The Varying Effects of Predatory Lending Laws on High-Cost Mortgage Applications

Giang Ho and Anthony Pennington-Cross

Federal, state, and local predatory lending laws are designed to restrict and in some cases prohibit certain types of high-cost mortgage credit in the subprime market. Empirical evidence using the spatial variation in these laws shows that the aggregate flow of high-cost mortgage credit can increase, decrease, or be unchanged after these laws are enacted. Although it may seem counter-intuitive to find that a law that prohibits lending could be associated with more lending, it is hypothesized that a law may reduce the cost of sorting honest loans from dishonest loans and lessen borrowers' fears of predation, thus stimulating the high-cost mortgage market. (JEL G21, C25)

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Documents that discuss predatory lending begin with a statement similar to that found in a report by the Department of Housing and Urban Development (HUD) and the Department of the Treasury (HUD and Treasury, 2000, p. 17): "Defining the practices that make a loan predatory, however, is problematic." This difficulty arises because predatory lending depends on the inability of the borrower to understand the loan terms and the obligations associated with them. The amorphous nature of predation has made it very difficult for federal, state, and local authorities to craft laws to stop or at least retard predation without also hindering legitimate lending. However, following the lead of federal regulations, state and local authorities have passed laws that have made it illegal to provide certain types of high-cost loans that have been associated with predation. Implicitly, lawmakers have determined that the benefit of stopping predation outweighs the costs associated with restricting some legitimate high-cost loans.

This paper provides a framework for considering some of the potential ways that a law could affect the flow of high-cost or subprime mortgage credit. The specific provisions of the laws vary state by state, and this creates the possibility that each law may affect mortgage applications, originations, and rejections in different ways. For example, the first state-level predatory lending law (in North Carolina) did significantly reduce applications and originations of high-cost mortgages, whereas some other laws subsequently passed were associated with increases in applications and originations.

TYPES OF PREDATORY LENDING

HUD and the Treasury published an influential report in 2000 entitled "Curbing Predatory Home Mortgage Lending." The report organized lending abuses or predatory practices into four groups:

- Loan flipping: Loans were being repeatedly refinanced in a short period of time (loan flipping). With each refinance, high fees were wrapped into the new loan amount,

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thus reducing the equity left in the home. In some instances, fees exceeded $5,000 or as much as 10 percent of the loan amount.

- Imposition of excessive fees and "packing": Fees were found to be very large at times. Typically, fees were added to the financed amount (wrapped) instead of being paid upfront. Perhaps most importantly, the consumers often were not aware of the fees, which could be charged by many different sources, including the mortgage broker, home improvement contractor, lender, or other third parties. In addition to normal closing fees,[1] some of the borrowers were sold single-premium credit life insurance, which was included in the loan amount and not used in the calculation of the annual percentage rate (APR).
- Lending without regard for the ability to repay: Loans were originated under terms that the borrower would never be able to meet. This problem was exacerbated when the lender did not try to verify income, which may have been falsified by a broker. Examples were found of elderly households on fixed incomes where the new mortgage payment exceeded their income. Once the borrower failed to make payments, the lender foreclosed on the property. Clearly, this practice is profitable only when the amount of equity in the home exceeds the cost of foreclosure and the borrower does not exercise the option to sell the home and prepay the mortgage before foreclosure.
- Fraud: Appraisers and brokers conspired to inflate prices or property values above the market price.

Based on these findings, the report recommended improved consumer literacy and disclosures, as well as prohibitions on loan flipping, lending without regard for the ability to repay, and the sale of insurance and other similar products. The report also recommended that potentially abusive terms and conditions such as balloon payments, prepayment penalties, excessive fees, and "points" be restricted.[2]

STATE PREDATORY LENDING LAWS

During this period of increased public attention, Congress strengthened the Home Ownership and Equity Protection Act (HOEPA, Regulation Z) that focuses on high-cost refinance loans.[3] For loans that meet the HOEPA definition of high-cost loans, the provisions restrict short-term balloon notes, prepayment penalties, non-amortizing schedules, loan documentation requirements, the ability to refinance into another HOEPA loan, and other factors.

Following the lead of federal regulations, by the end of 2004, at least 23 states had put into effect predatory lending laws that regulated the provision of high-cost credit.[4] In general, these state laws extend HOEPA's definition by expanding the definition of high-cost credit by lowering the factors that trigger the coverage of a law and by more aggressively restricting some types of loans and lending practices. For example, the Illinois law moves the APR trigger for first liens from 8 percent (the HOEPA trigger) above comparable-term Treasury yields to 6 percent.[5] As a result, the

[1] Typical closing fees include items that all real estate transactions must pay such as transfer taxes, appraisal fees, recording fees, title search fees, and other processing fees.

[2] Balloon payments have a large, lump sum payment at the end of the life of the loan.

[3] Home purchase loans and other types of lending backed by a home, such as lines of credit, are not covered by HOEPA. The original version, in 1994, set out the framework and defined the triggers and restrictions. The second version, in 2002, adjusted some of the triggers and restricted some additional practices. In the 2002 version, HOEPA protections were triggered in one of two ways: (i) if the loan's APR exceeded the rate for Treasury securities of comparable maturity by 8 percentage points or more on the first lien and 10 percentage points or higher on higher liens or (ii) if finance charges, including points and fees paid at closing for optional insurance programs and other debt protection programs, were greater than 8 percent of the loan amount or a fixed $480 amount indexed annually to the consumer price index.

[4] Arkansas, California, Colorado, Connecticut, Florida, Georgia, Illinois, Kentucky, Maine, Maryland, Massachusetts, Nevada, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Utah, and Wisconsin.

[5] The APR is a uniform measure of true or full annual borrower cost. For example, the APR includes annualized costs associated with upfront fees in addition to the periodic interest rate.

Illinois predatory regulations cover a larger segment of the mortgage market than do federal regulations. However, not all states extend regulations in the same manner. For example, the laws in Indiana and Kentucky do not lower the APR trigger below the federal 8 percent level. However, both the Indiana and Kentucky laws include loans used to purchase a home in addition to just refinances. Similar to federal regulations, the Illinois law covers only refinance loans (loans not for purchase of a new home). In general, each law has its own nuances. For example, the laws in Illinois, Indiana, and Kentucky all restrict the use of balloon payments. However, Kentucky prohibits all balloon payments on high-cost loans, whereas Indiana and Illinois prohibit balloons within the first 10 years of a loan's life and for all loans that last 15 years or less, respectively.

