

**The Impact of State Foreclosure and Bankruptcy Laws on Higher-Risk Lending:
Evidence from FHA and Subprime Mortgage Originations**

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Abstract

State foreclosure and bankruptcy laws govern the rights of mortgage lenders and borrowers during foreclosure and bankruptcy proceedings and therefore impact on lenders' exposure to credit risk. This paper seeks to understand the effects of these state laws on the type of mortgages originated. The empirical identification is based on state-level variations in foreclosure and bankruptcy provisions and a border estimation strategy. We find that higher-risk loans (FHA and subprime loans) are more likely to be originated in a state with lender-friendly foreclosure laws. Also, higher-risk loans are less likely to be originated in a state with a more generous bankruptcy homestead exemption. In addition, our results are consistent with the idea that FHA and subprime loans share a very similar clientele and are close substitutes. These results are robust without the ordering assumption among conventional prime, FHA and subprime loans.

Key words: State foreclosure laws; homestead exemption; mortgage originations; ordered probit
JEL Classifications: G21; G28; R10

1. Introduction

The market share of different types of mortgages has changed dramatically in the past decade with the boom and bust of the U.S. housing market (see Figure 1).¹ From 2001 to 2006, the market share of Federal Housing Administration (FHA)² mortgage originations dwindled to historically low level as subprime mortgage³ originations surged. With the onset of the 2007 financial crisis, FHA mortgage originations soared due to the collapse of the subprime market and the pullback of conventional mortgage lenders. By 2008, FHA mortgage originations comprised 19 percent of the mortgage market. This turbulent time provides an opportunity to study the mortgage market in general, especially the higher-risk market sector including FHA and subprime mortgage market.

The FHA lenders have historically been the major provider of low-down-payment loans⁴ and provided mortgage credit to the targeted market of first-time and low income borrowers. Subprime loans are loans made to borrowers with high credit risk, often because they have lower credit scores and little or no down payments. Although subprime and FHA loans were initially developed under different market conditions and are different in many aspects,⁵ they seem to share a very similar clientele compared to conventional prime mortgages—borrowers with higher credit risk. Not surprisingly, given their weaker credit history and financial situations, higher-risk borrowers are more likely to default on their loans. To compensate for the high risk, the

¹ Market shares reported in this paper are based on the number of loans, not the dollar amount. The calculation of market shares are restricted to owner-occupied mortgage originations from Home Mortgage Disclosure Act (HMDA) data. Mortgages that are backed by Department of Veterans Affairs, the Farm Service Agency, and Rural Housing Service are excluded.

² An FHA loan is a US Federal Housing Administration mortgage insurance backed mortgage loan that is provided by a FHA-approved lender.

³ Subprime loans are for persons with blemished or limited credit history. The loans carry a higher rate of interest than prime loans to compensate for increased credit risk.

⁴ The standard down payment requirement for a conventional home purchase loan was 20 percent during much of the 20th century. The traditional minimum down payment of FHA loan was 3% in 2000 and 3.5% in 2011.

⁵ For instance, most FHA loans are fixed-rate mortgages, while the majority of subprime loans are adjustable-rate mortgages. Also, unlike FHA loans, most subprime mortgages contain prepayment penalties.

effective costs for FHA and subprime loans are substantially higher than those of conventional prime loans.

The growth of high risk mortgage market sector provided people who could not previously qualify for a mortgage the opportunity to own a house. However, the expansion of credit to high risk borrowers also contribute to the 2007 financial crisis, which traps millions of homeowners in high cost mortgages that might eventually lead to default, foreclosure, bankruptcy and other adverse events. This paper seeks to link higher-risk lending to broad market conditions where state legislations may interact with mortgage lending decisions. State foreclosure and bankruptcy provisions have potential influence on lenders' exposure to credit risk. Also, the degree to which lenders would respond to those state legislations by adjusting their underwriting standards might differ across different risk segments of the mortgage market. The main research question is to examine the impact of state foreclosure and bankruptcy provisions on different types of mortgages that are available to prospective borrowers by looking for evidence that lenders tend to respond to higher-risk environment by modifying the types of loans that are originated.

