential effects. For instance, a change in monetary policy may have a stronger effect on small than on large banks, owing to their lack of an internal capital market.

We can relax this assumption by adding, as control, the difference between OCC and non-OCC lenders in the states without APL laws. This helps to address the concern just mentioned, because in order to invalidate this triple differences-in-difference any confounding factor should not only affect different types of lender differently, but should also be correlated with the presence of laws against predatory lending. Therefore, this approach is most use-

ful in controlling for unobserved time-varying heterogeneity that might predict differential behavior between the treatment and the control groups after 2004. The results are given in Tables 3, and reveal that, even in this more restrictive specification, we find that the credit score falls by about 10 points, combined LTV increases by 4 percentage points, and the probability of cash out refinancing increases by about 8 percentage points.

## 5.2 Contract Features

Next, we test whether the features of the OCC mortgages given to these riskier borrowers also changed significantly with the preemption. In Table 4 our dependent variables  $Y_{i,c,t}$  include a prepayment penalty indicator, the length of the prepayment term (e.g. the borrower is subject to prepayment penalties if he repays the mortgage within the first two years from origination), whether the prepayment penalty term would have been in violation of existing APL laws<sup>11</sup>, as well as, whether the mortgage is adjustable-rate or with deferred amortization as defined by APL laws (i.e. negative amortization or balloon features), or with an interest-only repayment period. The most important of these characteristics is the prepayment penalty, because it is the one that is restricted by all APL laws. Moreover, as is argued by [Mayer et al. \(2013\)](#), loans to riskier borrowers tend to have prepayment penalties, because otherwise borrowers would refinance as soon as their creditworthiness improves, which would lead them to leave the pool of mortgages and make it riskier.<sup>12</sup>

Table 4 presents the results. Column 1 shows that after the preemption an OCC mortgage lender in an APL state was about 15% more likely than a non-OCC lender to impose a prepayment penalty, while the unconditional mean for presence of prepayment penalties was 31.6%. That is, the preemption resulted in an economically important increase in prepayment penalties. Additionally, as is shown in Column 2, OCC lenders' prepayment penalty terms were 4-months longer than those of non-OCC lenders (with an unconditional mean of 8

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<sup>11</sup>For this purpose we use the [Bostic et al. \(2008\)](#) classification of prepayment penalty term related APL laws. See Table 2 of [Bostic et al. \(2008\)](#).

<sup>12</sup>This idea is related to the empirical prepayment literature that found path dependence of prepayment (see, for instance, [Richard and Roll \(1989\)](#)).

months), and these lenders were 10% more likely to make loans that would have been in violation of the APL law (Column 3), originated 11% more ARMs (Column 4) and made 4.2% more deferred-amortization loans (Column 5). Column 6 shows that OCC lenders were 5% less likely to originate interest-only mortgages, which comes as no surprise given such loans were not prohibited by the predatory lending laws.

Table 5 presents the results for our preferred triple differences-in-difference specification. Even in this case, the magnitude of the effect on the origination of loans with prepayment penalties remains statistically significant and economically substantial. So in this case too we confirm the hypothesis that following preemption OCC lenders expanded their supply of mortgages with prepayment penalties.

Finally, some discussion of potential bias in our estimates is warranted. Since the preemption rule affects non-OCC lenders as well (we show this in the next section), in principle our estimates might be biased either upward or downward. Upward bias would arise in the case of "business stealing," i.e. when OCC lenders attract riskier borrowers who would otherwise have borrowed from non-OCC competitors. If as a consequence of this poaching, non-OCC mortgages will less frequently display complex features, this will produce an upward bias in the estimation of the causal effect of deregulation on the supply of complex mortgages. Given the higher ex-post default rate for these complex mortgages, there may even be a potential selection of riskier borrowers into OCC lenders. Downward bias, instead, occurs when the non-OCC too begin to offer more complex mortgages after the deregulation; in this case, the differential effect of the preemption on the OCC lenders as estimated is smaller than the real effect. Two results corroborates this second case. First, we show that *controlling for borrower characteristics* (in particular, FICO score and LTV), non-OCC lenders also react to the preemption rule by making riskier loans with such features as IO, ARMs and deferred amortization. This means that even controlling for the potential selection of riskier borrowers towards OCC lenders, non-OCC lenders are actually increasing their origination of complex loans. Second, comparing Panel A and Panel B in Table 4, we see that the results

are larger when we do not control for borrower characteristics, which is consistent with the thesis that the characteristics help to control for the "business stealing" effect. Overall, to the extent that controlling for observable borrower characteristics controls for the "business stealing" effect, this evidence indicates that our estimates are biased downward.

### 5.3 Matching

Another way to alleviate the concerns about differences between national banks and other mortgage lenders is to match loans originated by OCC and non-OCC lenders. This can address the possibility of a non-linear relationship between borrower characteristics and outcome variables at different types of lender that our differences-in-difference methodology cannot control for. Adopting the nearest-neighbor matching method, we divided the FICO score into 50-point buckets, LTV into 10% buckets and loan size into \$50k buckets. We then matched with a replacement every loan originated by an OCC lender based on zip code, quarter of origination, documentation, FICO bucket, LTV bucket and size bucket. If there was more than one match, we found the closest match within each bucket, i.e. the one that minimized the distance along all the different dimensions. This approach allows us to find the closest possible match for each OCC loan among non-OCC loans and control in the most conservative way possible for all the relevant characteristics.

Our preferred specification is reported in Table 6, which shows the results for this matched sample, where the dependent variable is already the difference between the OCC and the non-OCC outcomes, so that the relevant coefficient becomes the interaction between our indicator for the post-period and our APL indicator.<sup>13</sup> The results closely resemble those of the previous section: OCC lenders are 18% more likely to impose prepayment penalties and they have significantly longer prepayment terms. We also check for the absence of any pre-trends in Figures 1 and 2 which plot the coefficient over time and show that there is no effect in the quarters prior to preemption. That is, OCC lenders' mortgages are not

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<sup>13</sup>Since we do not have a match for each loan, the sample size becomes significantly smaller.

statistically different from non-OCC lenders' inasmuch as the loans display similar features. After preemption, however, the presence of the penalties increases significantly and the term during which they apply lengthens. The effect is also quite persistent over time.

All in all the results find an exogenous component to the change in the pool of borrowers and in mortgage features between the pre- and the post-period to the post-period.

## 6 Competition and the Non-OCC Lenders' Response

We now consider whether the preemption also had an *indirect* effect on the non-OCC lenders, creating an un-level playing field whereby lenders not regulated by the OCC still had to comply with state APL laws. On the one hand, non-OCC lenders may have responded to the change in the competitive landscape by specializing in less risky borrowers and loans. In other words, the preemption rule may have heightened market segmentation, especially in regions where OCC lenders have a dominant position, deterring non-OCC lenders from competing for the same borrowers. On the other hand, non-OCC lenders could have increased their origination of loans with prepayment penalties, lengthened the penalty terms up to the level allowed by state law, or originated more complex loans, such as IO and ARMs, that were not directly governed by the APL laws. In addition, non-OCC lenders could have been more prone to take such actions in order to defend their market share in an environment where OCC lenders dominated more thoroughly. That is to say, the reaction of non-OCC lenders to the deregulation is an empirical question. We test the following hypothesis:

**Hypothesis I:** In more competitive mortgage markets, non-OCC lenders increase their issuance of riskier mortgages along the unregulated dimensions.

As a proxy for degree of competitiveness, we construct the "*Fraction OCC*", defined as the fraction of loans (by volume) originated by OCC lenders in 2003. Intuitively, if national banks have a higher market share, then non-OCC lenders might be even more adversely affected by the preemption rule as OCC lenders exploit their position to issue riskier mortgages



and capture an even higher market share. Before analyzing the non-OCC lenders origination behavior, we report in Table 7 the coefficient estimates of cross-sectional regressions relating the presence of national banks to a number of county characteristics. The fraction of loans originated by national banks is correlated with several important characteristics of the county. Less populous counties (Column 2) and those with more elastic housing supply (Column 3) and less intense securitization activity (Column 5) are those with larger fractions of loans originated by national banks. However, these correlations do not differ significantly between states with and without anti-predatory laws, as is shown by the non-significance of the coefficient on the interaction  $Fraction\ OCC \times APL_{g,2004}$ . In other words, the correlation between fraction of OCC and county characteristics does not vary with the presence or absence of a state predatory lending law. This reassures us that *Fraction OCC* does not proxy for other possibly relevant mortgage market characteristics. We address potential heterogeneity concerns in different ways. First, we exploit variation within counties and months. Second, we check that our results are robust to different measures of competition. Third, in section 7 we follow a matching procedure to minimize the differences between counties with large and small fractions of OCC activity.

Table 8 reports the effect of competition on non-OCC lending behavior. "*High Share*" is an indicator variable equal to one if the county is in the top two terciles of the OCC share distribution. Panel A shows that in counties in APL states where OCC lenders have a larger market share, non-OCC lenders respond by issuing mortgages with features not directly restricted by the law. Specifically, after the preemption they make significantly more adjustable-rate and deferred-amortization mortgages. As hypothesized, these effects are concentrated in counties where OCC lenders have larger market shares; while these patterns are not generally found in the counties where OCC lenders have little market power (Panel C), the correlation coefficients become large and significant where the measure of OCC activity is in the top two terciles (Panel B). The effects are statistically and economically significant. Specifically, we find that non-OCC lenders originate 5% more interest-only mortgages, 6%

more adjustable-rate mortgages and 6% more deferred-amortization mortgages. Interestingly, there is no significant effect on prepayment penalties or term length, which are the clauses governed by predatory lending laws. This is important as additional confirmation that non-OCC lenders form a good control group, in that they do not react along the same dimensions as the treatment group of OCC lenders.

To make sure that the issuance of complex mortgages by non-OCC banks in highly competitive counties is not driven by differential trends among counties, Figures 3-5 graph the time-series coefficients of the following regressions:

$$Y_{i,t} = \lambda_i + \eta_t + \sum_{\tau \neq t_0} \beta_{1\tau} APL_{2004} \mathbf{1}_{(\tau=t)} + \Gamma X_{i,t} + \varepsilon_{i,t},$$

where  $Y$  is a vector including our dependent variables capturing mortgage features,  $\mathbf{1}_{(\tau=t)}$  is a time dummy equal to 1 for quarter  $t$ , and  $X_{i,t}$  contains all the other main borrower controls. We normalize the coefficient  $\beta_{1,2003q3}$  – the quarter preceding the preemption rule – to zero. Note that  $APL_{2004}$  is time-invariant, equal to 1 for the states that had passed an APL by 2004 and 0 for the others. To keep the sample constant, we exclude the states that enacted APLs after 2004 ( Wisconsin, Rhode Island and Indiana). We examine only counties with a presence of OCC lenders in the top two terciles.