The appendix provides some of the details associated with the 10 laws that are used in the empirical analysis discussed below.[6] As with Illinois, Indiana, and Kentucky, the law can vary substantially among states. For example, 6 of the 10 states (Connecticut, Florida, North Carolina, Ohio, Pennsylvania, and Texas) specify the same trigger as HOEPA: For first (second) liens, an APR 8 (10) percent or higher than comparable-term Treasury yields will activate coverage of the loan by the law. California and Massachusetts reduce the APR trigger for either first or second liens, thus making the law cover more of the market. Georgia uses a different approach and instead defines the trigger relative to the prime rate instead of Treasury yields.

There is also substantial variation in what types of loans are prohibited by the law. For example, Georgia, Massachusetts, and North Carolina prohibit all balloon payments on covered loans, whereas Maryland has no provision covering balloons. The remaining states tend to restrict the availability of balloons for the first 5 to 10 years of a loan.

[6] See Ho and Pennington-Cross (2005) for details on all 23 state-level laws in effect before the end of 2004.

A SIMPLE MODEL OF APPLICATION OUTCOMES

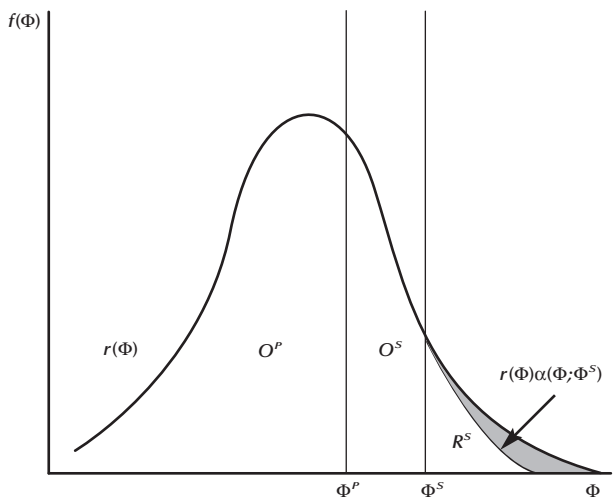
Although the minute variations in the laws are almost limitless, it is helpful to illustrate some of the potential effects of a predatory lending law using a highly stylized model of mortgage application outcomes (subprime applications, subprime originations, and subprime rejections). We assume that applicants understand that a subprime mortgage costs more than a prime mortgage and self-select to the appropriate market.[7] Following the approach of Ferguson and Peters (1995) and Ambrose, Pennington-Cross, and Yezer (2002), we assume that all of the information included in the application can be summarized by a single number (mortgage credit score or credit risk). Each loan applicant has a credit risk represented by $0 \leq \Phi \leq 1$. We interpret Φ as a monotonically increasing function of the borrower's likelihood of default, and we designate the marginal probability density function of credit risk as $r(\Phi)$. Assuming mortgage lenders can observe the true credit risk of borrowers, they approve all loan applications with credit risk lower than a uniform underwriting cut-off, which we denote as Φ^P for the prime market and Φ^S for the subprime market, with $\Phi^P < \Phi^S$.

In this model, the prime market is perfectly sorted; everyone who applies for a prime mortgage has credit risk $\Phi \leq \Phi^P$ and therefore is approved for a loan. Although we do observe in the marketplace some rejections of prime applications, empirical research has shown that subprime loans are rejected at a much higher rate than prime loans: 33 percent versus 9 percent (Scheessele, 1998). In addition, the assumption of perfect sorting, or borrower self-selection, does not affect the suggested impact of predatory lending laws on the outcome of subprime mortgage applications. In Figure 1, prime applications and originations are given by the same integral of the marginal density function and are represented by the area O^P:

[7] In essence we are assuming that no unqualified households apply for a prime loan (i.e., self-select themselves out of that market) or that the lender presorts potential applications to reduce rejections in the prime market. Therefore, there are no rejected prime loans.

Figure 1

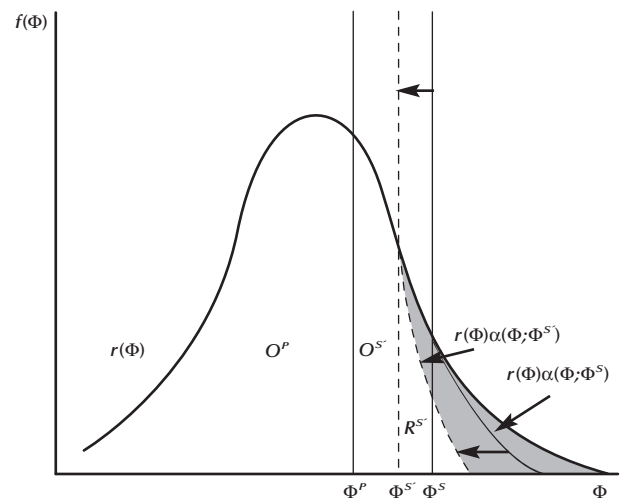
Prime and Subprime Mortgage Outcomes



NOTE: $r(\Phi)$ = marginal probability function of credit risk; $\alpha(\Phi; \Phi^S)$ = subprime application rate; Φ^P = prime underwriting standard; Φ^S = subprime underwriting standard; O^P = prime originations; O^S = subprime originations; R^S = subprime rejections.

Figure 2

Post-Law Scenario: Tightening Subprime Underwriting Standards



NOTE: $r(\Phi)$ = marginal probability function of credit risk; $\alpha(\Phi; \Phi^{S'})$ = subprime application rate; Φ^P = prime underwriting standard; Φ^S = pre-law subprime underwriting standard; $\Phi^{S'}$ = post-law subprime underwriting standard; O^P = prime originations; $O^{S'}$ = post-law subprime originations; $R^{S'}$ = post-law subprime rejections.

$$A^P = O^P = \int_0^{\Phi^P} r(\Phi)d\Phi. \tag{1}$$

Applicants with credit risk higher than the prime underwriting standard, Φ^P, are subprime applicants. However, assuming there is a cost associated with applying for a loan, an individual will apply only if he/she thinks the chance of being accepted is sufficiently high. This borrower self-selection implies that a fraction of individuals with credit risk higher than a certain level—we refer to these as the "marginal applicants"—will opt out of the subprime market, effectively altering the risk distribution. We define $\alpha(\Phi; \Phi^S)$ as the share of actual subprime applicants in the potential applicant universe; α is indexed by Φ, given the current subprime underwriting standard (Φ^S). For potential subprime applicants with $\Phi \leq \Phi^S$, $\alpha(\Phi; \Phi^S)$ equals unity. The probability of applying, $\alpha(\Phi; \Phi^S)$, is continuous and decreasing for $\Phi > \Phi^S$ until it equals zero at some value Φ', where $\Phi^S < \Phi' \leq 1$. The applicants who opt out and do not apply are shown as the shaded area in Figure 1 and would be rejected if they did apply.