The core assumption of this paper is that higher-risk mortgages cost more than conventional prime mortgages and mortgage applicants with different risk profiles self-select into different markets. As outlined by Stiglitz and Weiss (1981), when borrowers display observable differences in risk attributes, competitive markets will charge higher-risk borrowers higher interest rates. Such risk-based pricing has become increasingly common in the mortgage market and has been a longstanding practice in markets for commercial and industrial loans. Since subprime mortgage underwriting standards are generally less stringent than conventional prime mortgage underwriting standards and, on some dimensions, less demanding than FHA mortgage underwriting standards, the costs of subprime loans are substantially higher than conventional

prime loans and usually higher than FHA loans. In this regard, the three types of mortgages that are examined in this paper have an ordered ranking based on their risk and lending costs.⁶ For this reason, an ordered probit model will be used in the empirical analysis to test the impact of state policies on different types of mortgages. To test the robustness of our conclusions without the ordering assumption, the result from a multinomial logit model is also displayed.

There is also an interesting relationship between FHA and subprime loans. Since they serve a relatively similar clientele, they might be close substitutes. Therefore, we also run a set of probit regressions using only FHA and subprime loans. The idea is implicitly reflected in Figure 1 through the recent reversal in subprime and FHA market shares. Karikari, Voicu and Fang (2009) confirm this notion and find that a sizeable number of subprime loan borrowers would have qualified for FHA loans. By focusing on differences in the impact of state legislations on FHA and subprime mortgage originations, this paper helps to understand the extent to which the two types of loans are good substitutes. The results also help to understand and justify the governmental effort to promote FHA loans as the subprime market has collapsed. In order to compare the choice between FHA loans and subprime loans, we restrict the empirical analysis to home purchase loans.⁷

The identification of the empirical analysis is based on state-level variations in foreclosure laws and bankruptcy provisions and a border estimation strategy. The major identification challenge in this analysis is that a regional shock may be misinterpreted as the impact of the laws because of the regional patterns of the real estate markets. We address this problem by limiting our analysis to counties that border each other and are located in different states. This approach

⁶ Conventional prime loans are less risky than FHA loans; FHA loans are less risky than subprime loans. Conventional prime loans are less costly than FHA loans and even less costly than subprime loans.

⁷ We thank an anonymous referee for pointing out that FHA and subprime refinancing loans are not often comparable.

is widely used in the real estate finance literature, such as Pence (2006). An implicit assumption is that the mortgage applications in nearby counties take on similar values for unobserved characteristics that would otherwise bias the results. To further aid identification, we also control for a set of borrower characteristics as well as a wide range of county and census tract level attributes. These control variables consist of county level controls including state anti-predatory lending laws, foreclosure delay period, Herfindahl-Hirschman Index, dummy variables indicating FHA mortgage limits are set at the "floor" or the "ceiling"; tract level controls including income, age composition, racial composition, education characteristics, unemployment, poverty status, population density, characteristics of housing stock, income to housing value ratio, and denial rate of conventional loan applications; and loan level controls including race, gender, income and co-application status. The details of these control variables are in the data section. We believe these control measures shed additional light on the mortgage market and the 2007 subprime crisis, which are discussed in the results section.

Results are largely consistent with the model predictions. First, higher-risk loans are less likely to be originated in a state with defaulter-friendly foreclosure laws. Specifically, proven to be the most influential foreclosure provision in previous literature, judicial foreclosure requirements decrease the probability of originating a higher-risk loan no matter what the current market conditions are. The impact of deficiency judgments is much weaker and depends on the current market condition. Redemption provision shows no impact on the probability of originating a higher-risk loan. Second, higher-risk loans are less likely to be originated in a state with a more generous homestead exemption. Finally, the probit regressions based on FHA and subprime home purchase loans suggest that there is no clear pattern of the impact on FHA and subprime originations with respect to state foreclosure and bankruptcy laws under different

market conditions. This result is consistent with the idea that subprime and FHA loans are close substitutes and dominate the mortgage markets for riskier borrowers.

The plan for the rest of the paper is as follows. Section 2 discusses the relevant literature. Section 3 develops the conceptual model used to clarify the impact of state laws on mortgage market outcomes and provides additional legal background. Section 4 describes my empirical strategy and model. Section 5 contains a description of the data. Section 6 presents the estimation results, and Section 7 concludes.

2. Relevant Prior Literature

This paper is related to a number of studies that examine the linkage between legal environment, borrowers' access to mortgage credit and mortgage outcomes. These studies can be broadly categorized into several strands.