These event studies spotlight two points. First, in the pre-period there was no difference in the mortgage lending behavior of non-OCC lenders between states with and without APLs. In other words, the treatment group (counties in APL states) and the control group (counties in non APL states) were on parallel trends in the pre-period. Second, Figures 3-5 show the dynamics of the effects: the coefficients become significantly positive immediately following the passage of the preemption rule, which further reassures us that there are no confounding effects that coincide with the preemption rule.

These findings suggest that rather than attenuating the effects of deregulation, competition might induce even lenders not directly affected by the preemption to compete by

offering riskier and more complex mortgages. Furthermore, if as a result of fiercer competition with national banks, non-OCC lenders were offering more complex mortgages to more marginal borrowers for whom these were not optimal, then we may observe local mortgage market competition having significant consequences for borrowers' delinquency. We test the following hypothesis:

**Hypothesis II:** These complex mortgages from non-OCC lenders are also more likely to result in default in highly competitive markets.

In Table 9 we test this hypothesis and find that the complex mortgages originated after the preemption rule in states with APL laws were 5% more likely to default in counties where the presence of national banks is stronger. No such effect is found in counties where national banks do not have a dominant position, which reinforces the thesis that the results are driven by competition. Overall, it would appear that sharper competition in local credit markets induced non-OCC lenders to offer riskier mortgages (with their significantly higher default probability). Thus, the adverse effects of the deregulation were amplified rather than attenuated by the competition between different types of lender.

## 7 Further Evidence and Robustness

### 7.1 Matching Estimator

Of course, the relative competitiveness of mortgage markets is not randomly distributed, so it is hard to ascribe causality to the results presented in 6. We address endogeneity concerns in several ways. First, we have shown, above, that our results are robust to a battery of controls including county and time fixed effects, and detailed mortgage characteristics. Thus, market competition increases the likelihood of non-OCC banks' making riskier mortgage loans after the preemption in APL states even after allowing for the possibility that this sensitivity can vary with the aforementioned characteristics.

One may still object that our controls absorb only the linear effects of observable characteristics and that highly competitive counties in APL states are different from those in non-APL states. Therefore, we use a propensity score matching procedure to ensure that the counties with different degrees of competition are similar along the observable dimensions. We consider counties with OCC lending in the top two terciles and estimate the probability of a county's state having an APL, based on observable characteristics. Specifically, we match unemployment rate, fraction of households with FICO scores below 620 and below 680, average debt to income ratio, the log of median income, employment rate in different industries, the home ownership rate, and the shares of households with college and high school education all measured in 2000. We then match each high-competition county in APL states with the high-competition county in a non-APL state that has the closest propensity score and run our baseline specifications on the matched sample. Tables 10A and 10B report the results for mortgage features and defaults. We find that even on this matched sample, in more competitive markets non-OCC lenders were significantly more likely to issue ARMs and riskier mortgages with interest-only or deferred amortization clauses. Moreover, as Table 10B shows, borrowers were also significantly more likely to default on these mortgages.

As a further robustness check, we want to make sure that our results are not driven by heterogeneous price booms and busts. For instance, the regions that experienced more severe housing crashes might well also be those where competition was more intense during the boom, hence defaults more likely during the bust. To check this, for each zip code we compute the change in house prices between 2006 and 2008 and divide the zip codes into deciles of house price movement. We then rerun our specification for both mortgage origination and defaults, controlling for zip code bucket interacted with quarter fixed effects. In other words, we control for time-varying heterogeneity at zip code level; and the results are very similar (Table 10B, Panel B, Column 1). To be even more restrictive, we differentiate among types of mortgages by buckets of FICO score, LTV, and loan type and size and allow for heterogeneous trends among these loan groups within zip codes. Again, the results are

similar (Table 10B, Panel B, Column 2). This reassures us that the effect of competition is not confounded by unobserved local heterogeneity.

## 7.2 Securitization Activity

Now we can address the question of why national banks' lending became more aggressive. One possible reason is that the preemption affected their ability to securitize. In fact, there is evidence that the predatory lending laws had a substantial impact on the incentives for securitization, insofar as the market might impose tighter constraints on these lenders if they were in violation of state APL laws. In the words of one credit rating agency: "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".<sup>14</sup> Interestingly, the effect of the APL laws on securitization has been recently employed by [Keys et al. \(2010\)](#) as an instrument for the lenders' securitization activity and its effect on their screening decisions. Consistently with the credit rating concerns', they find that the incentives to screen the borrowers significantly increased during a period of strict enforcement of anti-predatory lending laws.

Table 11 reports on the test of this hypothesis with the results from the estimation of a linear probability model relating the securitization decision with the preemption ruling. We find that OCC lenders became 5% more likely to securitize, even after controlling for borrower characteristics at origination and county-by-month fixed effects. This suggests that the outward shift in the supply of complex mortgages after preemption was also due to the increased scope for these lenders, and not for non-OCC lenders, to securitize these riskier mortgages without running afoul of rating agencies' demands for credit enhancement.

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<sup>14</sup>Available at <http://www.iffr.com/Article/2026825/Predatory-lending-and-RMBS-securitizations-in-the-US.html>.

### 7.3 Competition among OCC Lenders

The main results reported in section 6 highlight one particular channel through which competition can shape banks' mortgage origination: regulated lenders – in fear of losing their market share- compete with unregulated banks by expanding mortgage origination along dimensions not specifically restrained by regulation. However, competition might also work through a different channel. Specifically, a more competitive market might directly affects the OCC lenders' response to the preemption rule. For instance, OCC lenders might have a higher incentive to originate complex mortgages in a more competitive environment to capture customers from other OCC lenders. Then, instead of investigating the competition between regulated and unregulated financial intermediaries, we compute the Herfindahl-Hirschman Index (HHI) of concentration of deposits calculated based on branch-level deposit data from the FDIC's Summary of Deposits dataset. This measure has been used extensively in the banking literature.<sup>15</sup> In Table A1, we report the correlations between this measure and several county characteristics as we did in Table 7 for the fraction of OCC.

Table A2 reports the results. We restrict the sample to loans made by OCC lenders in counties in the top two terciles of the distribution of the OCC Share measure. This makes sure that we focus on those counties where there is a sufficient presence of OCC lenders. We control for borrowers' characteristics, county and quarter fixed effects, as well as, the fraction of subprime borrowers, the fraction of low-income households and the change in house prices in the two years preceding the origination of the loan. This to make sure that our results are not confounded by other sources of heterogeneity across more or less competitive regions. Panel A reports that in highly competitive markets, OCC lenders originate a significantly higher fraction of loans with larger prepayment penalties, longer term length as well as loans with interest-only features.

For panels B and C, we also match counties without APL laws to counties with APL laws using a propensity score matching procedure. We match counties based on key observables

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<sup>15</sup>See, for instance, [Cetorelli and Strahan \(2006\)](#) and [Scharfstein and Sunderam \(2013\)](#).

such as unemployment rate, fraction subprime, median income, average debt to income, home ownership rate and college and high school graduation rate. We divide our sample of mortgages into terciles depending on the county HHI measure and show that the results hold only for the highly competitive counties (Panel B).

All in all, these results suggest that competition among lenders is a key factor affecting also the OCC lenders' response to the preemption rule.

## 8 Conclusion

In this paper, we use the pre-emption of state laws against predatory lending for banks regulated by the OCC -as a quasi-experiment to test for the effect of deregulation on the supply of complex mortgages. This was a shock that expanded the range of permissible loans by OCC-regulated lenders while leaving the set available to non-OCC lenders unchanged. This deregulation allows us to take advantage of two different sources of variation. First, we exploit the heterogeneity among OCC and non-OCC regulated mortgage originators before and after the preemption rule. Second, we can augment this approach by exploiting the fact that the preemption only affected a subset of US states, namely those that had predatory lending laws in place.

We obtain three main results. First, the supply of loans with prepayment penalties increased significantly in response to the deregulation. Prepayment penalties enable profitable use by lenders of such clauses as interest only or negative amortization. Second, while some states with APLs did not expressly restrict prepayment penalties, they did curb the length of the prepayment penalty term and we show that such terms were lengthened significantly after the preemption. Finally, we find that the quality of the OCC borrowers deteriorates significantly. These results confirm our hypothesis that the supply of complex mortgages increased in response to the deregulation.

Finally, we inquire into the potentially perverse effects of local mortgage market compe-

tition between lenders regulated by different agencies. We find that in highly competitive counties, those where OCC lenders had a higher market share, non-OCC lenders became more aggressive in originating loans with interest-only payments, deferred amortization and ARMs, all features not directly controlled by the state laws against predatory lending. What is more, the probability of default on these mortgages was significantly higher. This is all the more striking in that these non-OCC regulated lenders were not directly affected by the pre-emption ruling, which means their response can be seen as essentially an effort to defend their market position. Our evidence suggests the existence of a competition channel that triggered a “*race to the bottom*” and induced a potentially adverse response even by banks that remained subject to state regulation.