Given the current subprime underwriting standard, Φ^S, and the risk distribution, $r(\Phi)$, the number of applicants, A^S, originations, O^S, and rejections, R^S, are shown in Figure 1 and given by

$$\text{Applications } A^S = \int_{\Phi^P}^{1} r(\Phi)\alpha(\Phi;\Phi^S)d\Phi;$$

$$\text{Originations } O^S = \int_{\Phi^P}^{\Phi^S} r(\Phi)d\Phi; \text{ and} \tag{2}$$

$$\text{Rejections } R^S = \int_{\Phi^S}^{1} r(\Phi)\alpha(\Phi;\Phi^S)d\Phi.$$

The number of applicants can also be represented as the sum of originations and rejections, $A^S = O^S + R^S$.

Assume that a predatory lending law imposes restrictions on subprime mortgage lenders in terms of information disclosure, allowable loan

types, and required lending practices. To comply with the law's restrictions, lenders must tighten underwriting standards from Φ^S to $\Phi^{S'}$. This post-law scenario is illustrated in Figure 2. The law results in fewer subprime loans being originated, because of the tighter minimum lending standards required to comply with the predatory lending law:

$$(3) \qquad \int_{\Phi^P}^{\Phi^{S'}} r(\Phi)d\Phi = O^{S'} < O^S = \int_{\Phi^P}^{\Phi^S} r(\Phi)d\Phi.$$

The total number of subprime applicants also decreases after the law is implemented because more "marginal applicants," fearing higher probability of rejection, self-select out of the subprime market. For all values of $\Phi > \Phi^{S'}$, $r(\Phi)\alpha(\Phi; \Phi^S) > r(\Phi)\alpha(\Phi; \Phi^{S'})$, and, as a result, $A^S > A^{S'}$.

Depending on the functional form of $\alpha(.)$, the number of rejected applications could increase or decrease if lending standards are tightened, especially if the likelihood of applying is affected by the level of credit risk[8]:

$$(4) \qquad \int_{\Phi^{S'}}^{1} r(\Phi)\alpha(\Phi;\Phi^S)d\Phi = R^{S'} >,=,< R^S = \int_{\Phi^S}^{1} r(\Phi)\alpha(\Phi;\Phi^S)d\Phi.$$

In addition, the rejection rate or the ratio of rejections to applications could either increase or decrease—again, depending on the function of $\alpha(.)$.

This analysis allows us to develop testable hypotheses regarding the impact of a predatory lending law on subprime mortgage outcomes. Specifically, we expect that the introduction of a law that tightens lending standards will reduce (relative to the prime market) the number of subprime applications and originations. In addition, the impact of a law that tightens lending standards on subprime rejection rates should be indeterminate.

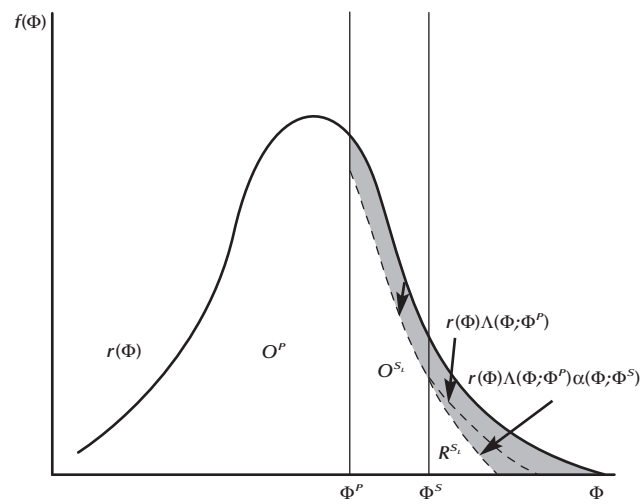
Finally, we introduce what we call the "lemons effect," as pioneered by Akerlof (1970), into the subprime mortgage market. In this type of market, loans can be sold honestly or dishonestly. The borrower attempts to sort the honest loans from the dishonest loans. Unfortunately, regulatory agencies (HUD and the Treasury) and the Board of Governors of the Federal Reserve System did find some evidence from task-force interviews and open meetings that some subprime borrowers, typically elderly or poorly educated households, have had difficulty sorting the honest loans from the dishonest loans (HUD and the Treasury, 2000, and Board of Governors, 2002).

In a market with some dishonest loans, all borrowers must exert extra effort and time to screen the lender and loan documents (higher transaction costs). The press, government reports, and local nonprofit agencies have informed the public about the presence of predatory lending, or dishonest loans, in the subprime market. This uncertainty in loan quality, the lemons effect, can deter subprime applications and is illustrated in Figure 3.

Here we introduce a shift function $\Lambda(\Phi; \Phi^P)$ that equals zero for $\Phi \leq \Phi^P$ and a constant k,

Figure 3

The "Lemons Effect"



NOTE: $r(\Phi)$ = marginal probability function of credit risk; $\Lambda(\Phi; \Phi^P)$ = lemons shift function; $\alpha(\Phi; \Phi^S)$ = subprime application rate; Φ^P = prime underwriting standard; Φ^S = subprime underwriting standard; O^P = prime originations; O^{S_L} = subprime originations under the lemons effect; R^{S_L} = subprime rejections under the lemons effect.

[8] However, if $\alpha(.)$ is a linear decreasing function of $(\Phi - \Phi^j)$, where j indexes the lending standards S and S', the number of rejected applications will increase when lending standards are tightened.

$0 < k < 1$, for $\Phi^P < \Phi \leq 1$. $\Lambda(.)$ can be interpreted as the fraction of potential subprime applicants that are deterred from applying for fear of falling prey to predatory lending or because of the additional transaction costs associated with identifying the dishonest loan or lender. Therefore, the risk distribution becomes kinked at Φ^P and shifts down for all applicants with credit risk above Φ^P. The resulting subprime originations and rejections are represented in Figure 3 by areas O^{S_L} and R^{S_L}, respectively, and subprime applications equal $O^{S_L} + R^{S_L}$.