First, government legislations affect the market share of different loan products. The academic literature has confirmed the impact of government targeted programs (i.e. GSE affordable housing goals⁸ and CRA⁹-related lending) on the traditional domain of the government-insured programs (FHA loans) in the mortgage market. An and Bostic (2008) find evidence that more aggressive GSE purchases in targeted communities result in a significant retreat of FHA activities.¹⁰ Spader and Quercia (2012) show that the extent to which the origination of a CRA mortgage substitutes for FHA and subprime originations. In addition, there

⁸ GSE stands for Government Sponsored Enterprise, and is commonly used to refer to Fannie Mae and Freddie Mac (together, the GSEs). The Department of Housing and Urban Development (HUD) sets certain targets for GSEs to purchase mortgages from the secondary market. The affordable housing goals require the GSEs to have a certain proportion of their purchases be of mortgages made to low income borrowers, borrowers residing in low income communities and borrowers in certain high minority neighborhoods.

⁹ CRA stands for the Community Reinvestment Act. It is a United States federal law designed to encourage commercial banks and savings associations to help meet the need of borrowers in all segments of the community, including low- and moderate-income neighborhoods.

¹⁰ Other related studies include Ambrose and Pennington-Cross (2000) and Gabriel and Rosenthal (2010).

is a growing literature seeking to understand how predatory lending laws affect the cost of subprime credit, the aggregate flow of subprime credit as well as the type of credit (e.g. Ho and Pennington-Cross (2007), Pennington-Cross and Ho (2008), Bostic, Engel, McCoy, Pennington-Cross and Wachter (2008), Bostic, Chomsisengphet, Engel, McCoy, Pennington-Cross and Wachter (2012)).

Second, state bankruptcy and foreclosure laws affect mortgage default and foreclosure rates. Lin and White (2001) argue that state bankruptcy homestead exemption influence borrowers' incentives to default by delaying resolution of default and determining the amount of assets that borrowers can retain after bankruptcy. Desai, Elliehausen and Steinbuks (2013) analyze the effects of state bankruptcy asset exemptions and foreclosure laws on mortgage default and foreclosure rates across different segments of the mortgage market and find that the effects of these legal provisions are most pronounced in the most risky segment of the mortgage market. Some other studies, including Pennington-Cross (2010), Capozza and Thomson (2006), Qi and Xiaolong (2009) and Ghent and Kudlyak (2011), examine how different state foreclosure laws affect the timing and cost of foreclosure.

Third, state bankruptcy and foreclosure laws affect borrowers' access to mortgage credit. Meador (1982) and Schill (1991) find a modest effect of foreclosure laws on mortgage interest rates. Pence (2006) shows that defaulter-friendly state foreclosure laws decrease equilibrium loan size. Cao (2014) finds a strong impact of state bankruptcy homestead exemptions on mortgage application outcomes. Curtis (2014) shows that lender-friendly foreclosure laws are associated with an increase in the volume of subprime originations, but has less effect on the prime market.

Furthermore, there is an extensive literature on mortgage contract choices.¹¹ Studies focusing on choices among conventional prime, FHA and subprime mortgages are relatively limited, partly because the subprime market is relatively new. Nichols, Pennington-Cross, and Yezer (2005) analyze originations of home purchase, fixed-rate mortgages between February 1996 and July 1996 among conventional prime, FHA, and subprime products and find that borrowers with higher-risk profiles are more likely to use subprime and FHA loans and FHA products dominate the market for low down-payment mortgages. LaCour-Little (2007) examines home purchase mortgage product preferences of low-and moderate-income borrowers and shows that individual credit characteristics and financial factors generally drive product choices.

This paper adds to the literature by examining the impact of state foreclosure and bankruptcy laws on the types of mortgages that are originated. We integrate the idea that lenders respond to state foreclosure and bankruptcy provisions differently across different risk segments of the mortgage market and borrowers self-select into different market segments after communicating with mortgage lending agencies. Together, we test the hypothesis that the impact of the state provisions are more pronounced in the more risky segments of the mortgage market, i.e. FHA and subprime markets. We also test the hypothesis that FHA and subprime mortgages are close substitutes.