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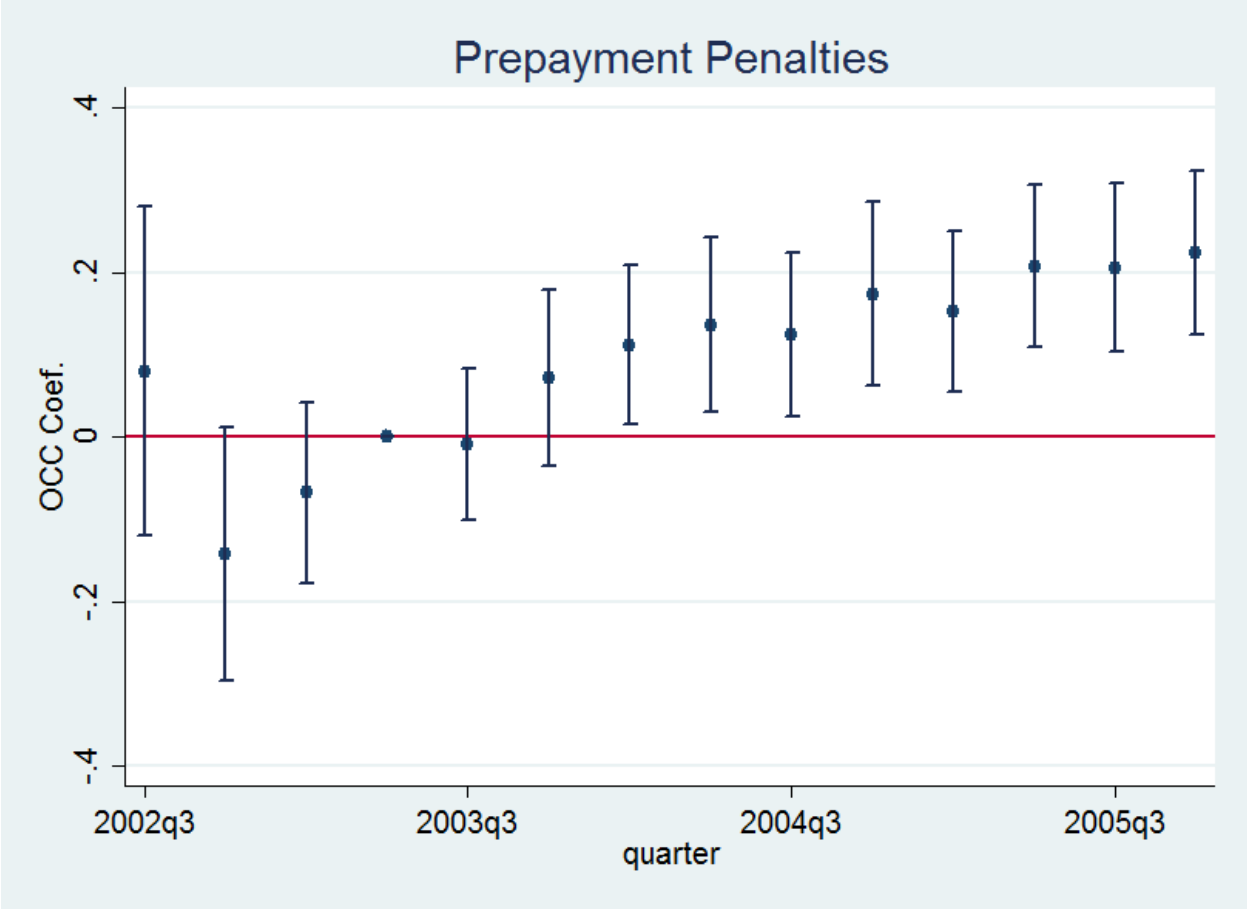


Figure 1

The figure plots the interaction coefficient of the OCC indicator with quarterly dummies relating the preemption of national banks to the issuance of mortgages with prepayment penalties.

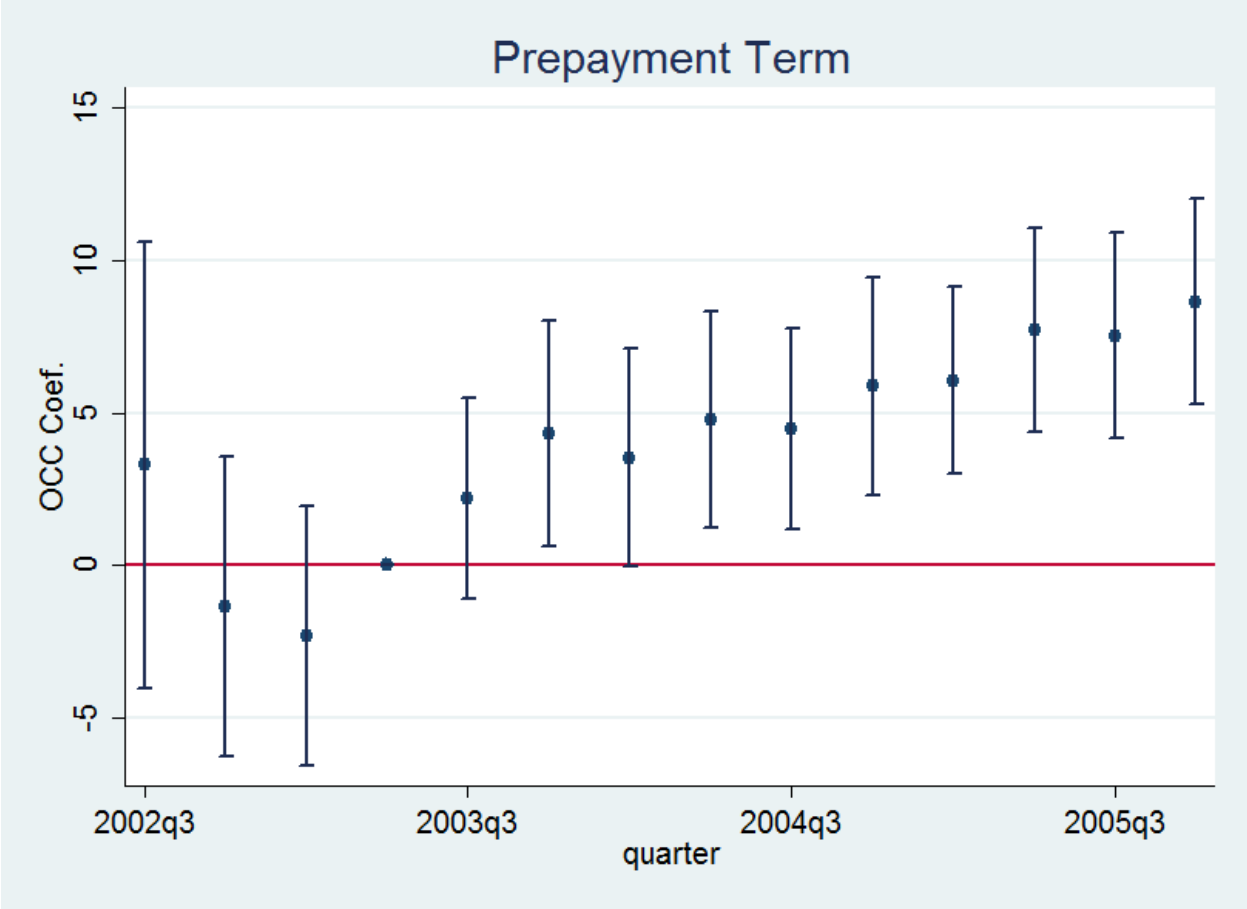


Figure 2

The figure plots the interaction coefficient of the OCC indicator with quarterly dummies relating the preemption of national banks to the issuance of mortgages with longer prepayment penalties terms.

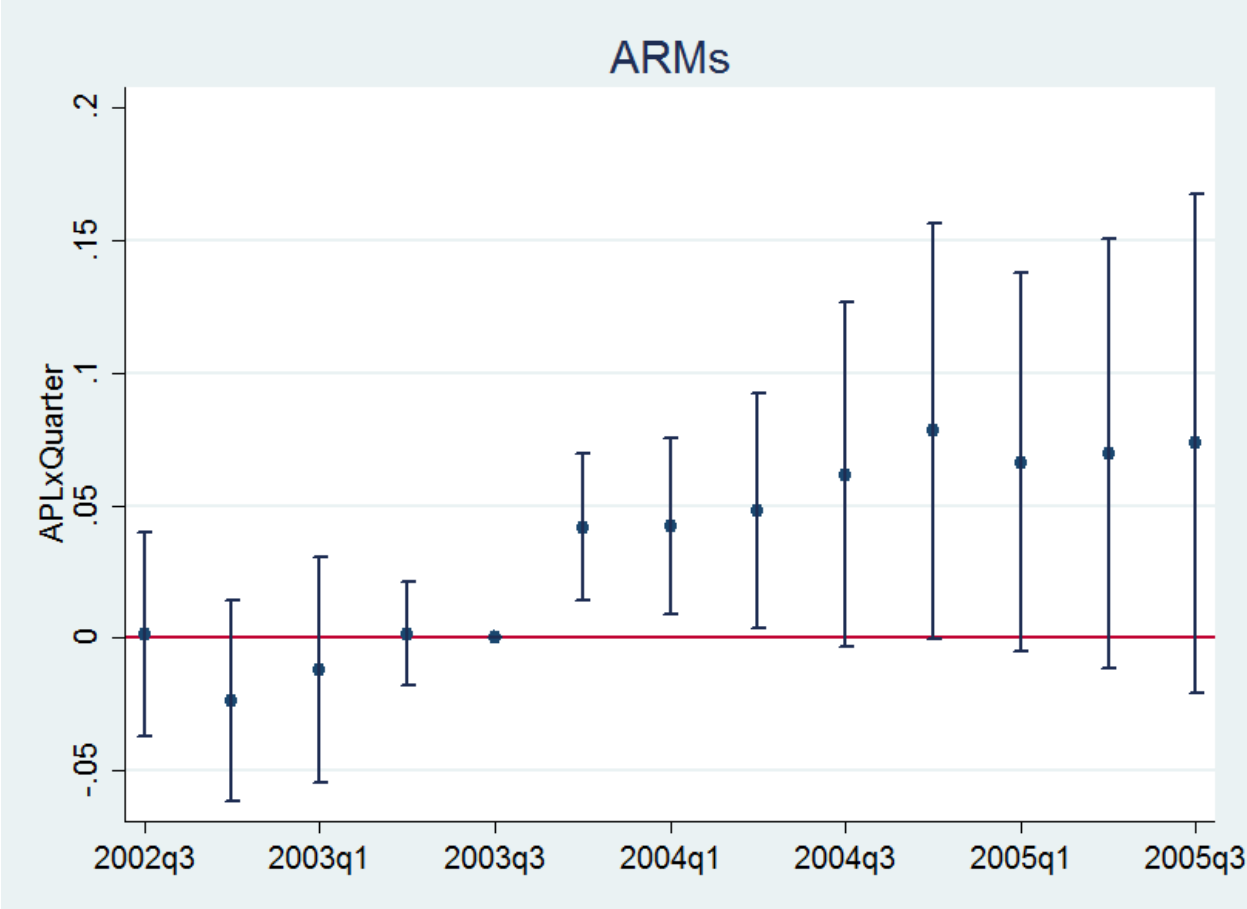


Figure 3

The figure plots the interaction coefficient of the APL indicator with quarterly dummies relating the preemption of national banks to the issuance of ARM's by non-OCC regulated banks in highly competitive counties.