Given the perception that predation has occurred in the subprime market and not in the prime market, the volume of lending as measured by the number of originations and applications may be lower than expected, given the distribution of credit risk, $r(\Phi)$. One of the primary purposes of predatory lending laws is to weed out the "lemons" in the subprime mortgage market. If households feel that the predatory lending law has been successful, there may be less need to spend time and energy to identify the dishonest loans; they may feel more comfortable applying for a mortgage. In this scenario $\Lambda(.)$ is reduced to zero or is much closer to zero. Therefore, if the subprime market is operating as a lemons market, the introduction of the predatory lending law should have two countervailing effects. First, as illustrated in Figures 1 and 2, the law should reduce applications and originations because of tighter lending standards. Second, as illustrated in Figure 3, if the law removes or heavily regulates the dishonest loans, it should induce potential applicants to return to the market. Therefore, in markets with a substantial lemons problem, or big $\Lambda(.)$, the impact of a predatory lending law could be neutral or could increase the rate of subprime applications and originations. In addition, if $\Lambda(.)$ is not strictly proportional, but has a larger impact on potential borrowers closer or farther away from Φ^S, then the introduction of a predatory lending law could increase or decrease rejection rates.

In summary, in the absence of a lemons problem, the introduction of a law that tightens lending standards should be associated with lower originations and applications for subprime loans. However, if the market suffers from a lemons problem, a new law can actually be associated with more applications and originations. Lastly, this simple model provides no guidance regarding potential effects of the law on rejections.

UNIVARIATE EVIDENCE: PREDATORY LENDING LAWS AND THE FLOW OF CREDIT

The first empirical test examines the laws' impact on the volume of lending. If volume is unaffected, then the aggregate flow of and the supply of credit to potential consumers has not been affected in the aggregate. This method generally follows Harvey and Nigro's (2004) research on the North Carolina predatory lending law, which found that this law significantly reduced subprime applications and originations but had no measurable impact on the rates of rejection. In particular, this section extends prior research by examining the effects in a variety of locations and seeing whether the North Carolina experience is representative for other states.

In each state, we examine the change in originations for subprime loans under the prescribed loan limits in the year before and the year after the predatory lending law is introduced; we use publicly available Home Mortgage Disclosure Act (HMDA) data.[9] Growth rates are calculated for loans associated with a list of subprime lenders as identified by the HUD subprime lender list.[10] Any loan application or origination associated with a lender on the list is identified as a subprime loan. All other loans are treated as non-subprime—that is, conventional loans. In an attempt to create comparison groups that are as similar as possible,

[9] The results are very similar if we do not apply loan limits (to reduce the sample).

[10] The source is www.huduser.org/datasets/manu.html, accessed on 2/1/05. HUD generates a list of subprime lenders from industry trade publications, HMDA data analysis, and phone calls to the lender to confirm the extent of subprime lending. Because this list is defined at the lender level, loans made by the subprime lender may include both prime and subprime loans. In addition, subprime loans made by predominately prime lenders will also be incorrectly identified as prime lending. Therefore, an alternative interpretation of the loans identified using the HUD subprime lender list is that it identifies the extent of specialized subprime lending, not full-service lending.

only counties that border other states without a state predatory lending law are used for the treatment group. The control group includes only counties in neighboring states that border the treatment state and do not have a predatory lending law in effect during the observed time period (the year before and after the introduction of the predatory lending law). This contrasts with other studies (Harvey and Nigro, 2004, and Elliehausen and Staten, 2004) that have used whole neighboring states or regions to define both control and treatment groups. Our approach should help to increase the comparability of the treatment group and the control group because they are geographically closer and, as a result, likely to be more economically similar than full state and region comparisons.

Beginning with North Carolina in 1999, at least 23 states have passed predatory lending laws that are currently in effect. However, the empirical approach combined with the availability of HMDA data reduces the sample to 10 states with predatory lending laws: California, Connecticut, Florida, Georgia, Maryland, Massachusetts, North Carolina, Ohio, Pennsylvania, and Texas.

Table 1 reports the percent change in loan originations. Using North Carolina as an example, the results show that, from 1999 through 2001, subprime originations decreased by 35.8 percent in the treatment counties while subprime originations decreased by 18.9 percent in the control counties. In other words, consistent with prior research on the North Carolina predatory lending law, subprime originations decreased substantially more than would be expected given the performance of the control counties. This is also true in four other states (Florida, Georgia, Massachusetts, and Ohio). However, in five states (California, Connecticut, Maryland, Pennsylvania, and Texas), subprime originations increased more in the treatment locations.[11] These results indicate that the experience in North Carolina may not extend to all other states with predatory lending laws and that there may be sufficient variation in the laws that may increase or decrease the flow of credit.

The second and third columns examine the relative growth rates in originations for minority and low-income applicants.[12] Again, the results are mixed: Some locations experienced a relative increase and others a relative decrease in subprime originations.

Table 2 examines the relative growth in applications for subprime credit, and Table 3 examines the relative change in subprime rejection rates. Again the application results are mixed and very similar to the origination results. For example, four states experienced a relative increase and six states experienced a relative decrease in applications. However, the rejection rates tell a more consistent story. In most states, rejection rates declined more in the treatment locations than in the control locations, indicating that the introduction of predatory lending laws was associated with a disproportionate reduction in the rejection rate for subprime applications.

Multivariate Evidence: Predatory Lending Laws and the Flow of Credit

The previous section provided a univariate analysis showing that predatory lending laws are associated with reductions in rejection rates of subprime applications, but have no consistent effect on the volume of subprime credit. This section extends this analysis by estimating the probability of originating a subprime versus prime loan, the probability of applying for a subprime versus a prime loan, and the probability of being rejected in a subprime application in probit model specifications. The main additional benefit of conducting a multivariate analysis is the ability to control for multiple characteristics at once. The previous univariate tables control only for time and location through the construction of the data set. This regression will be able to simultaneously

[11] The Texas sample consists of counties on the Texas-Louisiana border. Because all sampled Texas counties (Harrison, Marion, Newton, Orange, Panola, Sabine, and Shelby) are rural, few subprime lenders were identified in the data and, hence, the number of subprime loans might be deceptively small, especially in 2000. This might explain the unusually large percentage increases in applications and originations for Texas.

[12] "Low income" includes households with income less than or equal to 80 percent of the county median household income as reported in the 2000 Census. "Minority" includes black and Hispanic applicants as reported in HMDA.