3. Conceptual Model and State Laws

Consider now a stylized model of mortgage origination outcome. Following the work by Nichols, Pennington-Cross, and Yezer (2005), and Ho and Pennington-Cross (2007), this study assumes that applicants self-select into the appropriate market based on their understanding of

¹¹ For example, Gabriel and Rosenthal (1991), Hendershott et al. (1997), and Pennington-Cross and Nichols (2000) examine FHA and conventional prime choices. Courchane et al. (2004), Wachter et al. (2006) and Apgar et al. (2007) examine subprime and conventional prime choices.

the ordered costs of a subprime mortgage, a FHA mortgage and a prime mortgage.¹² Subprime underwriting standards are generally less stringent than conventional prime and, on some dimensions, less demanding than FHA underwriting standards. Thus, the costs of subprime loans are substantially higher than conventional prime loans and usually higher than FHA loans. Mortgage applicants with different risk profiles fall into different markets.

We assume that all information included in the application can be summarized by a single number (credit risk).¹³ The credit risk is a monotonically increasing function of the borrower's likelihood of default. Assuming mortgage lenders can observe the true credit risks of borrowers, they approve all loan applications with a credit risk that is lower than a uniform underwriting cut-off. The prime underwriting cut-off is lower than FHA underwriting cut-off and subprime underwriting cut-off. In this model, we also assume the prime market is perfectly sorted; everyone who applies for a conventional prime loan and has a credit risk less than the corresponding cutoff will be approved.¹⁴ Borrowers with credit risk above the conventional prime underwriting cut-off are classified as FHA and subprime borrowers.

The legal environment can affect mortgage outcomes. The state provisions this paper intend to examine are state foreclosure laws and bankruptcy homestead exemption laws. There are two types of foreclosure procedures in the US: judicial and non-judicial foreclosures. In a judicial foreclosure, a court orders the foreclosure and supervises the whole foreclosure process. In a non-judicial (power-of-sale) foreclosure, the lender notifies the borrower of its intent to foreclose and appoints an independent party to arrange the sale. Judicial foreclosures are generally more costly and time consuming for lenders than non-judicial foreclosures. A statutory

¹² In reality, this assumption is not unrealistic because of the existence of pre-application and communication between applicants and lending agencies before submitting a formal application.

¹³ Ferguson and Peters (1995) and Ambrose, Pennington-Cross, and Yezer (2002) also use this approach.

¹⁴ Although we observe some rejections of prime applications in practice, empirical research has shown that subprime loans are rejected at a much higher rate than prime loans.

right of redemption and a deficiency judgment are other significant foreclosure provisions. A statutory right of redemption allows a borrower to purchase the foreclosed property at the foreclosure sale price plus accrued interest during a specified period of time after the foreclosure sale. This right delays the buyer obtaining a clear title and lowers the bids at foreclosure sales. A deficiency judgment allows a lender to recover against the borrower's personal assets if the proceeds from the foreclosure sale are not sufficient to repay the loan. Allowing a deficiency judgment can potentially decrease lenders' costs in a foreclosure and overall risk.

Borrower-friendly state provisions, such as judicial foreclosure requirement, tend to impose larger costs on lenders. Thus, if a state imposes borrower-friendly restrictions on the foreclosure process, lenders may respond to the higher costs by reducing loan supply and borrowers may respond to the protections imbedded in these laws by demanding larger mortgages. Since higher-risk borrowers are more likely to default than conventional prime loan borrowers, mortgage lenders will tighten the underwriting standards for the higher-risk loans more than that of their conventional prime counterparts. Higher-risk loans would be less likely to be originated in states with borrower-friendly foreclosure provisions.

State homestead exemptions specify the amount up to which an individual's home equity is protected in a bankruptcy. If the home equity is below the state's homestead exemption, homeowners can keep their homes after filing for bankruptcy. If the home equity is above the state's homestead exemption, homeowners who file for bankruptcy must give up their homes for foreclosure sale. The proceeds of selling the house are first used to pay the costs of foreclosure. Then, the money obtained from selling the home is used to repay the mortgage, as well as the second mortgage if there is one, in full. Next, an amount up to the homestead exemption is retained by the homeowner. Finally, the remainder is distributed to the remaining unsecured

creditors.

As discussed in Cao (2014), the homestead exemption is unambiguously beneficial to mortgage borrowers and is likely to increase the propensity of homeowners to retain wealth in the form of home equity.¹⁵ However, the impact of the homestead exemption on mortgage lenders is potentially ambiguous. On the one hand, the homestead exemption allows mortgage borrowers to shift resources from consumer debts towards mortgage debts. This effect is known as the “wealth effect,” since a more generous homestead exemption leaves borrowers with more funds to make their mortgage payments. Therefore, mortgage lenders are less likely to encounter mortgage default risk. On the other hand, the bankruptcy filing stops all collection efforts and delays the foreclosure process, in which case mortgage lenders are more likely to encounter additional transaction costs. Therefore, homestead exemptions might have an ambiguous impact on mortgage lenders’ willingness to issue credit and thereby affect mortgage originations.