Figure 4

The figure plots the interaction coefficient of the APL indicator with quarterly dummies relating the preemption of national banks to the issuance of interest-only by non-OCC regulated banks in highly competitive counties.



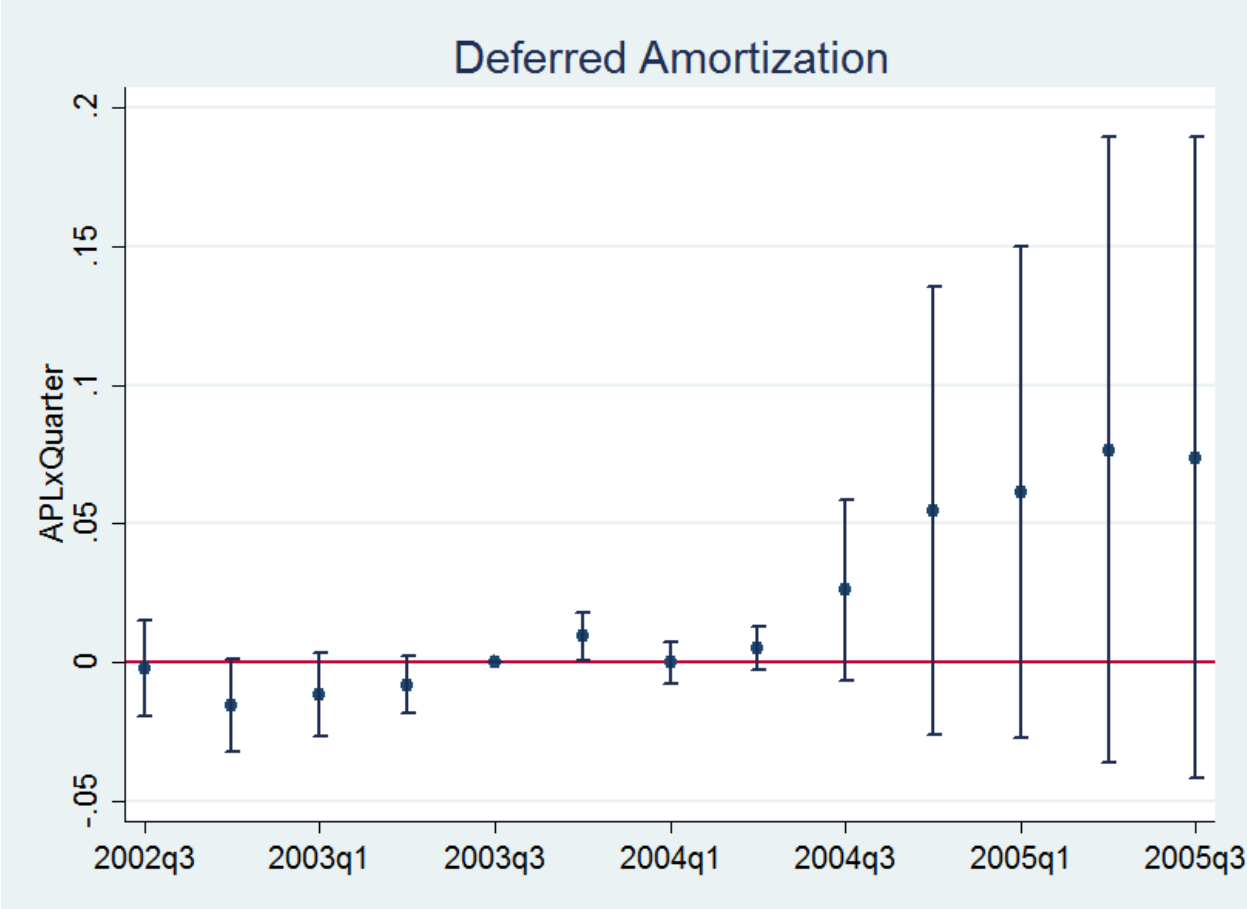


Figure 5

The figure plots the interaction coefficient of the APL indicator with quarterly dummies relating the preemption of national banks to the issuance of mortgages with deferred amortization by non-OCC regulated banks in highly competitive counties.

**Table 1A**

**Summary Statistics Loan Level (January 2001 to January 2004)**

The table below presents Summary Statistics by Regulatory Agency of Lender for Loans that were originated between and including January 2001 and January 2004. OCC refers to loans originated by national banks who were regulated by the OCC. Non-OCC includes all state chartered banks and state chartered savings and loans institutions as well as mortgage companies, funding companies and credit unions. Credit Score, LTV Ratio and Appraised Value have been winsorized at the 1st and 99th percentile. Second Lien Present is an indicator variable for whether the property had a second lien at the time of origination. PMI is an indicator variable equal to one if the mortgage had private mortgage insurance. Prepayment Penalty Term Violation is an indicator variable capturing whether a loan issued was in violation of the maximum prepayment penalty term length stipulated in the APL as classified by Bostic et al. (2009). Prepayment Penalty, Interest Only and ARM are indicator variables equal to 1 if the mortgage had each of these features respectively. Deferred Amortization is an indicator variable equal to one if the mortgage had a negative amortization or a balloon payment feature.

	<i>States with APL Laws by Feb 2004</i>				<i>States without APL Laws by Feb 2004</i>				
	OCC		Non-OCC		OCC		Non-OCC		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	SD
<b>Panel A: Covariates</b>									
CreditScore	686.875	77.632	637.305	70.406	672.037	76.971	630.697	67.892	
LTV Ratio	0.721	0.194	0.792	0.141	0.794	0.163	0.820	0.133	
Appraised Value	266642	236584	246102	180121	157455.649	134844.042	165060.516	127394.611	
Second Lien Present	0.075	0.263	0.081	0.272	0.051	0.221	0.073	0.260	
Low or No Doc	0.484	0.500	0.347	0.476	0.378	0.485	0.286	0.452	
PMI	0.146	0.353	0.121	0.326	0.148	0.355	0.148	0.355	
<b>Panel B: Loan Contract Features</b>									
Prepayment Penalty	0.177	0.382	0.275	0.447	0.332	0.471	0.367	0.482	
Prepayment Penalty Term Violation	0.120	0.325	0.167	0.373	-	-	-	-	
Deferred Amortization	0.019	0.136	0.016	0.124	0.024	0.154	0.018	0.131	
Interest Only Loan	0.013	0.113	0.036	0.187	0.003	0.056	0.016	0.126	
ARM Loan	0.224	0.417	0.549	0.498	0.222	0.416	0.536	0.499	
Observations	75112		990193		66151		773020		

**Table 1B**

**Summary Statistics Loan Level (February 2004 to December 2006)**

The table below presents Summary Statistics by Regulatory Agency of Lender for Loans that were originated between and including February 2004 and December 2006 in those states that had implemented APL laws by February 2004. OCC refers to loans originated by national banks who were regulated by the OCC. Non-OCC includes all state chartered banks and state chartered savings and loans institutions as well as mortgage companies, funding companies and credit unions. Credit Score, LTV Ratio and Appraised Value have been winsorized at the 1st and 99th percentile. Second Lien Present is an indicator variable for whether the property had a second lien at the time of origination. PMI is an indicator variable equal to one if the mortgage had private mortgage insurance. Prepayment Penalty Term Violation is an indicator variable capturing whether a loan issued was in violation of the maximum prepayment penalty term length as classified by Bostic et al. (2009). Prepayment Penalty, Interest Only and ARM are indicator variables equal to 1 if the mortgage had each of these features respectively. Deferred Amortization is an indicator variable equal to one if the mortgage had a negative amortization or a balloon payment feature.

	<i>States with APL Laws by Feb 2004</i>				<i>States without APL Laws by Feb 2004</i>				
	OCC		Non-OCC		OCC		Non-OCC		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	SD
<b>Panel A: Covariates</b>									
CreditScore	674.048	70.165	652.977	68.824	667.689	69.999	647.095	69.293	
LTV Ratio	0.758	0.150	0.781	0.127	0.787	0.133	0.803	0.121	
Appraised Value	327011	256682	342702	235484	234336.584	188550.835	240955.555	176497.628	
Second Lien Present	0.138	0.345	0.225	0.418	0.113	0.316	0.211	0.408	
Low or No Doc	0.412	0.492	0.451	0.498	0.391	0.488	0.386	0.487	
PMI	0.193	0.395	0.039	0.194	0.199	0.399	0.046	0.208	
<b>Panel B: Loan Contract Features</b>									
Prepayment Penalty	0.263	0.440	0.332	0.471	0.375	0.484	0.431	0.495	
Prepayment Penalty Term Violation	0.156	0.363	0.201	0.401	-	-	-	-	
Deferred Amortization	0.046	0.210	0.175	0.380	0.052	0.223	0.143	0.350	
Interest Only Loan	0.198	0.398	0.250	0.433	0.163	0.369	0.200	0.400	
ARM Loan	0.500	0.500	0.724	0.447	0.506	0.500	0.687	0.464	
Observations	307082		2956710		301487		2345248		

**Table 2****Effect of Pre-Emption Ruling on Borrower Quality (Diff in Diff)**

The table reports coefficient estimates from a linear probability model relating various borrower characteristics to the pre-emption ruling of national banks. The sample includes loans made in states which had implemented APL laws by 2004. The dependent variables are as follows: Column 1: Borrower's FICO score, Column 2: combined LTV ratio at origination, Column 3: Indicator variable for whether the property had a second lien at the time of origination, Column 4: Indicator variable for whether the mortgage was a Cash Out Refinance. OCC is an indicator for whether the mortgage was originated by an OCC regulated lender. APL is a time varying indicator variable for whether the state in which the loan was originated had an APL law in place at time of origination. Post is an indicator variable equal to 1 for months after January 2004. Asterisks denote significance levels (\*\*\*=1%, \*\*=5%, \*=10%).