Table 1

Pre- and Post-Law Percent Change in Originations

	All loans	Minority	Low-income
California, 2001-03			
Treatment group	177.3	344.7	148.7
Control group	53.1	71.1	17.8
Difference	124.2	273.6	130.9
Connecticut, 2000-02			
Treatment group	87.8	127.7	67.9
Control group	80.6	107.3	28.2
Difference	7.2	20.3	39.7
Florida, 2001-03			
Treatment group	55.5	101.0	8.8
Control group	59.9	125.2	2.3
Difference	–4.3	–24.3	6.5
Georgia, 2001-03			
Treatment group	18.9	87.5	–14.0
Control group	46.2	108.1	29.6
Difference	–27.3	–20.6	–43.6
Maryland, 2001-03			
Treatment group	129.4	256.5	140.6
Control group	57.6	165.4	84.6
Difference	71.8	91.0	55.9
Massachusetts, 2000-02			
Treatment group	56.4	134.8	17.1
Control group	69.6	107.4	8.2
Difference	–13.2	27.4	8.9
North Carolina, 1999-2001			
Treatment group	–35.8	–35.7	–50.2
Control group	–18.9	–30.1	–31.6
Difference	–16.9	–5.6	–18.5
Ohio, 2001-03			
Treatment group	3.2	4.2	–23.3
Control group	8.4	47.0	4.0
Difference	–5.3	–42.8	–27.3
Pennsylvania, 2000-02			
Treatment group	–5.8	–48.4	–38.0
Control group	–30.7	–59.1	–45.9
Difference	24.9	10.7	7.9
Texas, 2000-02			
Treatment group	3,069.2	—	—
Control group	–12.6	–53.0	–46.3
Difference	3,081.8	—	—

Table 2

Pre- and Post-Law Percent Change in Applications

	All loans	Minority	Low-income
California, 2001-03			
Treatment group	110.0	268.1	81.3
Control group	43.3	123.4	31.5
Difference	66.7	144.6	49.8
Connecticut, 2000-02			
Treatment group	43.4	51.9	29.1
Control group	59.8	34.7	35.4
Difference	–16.4	17.2	–6.3
Florida, 2001-03			
Treatment group	21.0	137.4	3.3
Control group	76.0	156.3	23.4
Difference	–55.0	–18.9	–20.1
Georgia, 2001-03			
Treatment group	–16.2	72.1	–29.8
Control group	27.7	116.4	7.4
Difference	–43.9	–44.3	–37.2
Maryland, 2001-03			
Treatment group	77.2	258.7	71.0
Control group	33.3	238.5	32.7
Difference	44.0	20.1	38.4
Massachusetts, 2000-02			
Treatment group	45.4	84.1	24.1
Control group	60.2	42.7	36.2
Difference	–14.8	41.4	–12.1
North Carolina, 1999-2001			
Treatment group	–25.9	–37.9	–35.7
Control group	16.1	–28.3	3.3
Difference	–42.0	–9.6	–39.0
Ohio, 2001-03			
Treatment group	–9.5	7.0	–27.5
Control group	–2.8	52.8	–15.1
Difference	–6.6	–45.7	–12.5
Pennsylvania, 2000-02			
Treatment group	11.0	–42.8	–1.2
Control group	–12.5	–57.3	–11.3
Difference	23.5	14.5	10.1
Texas, 2000-02			
Treatment group	5,480.0	—	6,014.3
Control group	–12.2	–53.6	–31.8
Difference	5,492.2	—	6,046.1

Table 3

Pre- and Post-Law Percent Change in Rejection Rates

	All loans	Minority	Low-income
California, 2001-03			
Treatment group	–33.4	–26.1	–25.0
Control group	–13.3	10.9	–2.3
Difference	–20.0	–37.0	–22.7
Connecticut, 2000-02			
Treatment group	–19.5	–17.0	–13.6
Control group	–19.7	–23.7	2.2
Difference	0.2	6.7	–15.9
Florida, 2001-03			
Treatment group	–12.2	2.3	–3.5
Control group	2.8	1.9	–1.0
Difference	–15.0	0.4	–2.6
Georgia, 2001-03			
Treatment group	–23.2	–13.0	–15.1
Control group	–8.3	1.1	–10.8
Difference	–14.9	–14.0	–4.3
Maryland, 2001-03			
Treatment group	–25.7	–6.9	–21.9
Control group	–15.7	24.6	–20.5
Difference	–9.9	–31.5	–1.3
Massachusetts, 2000-02			
Treatment group	–19.4	–25.5	–8.0
Control group	–13.6	–18.8	9.7
Difference	–5.7	–6.6	–17.7
North Carolina, 1999-2001			
Treatment group	20.0	9.7	24.4
Control group	37.0	6.2	28.0
Difference	–17.0	3.5	–3.6
Ohio, 2001-03			
Treatment group	–6.6	–1.2	–4.3
Control group	–2.0	–4.5	–5.8
Difference	–4.6	3.3	1.5
Pennsylvania, 2000-02			
Treatment group	2.4	7.0	18.6
Control group	3.4	1.6	16.8
Difference	–1.1	5.4	1.8
Texas, 2000-02			
Treatment group	72.7	—	4.8
Control group	–9.8	–7.9	–2.2
Difference	82.5	—	7.0

Table 4

Identification Strategy and Control Variable Definitions

Variable	Definition	Source
Outcome		
Application	Indicator variable = 1 for subprime application and 0 for prime	HMDA & HUD subprime lender list
Origination	Indicator variable = 1 for subprime origination and 0 for prime	HMDA & HUD subprime lender list
Rejection	Indicator variable = 1 if subprime loan is denied and 0 if accepted	HMDA & HUD subprime lender list
Identification		
Law	Indicator variable = 1 if borrower is from a location with a law at some point and 0 otherwise	Ho and Pennington-Cross (2005)
Postlaw	Indicator variable = 1 for post-legislation time period and 0 otherwise	Ho and Pennington-Cross (2005)
Ineffect	Interaction of *Law* and *Postlaw* indicators indicating that the borrower is from a location with a law currently in effect	Ho and Pennington-Cross (2005)
Control variables		
Income	Borrower's gross annual income ($ thousands)	HMDA
Loan2inc	Ratio of requested loan amount to borrower's income	Calculated from HMDA
Relinc	Ratio of tract median family income to MSA median family income	HMDA
Minority	Tract's minority population percentage	HMDA
Vacant	County's percentage of vacant housing units	Census 2000
Population	County's population growth from the calendar year before and after the law went into effect	Census Bureau
Unemployment	County's unemployment rate	Bureau of Labor Statistics

control for law characteristics, borrower characteristics, location, and economic conditions on both the control group (no law introduced) and the treatment group (law introduced).

The basic data design is the same as in the univariate analysis and includes only counties in treatment states that border other states without any treatment (control group) and subprime loans under the loan limits indicated by the law.

Identification and Probit Estimation

Identification Strategy. To identify the effect of a state predatory lending law, we include data on the location and timing of the law as well as borrower and location characteristics. Table 4 describes the variables and data sources. Similar to Harvey and Nigro (2003 and 2004), three separate dependent variables are tested to measure the effects of state predatory lending laws—the probability of applying for a subprime loan (application), the probability of originating a subprime loan (origination), and the probability of being rejected on a subprime application (rejection).