In addition, subprime and FHA loans seem to share a very similar clientele compared to conventional prime mortgages—borrowers with higher credit risks. If subprime and FHA loans are close substitutes, the impact of the foreclosure and bankruptcy laws on the probability of originating one of these two types of loans should be relatively small.

In summary, the above analysis allows us to develop a set of testable hypotheses regarding the impact of the state foreclosure laws and bankruptcy homestead exemption provisions on higher-risk mortgage lending outcomes. First, we expect lenders to impose tighter underwriting standards on higher-risk loans in states with defaulter-friendly foreclosure laws. Therefore, higher-risk loans are less likely to be originated in those areas, holding everything else equal.

¹⁵ There are two mechanisms through which mortgage borrowers could retain more wealth in the form of home equity. One is through the house value effect: holding the loan-to-value (LTV) ratio constant, borrowers buy more expensive homes and request larger loans. The other effect is through the LTV effect: holding house value constant, borrowers take out smaller loans and have smaller LTV ratios.

Second, conventional prime loans are more likely to be originated in the states that offer greater bankruptcy protection, which is measured by the bankruptcy homestead exemption. Finally, the laws will not have a significant impact on the lending activities between subprime loans and FHA loans since the two types of loans are close substitutes for each other.

4. Empirical Model

4.1. Identification Strategy

There are two primary empirical identification challenges. First, it is difficult to identify the impact of state foreclosure and bankruptcy policies on mortgage originations because housing markets vary dramatically by region over time. For instance, the inflation-adjusted housing prices have shown dramatically different growth around the country.¹⁶ From 1979 through 1998, house prices rose 74% in Boston, 10% in Los Angeles, 11% in Chicago and fell 21% in Dallas. In a simple cross sectional regression, a regional shock to the housing market could be misinterpreted as an effect of the foreclosure or bankruptcy laws. The second challenge is the potential endogeneity associated with foreclosure law provisions or the homestead exemption level. If differences or changes in the state foreclosure provisions or the homestead exemption level are driven by unobserved local attributes, our estimates can be biased.

Similar to Pence (2006) and Pennington-Cross and Ho (2008), we address these identification challenges by focusing on the 55 urban areas that cross state boundaries. We believe urban areas are more populated and are more likely to be affected by the policies. We assume that mortgage applications in the census tracts that are within the same urban area but located in adjacent states are reasonably similar. Therefore, mortgage applications in these census

¹⁶ See Wheaton and Nechayev (2008).

tracts are subject to different state foreclosure or bankruptcy provisions, but the proximity assures that they have similar unobserved local attributes. Also, the border areas are only a small portion of each state. Thus, we assume that the border areas are not large enough to drive the changes in the state-level policies, making the policy changes exogenous.

4.2. Estimation Equations

Two sets of models are examined for home purchase loans for all years pooled together and for each sample year. These regressions are (i) the impact of state laws on mortgage originations of conventional prime loans versus FHA loans versus subprime loans using an ordered probit model, (ii) the impact of state laws on mortgage originations of FHA loans versus subprime loans using a simple probit model. As a robust check to the ordering assumption, we also conduct multinomial regressions in addition to the ordered probit model.

The estimation equation we use is as follow:

$$Y_{ijt} = \theta_t J_{jt} + \mu_t E_{jt} + \gamma_t X_{ijt} + \alpha_j + \alpha_t + \varepsilon_{ijt} \quad (3.1)$$

Where i denotes the mortgage loan origination, j specifies the urban area to which the mortgage belongs, and t denotes the time period (year). Y_{ijt} equals to 1 for conventional prime originations, 2 for FHA originations, and 3 for subprime originations in the first set of regressions. Similarly, Y_{ijt} equals 0 for FHA originations and 1 for subprime originations in the second set of regressions. J_{jt} is a vector of indicator variables for the three foreclosure law provisions, E_{jt} is the homestead exemption amount in a specific period,¹⁷ X_{ijt} are a set of other relevant control variables, α_j is the urban area fixed-effect, α_t is the year fixed-effect and ε_{ijt} is the error term.