	(1) <i>Credit Score</i>	(2) <i>CLTV</i>	(3) <i>Second Lien</i>	(4) <i>Cash Out</i>
OCC <sub>i</sub> x Post <sub>t</sub>	-40.990*** (1.357)	0.063*** (0.005)	0.040*** (0.005)	0.061*** (0.010)
OCC <sub>i</sub> X APL <sub>gt</sub>	15.648*** (4.238)	-0.062*** (0.013)	0.020*** (0.005)	-0.062*** (0.016)
OCC <sub>i</sub>	-10.159*** (3.453)	0.024*** (0.008)	-0.062*** (0.005)	-0.420*** (0.014)
Observations	4,175,298	4,315,707	4,315,707	4,315,707
R-squared	0.120	0.109	0.079	0.062
County by Month FE	Yes	Yes	Yes	Yes
Mean of Dep Var	651.5	0.806	0.183	0.450

**Table 3****Effect of Pre-Emption Ruling on Borrower Quality (Diff in Diff in Diff)**

The table reports coefficient estimates from a linear probability model relating various borrower characteristics to the pre-emption ruling of national banks. The sample includes loans made in states which with and without APL laws in place. The dependent variables are as follows: Column 1: Borrower's FICO score, Column 2: combined LTV ratio at origination, Column 3: Indicator variable for whether the property had a second lien at the time of origination, Column 4: Indicator variable for whether the mortgage was a Cash Out Refinance. OCC is an indicator for whether the mortgage was originated by an OCC regulated lender. APL is a time varying indicator variable for whether the state in which the loan was originated had an APL law in place at time of origination. Post is an indicator variable equal to 1 for months after January 2004. Standard Errors are clustered at the county level. Asterisks denote significance levels (\*\*\*=1%, \*\*=5%, \*=10%).

	(1) <i>Credit Score</i>	(2) <i>CLTV</i>	(3) <i>Second Lien</i>	(4) <i>Cash Out</i>
Post <sub>t</sub> x APL <sub>gt</sub> x OCC <sub>i</sub>	-7.977** (3.193)	0.044*** (0.009)	-0.007 (0.006)	0.077*** (0.012)
OCC <sub>i</sub> x Post <sub>t</sub>	-37.022*** (1.828)	0.029*** (0.004)	0.032*** (0.006)	-0.020** (0.008)
OCC <sub>i</sub> X APL <sub>gt</sub>	8.203** (3.387)	-0.053*** (0.013)	0.018*** (0.004)	-0.056*** (0.011)
OCC <sub>i</sub>	-16.300*** (2.104)	0.043*** (0.005)	-0.068*** (0.004)	-0.404*** (0.010)
Observations	7,554,275	7,793,625	7,793,625	7,793,625
R-squared	0.118	0.109	0.081	0.063
County by Month FE	Yes	Yes	Yes	Yes
Borrower Controls	649.0	0.817	0.177	0.444
Mean of Dep Var	9.740	0.361	0.646	0.117

**Table 4****Effect of Pre-Emption Ruling on Loan Features (Diff in Diff)**

The table reports coefficient estimates from a linear probability model relating the presence of various mortgage terms to the pre-emption ruling of national banks. The sample contains loans made in those states that implemented APL laws before February 2004. The dependent variables are as follows: Column 1: an indicator variable for whether the loan has a prepayment penalty; Column 2: indicator variable capturing whether a loan originated was in violation of the maximum prepayment penalty term length of the APL law as classified by Bostic et al. (2009); Column 3: length of the prepayment penalty term, with 0 if there is no prepayment penalty; Column 4: indicator variable for whether a loan has an ARM feature; Column 5: indicator variable for whether a loan has either negative amortization or a balloon feature. Column 6: Indicator variable for whether a mortgage had an interest only feature. OCC is an indicator for whether the mortgage was originated by an OCC regulated lender. APL is a time varying indicator variable for whether the state in which the loan was originated had an APL law in place at time of origination. Post is an indicator variable equal to 1 for months after January 2004. All columns include the following controls: the LTV ratio at origination, the Log of appraised value at origination, the borrower's FICO score, an indicator for the presence of second liens, a low or no documentation indicator, an indicator for loan purpose (i.e. cash out refinance, rate refinance or other), and an indicator for the presence of PMI. Asterisks denote significance levels (\*\*\*=1%, \*\*=5%, \*=10%).

	(1)	(2)	(3)	(4)	(5)	(6)
	<i>Prepay Pen</i>	<i>Term Violation</i>	<i>Term Length</i>	<i>ARM</i>	<i>Deferred Amort.</i>	<i>IO</i>
<b>Panel A: With Borrower Controls</b>						
OCC <sub>i</sub> x Post <sub>t</sub>	0.142*** (0.018)	0.104*** (0.016)	4.169*** (0.540)	0.114*** (0.011)	0.042*** (0.004)	-0.052*** (0.008)
OCC <sub>i</sub> X APL <sub>gt</sub>	-0.172*** (0.024)	-0.112*** (0.016)	-4.494*** (0.659)	-0.077*** (0.014)	-0.014*** (0.003)	-0.036*** (0.006)
OCC <sub>i</sub>	0.148*** (0.018)	0.090*** (0.016)	3.436*** (0.595)	-0.108*** (0.016)	0.063*** (0.011)	-0.017* (0.010)
Observations	4,177,118	3,988,453	3,974,483	4,177,118	4,177,118	4,177,118
R-squared	0.179	0.213	0.176	0.191	0.226	0.216
County by Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean of Dep Var	0.316	0.193	8.113	0.660	0.126	0.195
<b>Panel B: No Borrower Controls</b>						
OCC <sub>i</sub> x Post <sub>t</sub>	0.169*** (0.017)	0.125*** (0.018)	4.926*** (0.545)	0.212*** (0.013)	0.006** (0.003)	-0.057*** (0.007)
OCC <sub>i</sub> X APL <sub>gt</sub>	-0.140*** (0.024)	-0.089*** (0.015)	-3.470*** (0.649)	-0.104*** (0.019)	0.006* (0.004)	-0.033*** (0.007)
OCC <sub>i</sub>	-0.133*** (0.020)	-0.107*** (0.017)	-4.934*** (0.710)	0.005 (0.020)	0.015** (0.007)	0.022** (0.010)
Observations	4,329,097	4,124,261	4,108,900	4,329,097	4,329,097	4,329,097
R-squared	0.137	0.182	0.140	0.122	0.210	0.154
County by Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Controls	No	No	No	No	No	No
Mean of Dep Var	0.311	0.188	7.899	0.660	0.126	0.193

**Table 5****Effect of Pre-Emption Ruling on Loan Features (Diff in Diff in Diff)**

The table reports coefficient estimates from a linear probability model relating the presence of various mortgage terms to the pre-emption ruling of national banks. The sample contains loans made in those states with and without APL laws. The dependent variables are as follows: Column 1: an indicator variable for whether the loan has a prepayment penalty; Column 2: length of the prepayment penalty term, with 0 if there is no prepayment penalty; Column 3: indicator variable for whether a loan has an ARM feature; Column 4: indicator variable for whether a loan has either negative amortization or a balloon feature. Column 5: Indicator variable for whether a mortgage had an interest only feature. OCC is an indicator for whether the mortgage was originated by an OCC regulated lender. APL is a time varying indicator variable for whether the state in which the loan was originated had an APL law in place at time of origination. Post is an indicator variable equal to 1 for months after January 2004. All columns include the following controls: the LTV ratio at origination, the Log of appraised value at origination, the borrower's FICO score, an indicator for the presence of second liens, a low or no documentation indicator, an indicator for loan purpose (i.e. cash out refinance, rate refinance or other), and an indicator for the presence of PMI. Asterisks denote significance levels (\*\*=1%, \*=5%, \*=10%).

	(1) <i>Prepay Pen</i>	(2) <i>Term Length</i>	(3) <i>ARM</i>	(4) <i>Deferred Amort.</i>	(5) <i>IO</i>
<b>Panel A: All Counties</b>					
Post <sub>t</sub> x APL <sub>gt</sub> x OCC <sub>i</sub>	0.150*** (0.016)	4.634*** (0.438)	0.010 (0.010)	-0.010 (0.008)	0.020** (0.009)
OCC <sub>i</sub> x Post <sub>t</sub>	0.024* (0.013)	0.666 (0.476)	0.107*** (0.007)	0.040*** (0.006)	-0.050*** (0.008)
OCC <sub>i</sub> X APL <sub>gt</sub>	-0.102*** (0.024)	-2.686*** (0.622)	-0.034*** (0.008)	-0.010*** (0.003)	-0.031*** (0.005)
OCC <sub>i</sub>	0.149*** (0.015)	-7.886*** (0.138)	-0.130*** (0.012)	0.042*** (0.008)	-0.014** (0.006)
Observations	7,555,361	7,169,712	7,555,361	7,555,361	7,555,361
R-squared	0.177	0.177	0.188	0.207	0.213
County by Month FE	Yes	Yes	Yes	Yes	Yes
Borrower Controls	Yes	Yes	Yes	Yes	Yes
Mean of Dep Var	0.361	9.740	0.646	0.117	0.176
<b>Panel B: Counties on the Border</b>					
Post <sub>t</sub> x APL <sub>gt</sub> x OCC <sub>i</sub>	0.150*** (0.022)	5.078*** (0.643)	-0.009 (0.016)	-0.007 (0.015)	0.016* (0.010)
OCC <sub>i</sub> x Post <sub>t</sub>	-0.003 (0.019)	-0.565 (0.735)	0.114*** (0.011)	0.039*** (0.009)	-0.053*** (0.009)
OCC <sub>i</sub> X APL <sub>gt</sub>	-0.105*** (0.028)	-3.115*** (0.718)	-0.017 (0.016)	-0.006 (0.004)	-0.028*** (0.006)
OCC <sub>i</sub>	0.139*** (0.027)	3.152*** (0.890)	-0.137*** (0.018)	0.046*** (0.014)	-0.000 (0.008)
APL <sub>gt</sub>	-0.029** (0.012)	-0.599 (0.437)	0.019* (0.010)	0.002 (0.006)	0.006 (0.005)
Observations	2,422,382	2,311,157	2,422,382	2,422,382	2,422,382
R-squared	0.181	0.184	0.181	0.191	0.208
Border County Pair by Month FE	Yes	Yes	Yes	Yes	Yes
Borrower Controls	Yes	Yes	Yes	Yes	Yes
Mean of Dep Var	0.330	8.705	0.649	0.111	0.166

**Table 6****Effect of Pre-Emption Ruling on Loan Features (Diff in Diff in Diff)**

The table reports coefficient estimates from a linear probability model relating the presence of various mortgage terms to the pre-emption ruling of national banks. The sample contains loans made in those states with and without APL laws. We employ the nearest-neighbor matching method to match each loan originated by OCC-regulated lender to a loan originated by a non-OCC lender. We constructed 50-points buckets for the FICO score, 10% buckets for the loan-to-value ratio and \$50k buckets for the loan size. We then match with replacement each loan originated by OCC lenders based on ZIP code, quarter of origination, documentation, FICO bucket, LTV bucket and size bucket. The dependent variables are as follows: Column 1: an indicator variable for whether the loan has a prepayment penalty; Column 2: length of the prepayment penalty term, with 0 if there is no prepayment penalty; Column 3: indicator variable for whether a loan has an ARM feature; Column 4: indicator variable for whether a loan has either negative amortization or a balloon feature. Column 5: Indicator variable for whether a mortgage had an interest only feature. APL is a time varying indicator variable for whether the state in which the loan was originated had an APL law in place at time of origination. Post is an indicator variable equal to 1 for months after January 2004. Asterisks denote significance levels (\*\*=1%, \*\*\*=5%, \*=10%).