The key variable shown in Table 4 is *Ineffect*. This variable indicates that a loan was made in a location when and where a predatory lending law was in effect. It is defined as zero before the law went into effect, even in the treatment location, and is always zero in the control location. *Ineffect* is constructed by multiplying the variable *Law*, which indicates locations where the law will eventually be in effect, and *Postlaw*, which indi-

cates the time period after a law has been put into effect. Therefore, *Law* identifies the treatment location and *Postlaw* identifies the time period the law went into effect in that location. The reference group comprises locations where the predatory lending laws will not be in effect in either time period. There are no priors regarding the coefficients on *Law* or *Postlaw*, because they will capture prevailing probabilities associated with location and time that are not controlled for by other variables. Given the results from prior research, we would expect *Ineffect* to be negative for the application and origination outcomes and potentially insignificant for the rejection outcome.

Both Harvey and Nigro (2003 and 2004) and Elliehausen and Staten (2004) include a series of control variables associated with the location of the loan or loan application and the borrower because they may affect the demand or supply of subprime credit. In general, we expect that borrowers will be more likely to use/apply for subprime loans, and perhaps be rejected by subprime lenders, in locations with difficult economic conditions and when borrowers have lower income or are in minority areas (Calem, Gillen, and Wachter, 2004, and Pennington-Cross, 2002). Economic conditions are proxied by the county-level unemployment rate, housing vacancy rate, and population growth rate. Borrower characteristics are proxied by the percent of minority population in the census tract and borrower income. In general, we expect that applicants with more income relative to their loan amount will have an easier time meeting prime underwriting requirements. Underwriting requirements are proxied by the loan-to-borrower income ratio. One important caveat to this analysis is that the borrower's credit history, or credit score, which has been shown to be a very important determinant of mortgage performance for both subprime and prime loans (Pennington-Cross, 2003), is not reported in the HMDA data and therefore cannot be included in this analysis. Lastly, perhaps because of minimum scale requirements, prime lending may be more available in locations with more households. As a result, subprime may be more prevalent in locations with a smaller population.

Probit Estimation

A probit model is estimated for each outcome and for each "law sample" (which includes the treatment and control groups). Therefore, for each sample, three probit models are estimated and a total of 30 model estimates are generated that include 10 explanatory variables each, for a total of 300 estimated coefficients excluding intercepts. The probit specification is given by

$$\Pr(Y = 1 \mid x) = \Phi(x'\beta), \tag{5}$$

where Y is the outcome (application, origination, or rejection), x is a vector of explanatory variables, β is a vector of parameters, and $\Phi(.)$ denotes the standard normal distribution. The log-likelihood for the probit model is

$$L = \sum_{y_i=0} \ln\left[1 - \Phi\left(x_i'\beta\right)\right] + \sum_{y_i=1} \ln \Phi\left(x_i'\beta\right), \tag{6}$$

where y_i and are x_i, respectively, the observed values of outcome Y and explanatory variables x for observation i.

Because of the large number of coefficient estimates, instead of reporting all coefficients, we provide summary information.[13] Table 5 provides context for the marginal effects by reporting the mean of the dependent variables for each of the law samples. It shows that there is a wide variety in subprime application, origination, and rejection rates. For example, subprime applications ranged from almost 25 percent in California to just over 15 percent in Maryland. The relative magnitude of application and origination rates provides indirect support for the high rates of rejection on subprime applications. In fact, in some of the law samples, over 50 percent of subprime applications were rejected.

Table 6 reports the marginal impact of a state predatory lending law for each state while evaluating all other variables at their means for each law sample. Consistent with prior literature, the results indicate that the North Carolina law did reduce the flow of subprime credit through a reduction in both application and origination probabilities. But the experience in terms of

[13] Detailed results are available upon request.

Table 5

Mean of Dependent (Outcome) Variables (percent)

Law sample (treatment and control groups)	Application	Origination	Rejection
California	0.249	0.153	0.354
Connecticut	0.245	0.119	0.397
Florida	0.177	0.063	0.574
Georgia	0.224	0.097	0.505
Massachusetts	0.174	0.080	0.357
Maryland	0.153	0.064	0.439
North Carolina	0.233	0.111	0.484
Ohio	0.241	0.092	0.551
Pennsylvania	0.261	0.109	0.476
Texas	0.242	0.104	0.550

Table 6

Marginal Effects of *Ineffect* Variable

Law sample (treatment and control groups)	Application	Origination	Rejection
California	0.032***	0.067***	–0.258***
Connecticut	0.014**	0.023***	0.013
Florida	–0.030***	0.008*	–0.057***
Georgia	–0.056***	–0.007**	–0.110***
Massachusetts	–0.074***	–0.032***	–0.030***
Maryland	0.029***	0.018***	–0.066***
North Carolina	–0.069***	–0.042***	–0.048***
Ohio	–0.005	–0.004	–0.022**
Pennsylvania	0.037***	0.032***	0.032***
Texas	0.189***	0.107***	0.148*

NOTE: */*/*** indicate that the marginal effect is significantly different from zero at the 90/95/99 percent levels. All other variables are evaluated at the mean for each law sample.

originations and applications in North Carolina is replicated in only one-half of the other state laws examined. In the other half, the introduction of the law was associated with an increase in the flow (originations) of subprime credit. The results are also mixed in terms of applications, with some laws being associated with higher and other laws associated with lower probabilities of application. The effects of the state laws on the probability of being rejected are a little more consistent, with 7 of the 10 laws being associated with lower rejection rates.

Table 7 provides a summary of coefficient estimates for the remaining control variables for the probit application, origination, and rejection models. The first four columns report the minimum, maximum, mean, and standard deviation of the 10 estimated coefficients. The last column reports the mean *t*-statistic associated with the coefficients. There is no expected sign or even