¹⁷ State foreclosure laws generally do not vary over time. But the homestead exemption levels vary over time even after adjusting for inflation.

The urban area fixed effect controls for time-invariant urban area characteristics, such as proximity to amenities. The year fixed-effect controls for temporal shocks. Furthermore, we also run the model year-by-year; the year-by-year estimation allows for differences in the impacts due to the changes in market conditions over the sample horizon. Those changes include dramatic shifts in mortgage underwriting standards, fluctuations in housing prices and differences in the overall mortgage market. We also add an assortment of county- and tract- level control variables in order to directly control for the within urban area time-varying, area-specific characteristics. The detailed explanations of these variables are in the Data section.

5. Data

5.1 Sources and variables

Following Pence (2006) and Pennington-Cross and Ho (2008), a geographic-based sampling approach is used. In particular, we focus on counties in the United States that are part of a metropolitan statistical area (MSA) as defined by the Census Bureau; that lie along state borders; and that share a border with another metropolitan county.¹⁸ Based on this selection criterion, we focus on 55 county groups that cross state boundaries, which consist of 181 bordering counties. Appendix A lists these counties.

The primary data that we utilize are obtained from the Home Mortgage Disclosure Act (HMDA). Specifically, we draw upon the HMDA data from 2004 to 2008. The HMDA data contain a rich set of information, including loan type, loan purpose, and borrower characteristics. We control for borrower attributes in all regressions. The FHA loans are also identified in the HMDA data. The sample is restricted to loan originations that are FHA-eligible (i.e. meet the

¹⁸ The Home Mortgage Disclosure Act (HMDA) only requires lenders to report mortgage applications in metropolitan areas.

FHA loan limits¹⁹ for one-unit single-family housing). This ensures that the choice between mortgage products that we consider in this study are not influenced by the FHA loan limits. We also exclude other government insured loans, such as VA loans, because they are not available to the general public, employ unique underwriting standards, and comprise only a small share of the market. Throughout the analysis, we retain only loan originations for owner-occupied properties and focus on home purchase loans. Since the sample sizes are large, we select a random sample of 50% of all originations each year. The major drawback of HMDA data is that it has no information about applicants' creditworthiness, such as credit scores.

Subprime loans are identified using the rate spread variable in HMDA.²⁰ There is no perfect way of identifying subprime loans. Mayer and Pence (2008) discuss three different definitions and data sources that can be used to identify subprime loans: securitized subprime loans from the LoanPerformance²¹ data set, higher-priced loans identified by rate spread variables²² in HMDA and the HUD subprime lender list²³. They suggest, for the time being, the HMDA higher-priced measure is likely to provide the most comprehensive coverage of subprime mortgages.²⁴ HUD subprime lender list and LoanPerformance definition of subprime mortgages are likely to miss large shares of subprime originations. Therefore, considering the time period of our study, we use the rate spread variable to define subprime loans.

¹⁹ FHA loan limits vary by county and over time. As of August 2011, the standard (floor) loan limit for areas where housing costs are relatively low is \$271,050 for one-unit properties. The "ceiling" loan limit for higher cost areas is \$729,750 for one-unit properties. FHA loan limits vary based on area median home price, but all will fall within the range of \$271,050 and \$729,750 for one unit properties.

²⁰ Rate spread is the difference between the annual percentage rate (APR) on a mortgage and the yield on a Treasury security of comparable maturity.

²¹ First American LoanPerformance, a subsidiary of First American Core Logic, Inc., provides information on securitized mortgages in subprime pools.

²² The information started to be added to HMDA data in 2004. Mortgages with an APR three percentage points over the Treasury benchmark and junior liens with an APR five percentage points over the benchmark are called "higher-priced" loans.

²³ HUD subprime lender list is available annually from 1993 to 2005.

²⁴ A potential limitation of using rate spread variables in HMDA to identify subprime mortgages is that it may capture different shares of ARMs and FRMs because of the way the threshold interest is calculated.

The key policy variables in this study are state foreclosure laws and bankruptcy homestead exemption laws. First, we included a set of dummy variables indicating state foreclosure laws.²⁵ These dummy variables are: whether a judicial foreclosure process is required; whether a deficiency judgment is permitted; whether a post-sale redemption is permitted. The judicial foreclosure variable equals one if the state requires that lenders must proceed through the courts to foreclose on a property. The deficiency variable equals one if the state permits deficiency judgments using the main procedure for foreclosure (either judicial or non-judicial) in the state. The redemption variable equals one if the state permits effective post-sale redemption of the foreclosure property.