	(1) <i>Prepay Pen</i>	(2) <i>Term Length</i>	(3) <i>ARM</i>	(4) <i>Deferred Amort.</i>	(5) <i>IO</i>
Post <sub>t</sub> x APL <sub>gt</sub>	0.180*** (0.056)	5.646*** (1.807)	-0.006 (0.021)	-0.019 (0.014)	0.025 (0.016)
APL <sub>gt</sub>	-0.133*** (0.050)	-3.781** (1.710)	-0.006 (0.018)	-0.005 (0.004)	-0.013 (0.013)
Observations	108,592	97,717	108,592	108,592	108,592
R-squared	0.057	0.074	0.009	0.029	0.013
Month FE	Yes	Yes	Yes	Yes	Yes

**Table 7****Examining the Competition Measure (Fraction OCC in 2003)**

The table reports coefficient estimates of weighted cross-sectional regressions relating the county level covariates to our measure of competition- the fraction OCC lending in each county between, and including, 2001 and 2003 in the ABSNet sample. The dependent variables are as follows. Column 1: Fraction of Subprime is estimated from HMDA as the fraction of originations to borrowers with FICO Score below 680; Column 2: The log of the County Population as at 2003; Column 3: A measure of elasticity of housing supply provided by Saiz (2010); Column 4: Fraction Securitized, estimated by dividing the number of loans in the BlackBox data on private securitizations by the total number of loans for each county in HMDA as at 2003; Column 5: Log of the County's Median Income. "APL in 2004" is equal to 1 if the state has an anti-predatory-lending law in place by 2004 and zero otherwise. High OCC Share is an indicator variable equal to 1 if the county's fraction of lending by OCC lenders was in the top two terciles of the distribution of this measure. All regressions are weighted by the number of loans in ABSNet for each county between 2001 and 2003. Standard errors are clustered at the county level. Asterisks denote significance levels (\*\*=1%, \*=5%, \*=10%).

	(1) <i>Fraction of Subprime</i>	(2) <i>Ln(Population)</i>	(3) <i>Elasticity</i>	(4) <i>Fraction Securitized</i>	(5) <i>Ln(Median Income)</i>
APL in 2004 <sub>g</sub> x High OCC Share <sub>c</sub>	0.026 (0.022)	-0.296 (0.405)	-0.326 (0.211)	0.002 (0.024)	-0.035 (0.044)
APL in 2004 <sub>g</sub>	-0.009 (0.016)	0.743** (0.363)	0.040 (0.157)	0.059*** (0.019)	0.081** (0.033)
High OCC Share <sub>c</sub>	-0.014 (0.014)	-0.744*** (0.212)	1.033*** (0.120)	-0.038*** (0.007)	-0.024 (0.027)
Constant	0.453*** (0.012)	12.709*** (0.190)	1.309*** (0.078)	0.133*** (0.007)	10.659*** (0.022)
Observations	2,665	2,167	768	2,117	2,167
R-squared	0.005	0.143	0.185	0.156	0.032



**Table 8**  
**Competition and Loan Features Unmatched Sample (Non-OCC Lenders)**

The table below reports coefficient estimates of regressions relating the pre-emption of state anti-predatory lending laws for national banks and features of mortgages originated. The sample contains loans originated in states with and without APL laws. We further restrict the sample to loans made by non-OCC lenders. The dependent variables are as follows: Column 1: Indicator variable for whether a mortgage had an interest only feature; Column 2: indicator variable for whether a loan has an ARM feature; Column3: indicator variable for whether a loan has either negative amortization or a balloon feature; Column 4: length of the prepayment penalty term, with 0 if there is no prepayment penalty; Column 5: an indicator variable for whether the loan has a prepayment penalty. We divide our sample of mortgages into terciles depending on the share of OCC lending in the county of origination between 2001 and 2003 based on the ABSNet Sample. High Share is an indicator variable equal to one if the loan was originated in a county in the top two terciles of the distribution of this measure. APL is a time varying indicator variable for whether the state in which the loan was originated had an APL law in place at time of origination. Post is an indicator variable equal to 1 for months after January 2004. Fraction<680 measures the share of borrowers in a county with FICO below 680.  $\Delta$  House Price Index measures the zip code level house price change between two years prior to origination of mortgage  $i$ , and the date of origination. Panel B performs the regression only on the sample of loans with High Share=1. Panel C performs the regression for loans with High Share=0. All columns include the following controls: the LTV ratio at origination, the Log of appraised value at origination, the borrower's FICO score, an indicator for the presence of second liens, a low or no documentation indicator, an indicator for loan purpose (i.e. cash out refinance, rate refinance or other), and an indicator for the presence of PMI. Additionally, we control for a High Share specific time trend. Standard errors are clustered at the county level. Asterisks denote significance levels (\*\*=1%, \*\*\*=5%, \*=10%).

	(1)	(2)	(3)	(4)	(5)
	<i>IO</i>	<i>ARM</i>	<i>Deferred Amort.</i>	<i>Term Length</i>	<i>Prepay Pen.</i>
<b>Panel A</b>					
Post <sub>t</sub> x APL <sub>st</sub> x High Share <sub>c</sub>	0.033 (0.030)	0.097*** (0.031)	0.074*** (0.025)	0.604 (0.742)	0.032* (0.019)
APL <sub>st</sub> x High Share <sub>c</sub>	0.016 (0.023)	-0.016 (0.018)	0.000 (0.017)	0.443 (0.715)	0.022 (0.019)
Post <sub>t</sub> x High Share <sub>c</sub>	-0.006 (0.019)	-0.044** (0.022)	-0.048** (0.020)	-0.212 (0.579)	-0.022 (0.017)
Post <sub>t</sub> x APL <sub>st</sub>	0.008 (0.023)	-0.039 (0.025)	-0.007 (0.019)	0.149 (0.549)	-0.014 (0.015)
APL <sub>st</sub>	-0.010 (0.020)	-0.017 (0.014)	-0.040*** (0.015)	-3.702*** (0.635)	-0.127*** (0.016)
Post <sub>t</sub> x Fraction < FICO 680 <sub>c</sub>	-0.126 (0.099)	-0.082 (0.064)	-0.271*** (0.068)	-3.829** (1.777)	-0.134** (0.057)
Post <sub>t</sub> x Ln(Median Income) <sub>c</sub>	0.048 (0.037)	0.004 (0.013)	0.009 (0.013)	-0.300 (0.379)	-0.016 (0.014)
$\Delta$ House Price Index <sub>it,-24</sub>	0.113*** (0.019)	0.067*** (0.016)	0.025 (0.027)	-0.990 (0.681)	0.002 (0.023)
Observations	5,396,577	5,396,577	5,396,577	5,100,560	5,396,577
R-squared	0.185	0.130	0.186	0.141	0.145
High Share Trend	Yes	Yes	Yes	Yes	Yes
Mean of Dep Var	0.202	0.682	0.136	10.02	0.373
<b>Panel B: High OCC Share</b>					
Post <sub>t</sub> x APL <sub>st</sub>	0.042** (0.021)	0.058*** (0.016)	0.067*** (0.016)	0.813 (0.501)	0.020 (0.013)
APL <sub>st</sub>	0.006 (0.010)	-0.034*** (0.011)	-0.041*** (0.008)	-3.345*** (0.337)	-0.107*** (0.010)
Post <sub>t</sub> x Fraction < FICO 680 <sub>c</sub>	-0.177 (0.115)	-0.196** (0.079)	-0.378*** (0.093)	-7.177*** (2.097)	-0.256*** (0.072)
Post <sub>t</sub> x Ln(Median Income) <sub>c</sub>	0.053 (0.043)	0.021 (0.014)	0.022 (0.019)	-0.583 (0.467)	-0.022 (0.017)
$\Delta$ House Price Index <sub>it,-24</sub>	0.140*** (0.021)	0.065*** (0.017)	0.013 (0.038)	-1.389* (0.839)	0.004 (0.029)
Observations	3,528,219	3,528,219	3,528,219	3,330,969	3,528,219
R-squared	0.191	0.137	0.189	0.131	0.139
Mean of Dep Var	0.214	0.677	0.139	10.24	0.379
<b>Panel C: Low OCC Share</b>					
Post <sub>t</sub> x APL <sub>st</sub>	0.002 (0.022)	-0.035* (0.018)	-0.003 (0.015)	-0.363 (0.509)	-0.032** (0.014)
APL <sub>st</sub>	-0.007 (0.016)	-0.008 (0.013)	-0.030** (0.014)	-3.094*** (0.612)	-0.108*** (0.015)
Post <sub>t</sub>	-0.326 (0.824)	0.910* (0.548)	0.666 (0.463)	-33.915* (18.217)	-0.872 (0.641)
Post <sub>t</sub> x Fraction < FICO 680 <sub>c</sub>	-0.017 (0.228)	0.046 (0.145)	-0.134 (0.132)	7.739* (4.262)	0.259** (0.123)
Post <sub>t</sub> x Ln(Median Income) <sub>c</sub>	0.035 (0.069)	-0.082* (0.047)	-0.055 (0.039)	2.953* (1.576)	0.073 (0.056)
$\Delta$ House Price Index <sub>it,-24</sub>	0.045 (0.038)	0.056 (0.039)	0.036 (0.032)	-0.486 (1.259)	-0.018 (0.039)
Observations	1,868,358	1,868,358	1,868,358	1,769,591	1,868,358
R-squared	0.170	0.119	0.181	0.163	0.156
Mean of Dep Var	0.178	0.691	0.129	9.596	0.361
<b>For Panels A, B and C</b>					
County FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
Borrower Controls	Yes	Yes	Yes	Yes	Yes

**Table 9**  
**Competition and Mortgage Delinquency Unmatched Sample**

The table below reports coefficient estimates of regressions relating the pre-emption of state anti-predatory lending laws for national banks and the probability of serious delinquency. The sample contains loans originated in states with and without APL laws. We further restrict the sample to loans made by non-OCC regulated lenders. The dependent variable in each regression is an indicator variable equal to one if the mortgage became 90+ days delinquent at any point in its history prior to December 2009. We divide our sample of mortgages into terciles depending on the share of OCC lending in the county of origination between 2001 and 2003 based on the ABSNet Sample. High Share is an indicator variable equal to one if the loan was originated in a county in the top two terciles of the distribution of this measure. APL is a time varying indicator variable for whether the state in which the loan was originated had an APL law in place at time of origination. Post is an indicator variable equal to 1 for months after January 2004. In Panel B, Complex is an indicator variable for whether the mortgage has an IO or Deferred Amortization feature. Column (1) considers the sample of loans in the lowest tercile of the Fraction of OCC lending measure. Column (2) considers the sample of loans in the highest two terciles. All columns include the following controls: updated LTV as at December 2009 (we estimate a new LTV based on an updated property value using a zip code level House Price Index, and under the assumption that the loan survived until December 2009), the Log of appraised value at origination, the borrower's FICO score, an indicator for the presence of second liens, a low or no documentation indicator, an indicator for loan purpose (i.e. cash out refinance, rate refinance or other), and an indicator for the presence of PMI. Standard errors are clustered at the county level. Asterisks denote significance levels (\*\*=1%, \*\*\*=5%, \*=10%).