Table 7

Summary of Control Variable Coefficient Estimates

	Coefficient				*t*-Statistics
Variable	Minimum	Maximum	Mean	Standard deviation	Mean
Application results					
Law	–1.191	0.500	–0.032	0.447	2.621
Postlaw	–0.254	0.156	–0.078	0.120	–8.530
Ineffect	–0.288	0.765	0.031	0.299	–1.639
Income	–0.319	–0.058	–0.176	0.083	–34.463
Loan2inc	–0.001	0.032	0.012	0.012	9.622
Relinc	–0.617	–0.215	–0.431	0.165	–41.554
Minority	0.274	0.819	0.550	0.153	35.074
Vacant	–10.514	15.820	–0.207	6.704	–3.124
Population	–0.119	0.059	–0.018	0.053	–5.243
Unemployment	–5.393	16.539	7.503	6.453	13.972
Origination results					
Law	–0.807	0.230	–0.079	0.293	–1.223
Postlaw	–0.509	0.067	–0.158	0.170	–8.510
Ineffect	–0.229	0.759	0.103	0.279	1.999
Income	–0.497	–0.039	–0.213	0.159	–19.529
Loan2inc	–0.033	0.031	–0.002	0.018	–2.871
Relinc	–0.615	–0.141	–0.388	0.156	–22.270
Minority	0.384	0.820	0.605	0.141	24.624
Vacant	–9.833	4.701	–1.604	3.791	–4.108
Population	–0.128	0.026	–0.022	0.055	–2.545
Unemployment	–5.246	18.093	6.891	6.623	9.131
Rejection results					
Law	–0.377	1.837	0.197	0.599	3.088
Postlaw	–0.263	0.321	–0.006	0.168	–0.194
Ineffect	–0.469	0.373	–0.084	0.223	–3.927
Income	–0.082	0.051	–0.031	0.043	–4.660
Loan2inc	0.001	0.055	0.022	0.017	7.779
Relinc	–0.395	–0.018	–0.190	0.108	–9.553
Minority	–0.038	0.242	0.125	0.087	3.447
Vacant	–18.268	6.909	0.736	7.194	3.552
Population	–0.033	0.098	0.016	0.040	0.407
Unemployment	–7.209	26.239	1.147	9.270	–0.646

NOTE: These statistics provide a summary of the 10 models estimated. For example, the mean coefficient is the simple average of the 10 coefficient estimates for each variable and the standard deviation is the standard deviation of the 10 estimated coefficients.

significance associated with the *Law* and *Postlaw* dummy variables because they control for unobserved impacts of location and time in each law sample. There are three measures of income included in the model (borrower income, the ratio of the requested loan amount to borrower income, and the ratio of the tract to the MSA median family income). As anticipated, on average, borrowers with higher income are less likely to apply for or get a subprime loan and are less likely to be rejected on a subprime application. However, as with most of the control variables, there is substantial variation in the sign and magnitude of the coefficient estimates. Consistent with borrower income, originations, applications, and rejections are more likely in locations with relatively lower incomes. In addition, as anticipated, applicants requesting larger loans relative to their income are more likely to be rejected.

Higher unemployment rates are also associated on average with higher probabilities of application, origination, and rejection, but the signs of the coefficient estimates can be negative or positive. In addition, weaker housing markets, proxied by the vacancy rate and county population growth, are inconsistently associated with application, origination, and rejection probabilities. However, consistent with prior research, locations with more minorities are associated with higher application, origination, and rejection probabilities.

These results do not provide any indication that predatory lending laws systematically reduce the flow of subprime credit. However, the results do show that predatory lending laws may be associated with lower rejection rates of subprime mortgage applications. It can be expensive just to apply for a mortgage: The nonrefundable application fee usually runs from $200 to $300, not to mention other hidden or nonpecuniary costs. Thus, although reducing rejection rates may not have been the primary purpose of the laws, a reduction in rejections can represent substantial savings to consumers.

DISCUSSION AND CONCLUSION

The introduction of state predatory lending laws has created a situation in which a loan may be legal and available in Missouri, but the identical loan is illegal and not available just across the Mississippi River in Illinois. For example, in Illinois, high-cost loans with prepayment penalties in the first three years of the loans are prohibited, whereas Missouri has no such provision.

This paper provided a framework to consider some of the potential effects that the predatory lending laws, such as the one in Illinois, would have on the total or aggregate flow of high-cost or subprime mortgage credit. This framework indicates that laws that require tighter lending standards should be associated with fewer originations and applications. However, if households were deterred from applying for a loan because they were afraid of being taken advantage of, the introduction of a predatory lending law could lead to more applications because the fear of predation is reduced.

Consistent with this framework, univariate and multivariate empirical results confirmed that some laws were associated with increased applications (for example, California, Connecticut, Maryland, Pennsylvania, and Texas) and other laws were associated with decreased applications (for example, Florida, Georgia, Massachusetts, and North Carolina).[14] We interpret net increases in applications as being consistent with a reduction in fear of predation after the law was passed and decreases in applications as consistent with a reduction in the potential or legal size of the high-cost market as a result of tighter lending standards.

The laws in California, Connecticut, Maryland, Pennsylvania, and Texas were associated with more subprime lending when a predatory lending law was introduced into the subprime market.[15] Therefore, these locations are more likely to have been suffering from a strong lemons problem in the mortgage market. In addition, these states tend to have relatively modest restrictions on allowable lending. In particular, four of these five states have

[14] Prior research has also found this mixed reaction in the market to the introduction of regulations of high-cost mortgage lending (Ho and Pennington-Cross, 2006, and Li and Ernst, 2006).

[15] Conversely, the laws in Florida, Georgia, Massachusetts, and North Carolina were associated with declines in the volume of subprime lending.

no provision regarding mandatory arbitration relief. Four of these five states also do not require pre-purchase or post-purchase loan counseling. In addition, balloon loans are only modestly restricted or left unrestricted by these five state laws. However, there does not seem to be any pattern for these five states in how much of the subprime mortgage market the law applies to.

In future research it would be helpful to determine how product mix adjusts to the introduction of these laws. For example, the laws make no distinction between initial interest rates on fixed rate and adjustable interest rate loans. But adjustable rate loans tend to have lower initial rates, resulting in substitution rather than fewer loans, and can include teaser terms or caps on future interest rate adjustment that could reduce the rate below the benchmark or trigger. Therefore, adjustable rate loans may be one way to avoid the trigger APR levels in predatory lending laws and shift a borrower out from the protective coverage of the regulations. There also may be a regulatory burden associated with these laws that needs to be passed on to consumers through higher interest rates and upfront fees. In addition, these laws may reduce the availability of the secondary market, leading to liquidity issues in the subprime market, which may also increase the cost of credit.

REFERENCES

Akerlof, George A. "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism." *Quarterly Journal of Economics*, 1970, *84*(3), pp. 488-500.

Ambrose, Brent W.; Pennington-Cross, Anthony and Yezer, Anthony M. "Credit Rationing in the U.S. Mortgage Market: Evidence from Variation in FHA Market Shares." *Journal of Urban Economics*, March 2002, *51*(2), pp. 272-94.

Board of Governors of the Federal Reserve System. Truth in Lending, Final Rule, 12 CF part 226, Regulation Z; Docket No. R-1090. Board of Governors of the Federal Reserve System, 2002.