Second, we included one state bankruptcy homestead exemption variable whose effects on mortgage markets are examined in Cao (2014). There are substantial differences in the generosity of homestead exemption across states and time. The homestead exemption ranges from zero or a few thousand dollars to unlimited. For simplicity, we top coded the unlimited exemption as \$500,000.²⁶ The homestead exemption also depends on the characteristics of debtors. Some states allow married couples to have a higher homestead exemption which usually doubles when they file jointly. Since HMDA does not have information on the applicant's marital status, we assume the applicants that have co-applicants are married. Following Cao (2014), we double the homestead exemption for the applicants who have co-applicants and live in states that allow this increase.²⁷ Some states also specify larger exemptions for senior citizens, veterans, the disabled, heads of family and debtors with dependents. We ignore these special treatments for simplicity.

²⁵ Data on the state foreclosure law variables are hand collected and cross validated from Pence (2006), Elias (2009) and Curtis (2014).

²⁶ We convert the homestead exemptions to year 2008 dollars using the Consumer Price Index obtained from the Bureau of Labor Statistics.

²⁷ The results are similar without this assumption being made.

The empirical model also includes several county-level control variables. The first is an index measuring the strength of state anti-predatory lending laws (Bostic, et al., 2008) that affect credit availability. The index measures which loans are covered by anti-predatory lending laws, which loan terms are restricted, and which parties may enforce the restrictions. Predatory lending laws affect mortgage originations by limiting certain loan terms. This variable also helps control for differences in states' overall mortgage regulation approach. The second is a variable capturing foreclosure delay period. Cutts and Merrill (2008) compute the difference in the legally required and actually observed foreclosure timelines, which gives a measure of delay related to, for example, backlogged court calendars. Delay in foreclosure process decreases recovery on defaulted loans and increases the lender cost of foreclosure. The third is the Herfindahl-Hirschman Index (HHI)²⁸ of mortgage markets at the county level, calculated using the HMDA data. The HHI captures local market competition among mortgage lenders.²⁹ As pointed out by Dick and Lehnert (2010), the effects of competition on lending standards are theoretically ambiguous.³⁰ Dell'Ariccia, Igan and Laeven (2008) find that denial rates decrease in areas with a larger number of competitors, indicating that there is a loosening in lending standards associated with market competition. This control variable helps to understand the linkage between market competition and lending standards and tests whether higher-risk loans are more easily originated in a more competitive market. Fourthly, we include two dummy variables, Low Cost Areas and High Cost Areas, indicating FHA mortgage limits are set at the

²⁸ The HHI equals to the sum of squared market shares of mortgage loans. The shares are calculated as the number of loans originated by each mortgage lender to the total number of mortgage loans originated in a county. An increase in the HHI generally indicates a decrease in competition and an increase in market power.

²⁹ As suggested by one anonymous referee, this index may also represent the "hotness" of a market.

³⁰ On the one hand, we might expect banks to loosen standards due to larger competitive pressure. On the other hand, banks may not be able to afford the luxury of relaxing lending standards due to larger competitive pressure, and in fact, may have to strengthen them.

"floor" or the "ceiling" in the county.³¹ Finally, we obtain yearly unemployment rate from the Bureau of Labor Statistics. Areas with high unemployment rates may be viewed as higher-risk locations by lenders.

Data on neighborhood characteristics are obtained from the year 2000 census. The census data provide tract-level measures of socio-demographic and economic variables. These include income, age composition, racial composition, education characteristics, unemployment, poverty status, population density, and characteristics of housing stock. We also include census tract level denial rates of conventional loan applications in the previous year. Borrowers may turn to higher-risk loans because their prior conventional mortgage applications have been turned down or they know it is difficult to be approved of conventional mortgages. Mian and Sufi (2009) find that borrowers who live in the subprime ZIP codes are more likely to be denied in a mortgage application prior to the expansion of subprime mortgages.³² In the credit expansion, however, firms may choose to exploit people with unwarranted subprime loans at locations with unsatisfied demand. The ratio of average family income to average housing value in the tract and median rent are also included in the regressions to proxy for other aspects of housing, such as affordability issues.