	<i>Non-OCC Sample</i>			
	(1) Low Share	(2) Low Share	(3) High Share	(4) High Share
Complex <sub>i</sub> x APL <sub>gt</sub> x Post <sub>t</sub>	0.034 (0.025)	0.026 (0.022)	0.050*** (0.017)	0.037*** (0.014)
Complex <sub>i</sub> x APL <sub>gt</sub>	-0.030** (0.014)	-0.031** (0.014)	-0.038*** (0.010)	-0.032*** (0.008)
Complex <sub>i</sub> x Post <sub>t</sub>	0.008 (0.012)	0.015 (0.010)	0.017 (0.011)	0.020* (0.011)
Post <sub>t</sub> x APL <sub>gt</sub>	0.017 (0.014)	0.016 (0.011)	0.019** (0.007)	0.014** (0.007)
APL <sub>gt</sub>	-0.006 (0.012)	-0.024** (0.011)	-0.014** (0.007)	-0.019*** (0.006)
Complex <sub>i</sub>	0.027*** (0.006)	0.025*** (0.006)	0.020*** (0.005)	0.019*** (0.005)
Post <sub>t</sub> x Fraction < FICO 680 <sub>c</sub>		-0.168* (0.095)		-0.169*** (0.062)
Post <sub>t</sub> x Ln(Median Income) <sub>c</sub>		-0.078** (0.031)		0.015 (0.010)
Δ House Price Index <sub>it,-24</sub>		-0.186** (0.072)		-0.142*** (0.050)
Observations	1,868,358	1,868,358	3,528,219	3,528,219
R-Square	0.171	0.172	0.165	0.166
County FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Borrower Controls	Yes	Yes	Yes	Yes
Mean of Dep Var	0.289	0.289	0.265	0.265

**Table 10A**

**Competition and Loan Features Matched Sample (Non-OCC Lenders)**

The table below reports coefficient estimates of weighted regressions relating the pre-emption of state anti-predatory lending laws for national banks and features of mortgages originated. The sample contains loans originated in states with and without APL laws. We match counties without APL laws to counties with APL laws using a propensity score matching procedure. We match counties based on key observables such as unemployment rate, fraction subprime, median income, average debt to income, home ownership rate and college and high school graduation rate. We further restrict the sample to loans made by non-OCC lenders. The dependent variables are as follows: Column 1: Indicator variable for whether a mortgage had an interest only feature; Column 2: indicator variable for whether a loan has an ARM feature; Column3: indicator variable for whether a loan has either negative amortization or a balloon feature; Column 4: length of the prepayment penalty term, with 0 if there is no prepayment penalty; Column 5: an indicator variable for whether the loan has a prepayment penalty. We divide our sample of mortgages into terciles depending on the share of OCC lending in the county of origination between 2001 and 2003 based on the ABSNet Sample. High Share is an indicator variable equal to one if the loan was originated in a county in the top two terciles of the distribution of this measure. APL is a time varying indicator variable for whether the state in which the loan was originated had an APL law in place at time of origination. Post is an indicator variable equal to 1 for months after January 2004. Panel B performs the regression only on the sample of loans with High Share=1. Panel C performs the regression for loans with High Share=0. All columns include the following controls: the LTV ratio at origination, the Log of appraised value at origination, the borrower's FICO score, an indicator for the presence of second liens, a low or no documentation indicator, an indicator for loan purpose (i.e. cash out refinance, rate refinance or other), and an indicator for the presence of PMI. Standard errors are clustered at the county level. Asterisks denote significance levels (\*\*\*=1%, \*\*=5%, \*=10%).

	(1)	(2)	(3)	(4)	(5)
	<i>IO</i>	<i>ARM</i>	<i>Deferred Amort.</i>	<i>Term Length</i>	<i>Prepay Pen.</i>
<b>Panel A: High OCC Share Matched Sample</b>					
Post <sub>t</sub> x APL <sub>gt</sub>	0.041** (0.020)	0.058*** (0.016)	0.062*** (0.017)	0.587 (0.490)	0.015 (0.013)
APL <sub>gt</sub>	0.015 (0.011)	-0.024** (0.012)	-0.029*** (0.010)	-3.251*** (0.340)	-0.105*** (0.011)
Post <sub>t</sub>	0.024* (0.015)	0.010 (0.015)	-0.033** (0.014)	0.707* (0.386)	0.001 (0.013)
Δ House Price Index <sub>it,t-24</sub>	0.122*** (0.021)	0.057*** (0.019)	0.010 (0.039)	-1.671* (0.959)	-0.003 (0.033)
Observations	3,460,002	3,460,002	3,460,002	3,266,850	3,460,002
R-squared	0.189	0.138	0.190	0.131	0.140
County FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
Borrower Controls	Yes	Yes	Yes	Yes	Yes
Mean of Dep Var	0.214	0.678	0.139	9.890	0.368
<b>Panel B: Low OCC Share Matched Sample</b>					
Post <sub>t</sub> x APL <sub>gt</sub>	0.003 (0.025)	-0.038* (0.023)	-0.012 (0.018)	0.023 (0.451)	-0.021* (0.012)
APL <sub>gt</sub>	-0.005 (0.022)	-0.012 (0.015)	-0.022 (0.017)	-3.524*** (0.624)	-0.123*** (0.016)
Δ House Price Index <sub>it,t-24</sub>	0.042 (0.037)	0.064* (0.037)	0.031 (0.030)	-0.328 (1.193)	-0.016 (0.034)
Observations	1,864,736	1,864,736	1,864,736	1,766,207	1,864,736
R-squared	0.170	0.121	0.180	0.165	0.158
County FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
Borrower Controls	Yes	Yes	Yes	Yes	Yes
Mean of Dep Var	0.176	0.690	0.128	9.194	0.350

**Table 10B****Competition and Mortgage Delinquency Matched Sample (Non-OCC Lenders)**

The table below reports coefficient estimates of regressions relating the pre-emption of state anti-predatory lending laws for national banks and the probability of serious delinquency. The sample contains loans originated in states with and without APL laws. We further restrict the sample to loans made by non-OCC lenders. We match counties without APL laws to counties with APL laws using a propensity score matching procedure. We match counties based on key observables such as unemployment rate, fraction subprime, median income, average debt to income, home ownership rate and college and high school graduation rate. We further restrict the sample to loans made by non-OCC regulated lenders. The dependent variable in each regression is an indicator variable equal to one if the mortgage became 90+ days delinquent at any point in its history prior to December 2009. We divide our sample of mortgages into terciles depending on the share of OCC lending in the county of origination between 2001 and 2003 based on the ABSNet Sample. High Share is an indicator variable equal to one if the loan was originated in a county in the top two terciles of the distribution of this measure. APL is a time varying indicator variable for whether the state in which the loan was originated had an APL law in place at time of origination. Post is an indicator variable equal to 1 for months after January 2004. Complex is an indicator variable for whether the mortgage has an IO or Deferred Amortization feature. Column (1) considers the sample of loans in the lowest tercile of the Fraction of OCC lending measure. Column (2) considers the sample of loans in the highest two terciles. All columns include the following controls: updated LTV as at December 2009 (we estimate a new LTV based on an updated property value using a zip code level House Price Index, and under the assumption that the loan survived until December 2009), the Log of appraised value at origination, the borrower's FICO score, an indicator for the presence of second liens, a low or no documentation indicator, an indicator for loan purpose (i.e. cash out refinance, rate refinance or other), and an indicator for the presence of PMI. In Panel B we compute for each zip code the house price change between 2006 and 2008 and we divide zip codes in deciles of house price movements. In Column 1 we control for zip code bucket interacted with quarter fixed effects. In Column 2, we differentiate among different type of mortgages based on the buckets of FICO score, LTV, loan type and size and allow for heterogeneous trends for these different loan groups within zip codes. Standard errors are clustered at the county level. Asterisks denote significance levels (\*\*\*=1%, \*\*=5%, \*=10%).