Calem, Paul S.; Gillen, Kevin and Wachter, Susan. "The Neighborhood Distribution of Subprime Mortgage Lending." *Journal of Real Estate Finance and Economics*, December 2004, *29*(4), pp. 393-410.

Elliehausen, Gregory and Staten, Michael. E. "Regulation of Subprime Mortgage Products: An Analysis of North Carolina's Predatory Lending Law." *Journal of Real Estate Finance and Economics*, December 2004, *29*(4, Special Issue), pp. 411-34.

Ferguson, Michael and Peters, Stephen R. "What Constitutes Evidence of Discrimination in Lending?" *Journal of Finance*, June 1995, *50*(2), pp. 739-48.

Harvey, Keith D. and Nigro, Peter J. "How Do Predatory Lending Laws Influence Mortgage Lending in Urban Areas? A Tale of Two Cities." *Journal of Real Estate Research*, October-December 2003, *25*(4), pp. 479-508.

Harvey, Keith D. and Nigro, Peter J. "Do Predatory Lending Laws Influence Mortgage Lending? An Analysis of the North Carolina Predatory Lending Law." *Journal of Real Estate Finance and Economics,* 2004, *29*(4), pp. 435-56.

Ho, Giang and Pennington-Cross, Anthony. "The Impact of Local Predatory Lending Laws." Working Paper 2005-049B, Federal Reserve Bank of St. Louis, 2005.

Ho, Giang and Pennington-Cross, Anthony. "The Impact of Local Predatory Lending Laws on the Flow of Subprime Credit." *Journal of Urban Economics*, 2006, *60*, pp. 210-28.

Li, Wei and Ernst, Keith S. "Do State Predatory Home Lending Laws Work? A Panel Analysis of Market Reforms." Presented at the American Real Estate and Urban Economics Association, Center for Responsible Lending, Boston, MA, January 2006 (paper dated December 2005).

Pennington-Cross, Anthony. "Subprime Lending in the Primary and Secondary Markets." *Journal of Housing Research*, 2002, *13*(1), pp. 31-50.

Pennington-Cross, Anthony. "Credit History and the Performance of Prime and Nonprime Mortgages."

Journal of Real Estate Finance and Economics, November 2003, *27*(3), pp. 279-301.

Scheessele, Randall. "HMDA Highlights." Housing Finance Working Paper Series No. HF-009, U.S. Department of Housing and Urban Development, 1998.

U.S. Department of Housing and Urban Development and the U.S. Treasury Department. Curbing Predatory Home Mortgage Lending. Washington, DC: GPO, 2000; huduser.org/publications/hsgfin/curbing.html.

APPENDIX

Some Details of 10 Predatory Lending Laws

	California	Connecticut
Effective date	7/1/2002	10/1/2001
Covered loan type (HOEPA: closed-end, refinance)	Consumer credit transaction ≤ $250,000 (adjusted every 5 years)	Any loan or extension of credit, including an open-end line of credit but excluding a reverse mortgage transaction
APR triggers (HOEPA: APR > T-bill + 8% for first lien; + 10% for second lien)	APR > T-bill + 8% for both liens	Like HOEPA
Points and fees (P&F) trigger (HOEPA: P&F > 8% loan amount or $499 [for 2004, adjusted annually to CPI])	P&F > 6% loan amount	P&F > 5% loan amount or $2,000
Prepayment penalties	Prohibited after 36 months	Restricted to 3% balance within 1 year, 2% between 1 and 2 years, and 1% between 2 and 3 years; not allowed if debts 50% ≥ monthly gross income
Balloon	Prohibited for loans < 5 years	Prohibited for loans < 7 years
Loan counseling	Not required	Not required
Mandatory arbitration limiting judicial relief	No provision	Prohibited

SOURCE: www.butera-andrews.com/state-local/b-index.htm; www.mbaa.org/resources/predlend/; Standard & Poor's "Anti-Predatory Lending Law Update" (September 20, 2004).

Florida	Georgia	Maryland
10/2/2002	10/1/2002; amended 3/7/2003	5/16/2002
Like HOEPA	Any loan or extension of credit, including an open-end line of credit but excluding a reverse mortgage transaction	All loans
Like HOEPA	Covered loan: APR > higher of 4% (5.5% for second lien) above prime rate or 2% (3% for second lien) above 90-day standard delivery commitment with comparable term; high-cost: APR > higher of 2% (3% for second lien) above Fannie/Freddie or 4% (5.5% for second lien) above prime	APR > T-bill + 7% (first lien) or 9% (second lien)
Like HOEPA	Covered loan: P&F > 3% loan amount; high-cost: P&F > 5% loan amount for loans ≥ $20,000, 8% loan amount or $1,000 for loans < $20,000)	P&F > 7% loan amount or $499 (for 2004)
Prohibited after 36 months	Restricted to 2% loan amount during first 12 months and 1% loan amount during second year	No provision
Prohibited for loans < 10 years	Prohibited for all loans	No provision
Not required	Required	Required
No provision	Prohibited	No provision

APPENDIX, cont'd

	Massachusetts	North Carolina
Effective date	3/22/2001	10/1/1999
Covered loan type (HOEPA: closed-end, refinance)	Consumer credit transaction, excluding a reverse mortgage	Loans including open-end lines of credit but excluding reverse mortgages, amount ≤ the lesser of conforming limit or $300,000
APR triggers (HOEPA: APR > T-bill + 8% for first lien; + 10% for second lien)	APR > T-bill + 8% (1st lien); + 9% (second lien)	Like HOEPA
P&F trigger (HOEPA: P&F > 8% loan amount or $499 [for 2004, adjusted annually to CPI])	P&F > 5% loan amount or $400 (adjusted annually)	P&F > 5% loan amount if loan ≥ $20,000; 8% loan amount of $1,000 if loan < $20,000
Prepayment penalties	Prohibited after 36 months; before 36 months, restricted to balance of first year's interest or three-months' interest, whichever is less	Prohibited for all loans < $150,000
Balloon payments	Prohibited for all loans	Prohibited
Loan counseling	Required	Required
Mandatory arbitration limiting judicial relief	Prohibited	No provision

Ohio	Pennsylvania	Texas
2/22/2002	6/21/2001	9/1/2001
All loans	Loans < $100,000	Residential mortgages ≥ $20,000 and <1/2 conforming limit, excluding an open-end account or a reverse mortgage
Like HOEPA	Like HOEPA	Like HOEPA
Like HOEPA	Like HOEPA	Like HOEPA
Prohibited	Prohibited after 60 months	Prohibited
Prohibited for loans < 5 years	Prohibited for loans < 10 years	Prohibited after 60 months
Not required	Not required	Not required
No provision	No provision	No provision