*Panel A*

	<i>Non-OCC Sample</i>	
	(1) <i>Low Share</i>	(2) <i>High Share</i>
Complex <sub>i</sub> x APL <sub>gt</sub> x Post <sub>t</sub>	0.031 (0.024)	0.047*** (0.016)
Complex <sub>i</sub> x APL <sub>gt</sub>	-0.034** (0.015)	-0.037*** (0.008)
Complex <sub>i</sub> x Post <sub>t</sub>	0.013 (0.011)	0.016 (0.012)
Post <sub>t</sub> x APL <sub>gt</sub>	0.003 (0.014)	0.011 (0.007)
APL <sub>gt</sub>	-0.017 (0.014)	-0.012* (0.006)
Complex <sub>i</sub>	0.026*** (0.006)	0.020*** (0.005)
$\Delta$ House Price Index <sub>it,t-24</sub>	-0.204*** (0.070)	-0.159*** (0.049)
Observations	1,864,736	3,460,002
R-Square	0.170	0.163
County FE	Yes	Yes
Quarter FE	Yes	Yes
Borrower Controls	Yes	Yes
Mean of Dep Var	0.288	0.264

*Panel B*

	(1) <i>90+ Days High Share</i>	(2) <i>90+ Days High Share</i>
$\text{Complex}_i \times \text{APL}_{\text{gt}} \times \text{Post}_t$	0.048*** (0.012)	0.031*** (0.010)
$\text{Complex}_i$	0.018*** (0.005)	0.016*** (0.005)
Observations	3,525,504	3,525,504
R-Square	0.165	0.208
Zip Code Group by Quarter FE	Yes	No
Zip Code-Loan Group by Quarter FE	No	Yes
Borrower Controls	Yes	Yes

**Table 11****Increase in Private Securitization by OCC Lenders**

The model estimates the effect of the pre-emption on the probability that an originated loan was sold to an entity other than the GSEs . The regression sample is conventional originated (HMDA action code=1) loans in HMDA between and including 2001 to 2006. Columns 1 and 2 consider a the subset of loans originated in those states that had APL laws in place by year 2004. The dependent variable is an indicator variable equal to one if the loan is recorded as being sold to an entity other than a GSE (HMDA purchase code>4). OCC is an indicator variable equal to 1 whenever the lender in HMDA is regulated by the OCC. APL is an indicator for whether the state in which the loan was originated had an APL in place at the year of origination. Post is an indicator variable equal to 1 for all years 2004 and beyond. Control variables include dummy variables for race, occupancy status, loan purpose and property type. Standard errors are clustered at the county level. Asterisks denote significance levels (\*\*\*=1%, \*\*=5%, \*=10%).

	(1)	(2)	(3)	(3)
	<i>DD</i>	<i>DD</i>	<i>DDD</i>	<i>DDD</i>
$OCC_i \times Post_t \times APL_{gt}$			0.051***	0.057***
			(0.007)	(0.007)
$OCC_i \times Post_t$	0.055***	0.018**	0.014***	-0.011*
	(0.006)	(0.008)	(0.004)	(0.006)
$OCC_i \times APL_{gt}$	-0.064***	-0.102***	-0.060***	-0.058***
	(0.006)	(0.009)	(0.006)	(0.007)
$OCC_i$	-0.215***		-0.218***	
	(0.005)		(0.004)	
Observations	36,055,095	36,055,095	76,376,527	76,376,527
R-squared	0.131	0.234	0.129	0.228
County by Year FE	Yes	Yes	Yes	Yes
Agency Trends	No	Yes	No	Yes
Borrower Controls	Yes	Yes	Yes	Yes
Mean of Dep Var	0.416	0.416	0.387	0.387

**Table A1**

**Examining the Competition Measure (HHI based on Deposits 2003)**

The table reports coefficient estimates of weighted cross-sectional regressions relating the county level covariates to our measure of competition- a Herfindahl Hirschman Index at the county level based on the Summary of Deposits from the FDIC. The dependent variables are as follows. Column 1: Fraction of Subprime is estimated from HMDA as the fraction of originations to borrowers with FICO Score below 680; Column 2: The log of the County Population as at 2003; Column 3: A measure of elasticity of housing supply provided by Saiz (2010); Column 4: Fraction Securitized, estimated by dividing the number of loans in the BlackBox data on private securitizations by the total number of loans for each county in HMDA as at 2003; Column 5: Log of the County's Median Income. "APL in 2004" is equal to 1 if the state has an anti-predatory-lending law in place by 2004 and zero otherwise. Low HHI Share is an indicator variable equal to 1 if the county's HHI index was in the bottom two terciles of this measure (i.e. in less concentrated, more competitive areas). The regressions are weighted by county population as of 2003. Standard errors are clustered at the county level. Asterisks denote significance levels (\*\*=1%, \*=5%, \*=10%).

	(1)	(2)	(3)	(4)	(5)
	<i>Fraction of Subprime</i>	<i>Ln(Population)</i>	<i>Elasticity</i>	<i>Fraction Securitized</i>	<i>Ln(Median Income)</i>
APL in 2004 <sub>g</sub> x Low HHI <sub>c</sub>	-0.010 (0.019)	0.354 (0.580)	-1.205* (0.621)	0.061*** (0.021)	0.064 (0.064)
APL in 2004 <sub>g</sub>	0.024 (0.016)	0.351 (0.527)	0.939 (0.605)	0.006 (0.016)	0.005 (0.061)
Low HHI <sub>c</sub>	-0.047*** (0.013)	1.635*** (0.382)	-0.131 (0.508)	0.002 (0.011)	0.114** (0.045)
Constant	0.486*** (0.011)	10.712*** (0.366)	2.016*** (0.502)	0.108*** (0.010)	10.535*** (0.043)
Observations	2,217	2,217	769	2,160	2,217
R-squared	0.018	0.116	0.034	0.126	0.039

**Table A2**

**HHI Measure and Loan Features (OCC Lenders)**

The table below reports coefficient estimates regressions relating the pre-emption of state anti-predatory lending laws for national banks and features of mortgages originated. The sample contains loans originated in states with and without APL laws. We further restrict the sample to loans made by OCC lenders in counties in the top two terciles of the distribution of the OCC Share measure. For panels B and C, we match counties without APL laws to counties with APL laws using a propensity score matching procedure. We match counties based on key observables such as unemployment rate, fraction subprime, median income, average debt to income, home ownership rate and college and high school graduation rate. The dependent variables are as follows: Column 1: Indicator variable for whether a mortgage had an interest only feature; Column 2: indicator variable for whether a loan has an ARM feature; Column 3: indicator variable for whether a loan has either negative amortization or a balloon feature; Column 4: length of the prepayment penalty term, with 0 if there is no prepayment penalty; Column 5: an indicator variable for whether the loan has a prepayment penalty. We divide our sample of mortgages into terciles depending on the county HHI measure based on the summary of deposits from the FDIC. Low HHI is an indicator variable equal to one if the loan was originated in a county in the bottom two terciles of the distribution of this measure. APL is a time varying indicator variable for whether the state in which the loan was originated had an APL law in place at time of origination. Post is an indicator variable equal to 1 for months after January 2004. Fraction<680 measures the share of borrowers in a county with FICO below 680. Additionally, we control for a Low HHI specific time trend. Panel B performs the regression only on the sample of loans with Low HHI=1. Panel C performs the regression for loans with Low HHI=0. All columns include the following controls: the LTV ratio at origination, the Log of appraised value at origination, the borrower's FICO score, an indicator for the presence of second liens, a low or no documentation indicator, an indicator for loan purpose (i.e. cash out refinance, rate refinance or other), and an indicator for the presence of PMI. Standard errors are clustered at the county level. Asterisks denote significance levels (\*\*\*)=1%, (\*\*)=5%, (\*)=10%.

	(1)	(2)	(3)	(4)	(5)
	<i>Term Length</i>	<i>Prepay Pen.</i>	<i>IO</i>	<i>ARM</i>	<i>Deferred Amort.</i>
<b>Panel A: Triple Difference in Difference</b>					
Post <sub>t</sub> x APL <sub>gt</sub> x Low HHI <sub>c</sub>	1.428*	0.048*	0.082**	0.007	0.010
	(0.799)	(0.025)	(0.037)	(0.020)	(0.008)
APL <sub>gt</sub> x Low HHI <sub>c</sub>	-0.651	-0.025	-0.027	-0.004	-0.003
	(0.877)	(0.029)	(0.024)	(0.028)	(0.006)
Post <sub>t</sub> x Low HHI <sub>c</sub>	-0.982	-0.027	-0.033	0.018	-0.007
	(0.806)	(0.025)	(0.023)	(0.026)	(0.007)
Post <sub>t</sub> x APL <sub>gt</sub>	1.845***	0.032*	-0.008	-0.006	-0.005
	(0.544)	(0.018)	(0.029)	(0.016)	(0.006)
APL <sub>gt</sub>	-4.613***	-0.148***	-0.024	-0.007	-0.006
	(0.694)	(0.022)	(0.019)	(0.025)	(0.004)
Post <sub>t</sub> x Fraction < FICO 680 <sub>c</sub>	-4.292	-0.107	-0.158	0.061	-0.060***
	(2.962)	(0.098)	(0.132)	(0.064)	(0.014)
Post <sub>t</sub> x Ln(Median Income) <sub>c</sub>	-2.202	-0.081	0.102	0.071**	0.000
	(1.507)	(0.053)	(0.062)	(0.030)	(0.003)
Δ House Price Index <sub>it,t-24</sub>	2.225***	0.053**	-0.022	0.010	0.008
	(0.787)	(0.025)	(0.051)	(0.039)	(0.024)
Observations	390,040	405,788	405,788	405,788	405,788
R-squared	0.232	0.264	0.250	0.286	0.068
Low HHI <sub>c</sub> Trend	Yes	Yes	Yes	Yes	Yes
Mean of Dep Var	7.531	0.290	0.180	0.449	0.0407
<b>Panel B: Low HHI (High Competition)</b>					
Post <sub>t</sub> x APL <sub>gt</sub>	4.015***	0.101***	0.075***	0.004	0.009
	(0.690)	(0.020)	(0.027)	(0.015)	(0.006)
APL <sub>gt</sub>	-5.541***	-0.181***	-0.030	0.004	-0.009*
	(0.600)	(0.020)	(0.020)	(0.014)	(0.005)
Δ House Price Index <sub>it,t-24</sub>	2.287	0.075*	-0.129**	-0.065	-0.022
	(1.405)	(0.044)	(0.054)	(0.047)	(0.021)
Observations	254,507	263,927	263,927	263,927	263,927
R-squared	0.226	0.256	0.256	0.291	0.071
Mean of Dep Var	6.921	0.262	0.202	0.443	0.0410
<b>Panel C: High HHI (Low Competition)</b>					
Post <sub>t</sub> x APL <sub>gt</sub>	1.836***	0.028	0.011	0.008	-0.006
	(0.528)	(0.020)	(0.033)	(0.018)	(0.004)
APL <sub>gt</sub>	-4.731***	-0.155***	-0.019	-0.009	-0.002
	(0.648)	(0.022)	(0.024)	(0.025)	(0.005)
Δ House Price Index <sub>it,t-24</sub>	2.729***	0.059*	0.168**	0.106*	0.036
	(0.887)	(0.035)	(0.073)	(0.054)	(0.052)
Observations	126,510	132,557	132,557	132,557	132,557
R-squared	0.246	0.271	0.254	0.286	0.058
Mean of Dep Var	7.862	0.309	0.162	0.465	0.0368
<b>For Panels A,B and C</b>					
County FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
Borrower Controls	Yes	Yes	Yes	Yes	Yes