5.2 Summary Statistics

Table 1 provides the summary statistics. The table indicates that 56 percent of mortgage originations in my sample are located in states that require a judicial foreclosure process; 94

³¹ In 2004 to 2007, the National Housing Act provides that the FHA mortgage limit for any given area shall be set at 95% of the median house price in that area, as determined by the Department of Housing and Urban Development. In 2008, FHA limit increases to 125% of the median house price in that area. However, FHA limit cannot be lower than a "floor" or higher than a "ceiling". The "floor" and the "ceiling" are a certain percentage of Freddie Mac loan limit.

³² Subprime zip codes are defined in the paper as zip codes in the highest quartiles in the national distribution of the fraction of consumers with a credit score below 660 as of 1991.

percent of mortgage originations in states with deficiency judgments allowed in the main procedure for foreclosure of the state; 10 percent of mortgage originations in states with right of redemption allowed. The average homestead exemption amount is about \$92,124.

The average foreclosure delay is 43 days. The mean of anti-predatory lending law index is 6.65. 19 percent of mortgage originations are in low-cost counties, while 22 percent of mortgage originations are in high-cost counties. The mean of HHI is around 0.07, indicating the market competition is relatively intense. The loan denial rate of conventional loan applications in the previous year is around 19%, which is consistent with market priors.

6. Estimation Results

This section presents the empirical results. In all tables, t ratios based on standard errors clustered at the census tract level are reported.³³ All regressions include urban area fixed effects, year fixed effects when applicable and an extensive list of socioeconomic attributes at different geographic levels. We mainly focus on the statistically significant results in the discussion.

6.1 Conventional Prime vs. FHA vs. Subprime

Table 2 presents estimation results from the ordered probit regressions, which are based on conventional prime, FHA, and subprime home purchase loans. The pooled results for all year from 2004 through 2008 and the results for each year are presented. To show our results are robust without the ordering assumption, table 3 and appendix B present the results of the

³³ We do not cluster at the urban area level because households living in the same census tract are more homogeneous with respect to income, wealth and other socioeconomic attributes. By clustering at the census tract level, we allow for arbitrary correlation across observations in the same census tract.

multinomial logit model.³⁴ Table 5 provides estimated marginal effects of the explanatory variables calculated at their means for the pooled regressions. The discussion is based on ordered regressions, unless otherwise noted.

The pooled ordered probit model suggests that higher-risk loans are less likely to be originated in a state with judicial foreclosure requirements. A conventional prime loan is more likely to be originated in a state with judicial foreclosure requirements by the probability of 0.74%. It also suggests that higher-risk loans are more likely to be originated in a state with readily available deficiency judgments, although the t-ratio is only 1.41. Redemption provision does not affect the probability of originating a higher-risk home purchase loan. Turn to the estimates for each year. The impact of judicial foreclosure requirements is consistent across years no matter what the market conditions are. The impact of deficiency judgments varies a lot at different time periods. These results are consistent with our prior predictions. Lenders respond to the extra costs imposed by defaulter-friendly foreclosure provisions by imposing tighter underwriting standards. Redemption rights are rarely exercised, and previous research has found little effect of the redemption provision (Pence, 2006; Curtis, 2014).

The estimates also suggest that conventional prime loans are more likely to be originated in a state with a more generous homestead exemption. This result is robust across all sample years. It is consistent with the idea that a more generous homestead exemption encourages mortgage borrowers to file for bankruptcy and the bankruptcy proceeding imposes large additional costs on mortgage lenders. Therefore, mortgage lenders are exposed to larger default risk and are more willing to originate safer and less expensive loans.

³⁴ Table 3 reports the pooled results and appendix B presents the results for each sample year. Multinomial logit model and multinomial probit model produce very similar results; we choose multinomial logit because it is much less demanding on computation.

The multinomial logit results support these conclusions, although the point estimates differ slightly. While we think there is indeed an ordering of associated credit risk and costs among conventional prime loans, FHA loans and subprime loans, our results are very robust without this ordering assumption.

The coefficients on control variables provide additional insights on the mortgage market. As expected, foreclosure delay decreases recovery on defaulted loans, and thus decreases the probability of higher-risk loan originations. Consistent with previous literature (Bostic et al., 2008; Ho and Pennington-Cross, 2007), stronger anti-predatory lending laws are associated with higher probability of higher-risk originations. The hypothesis is that anti-predatory lending laws can reduce the costs of sorting honest loans and dishonest loans and lessen borrowers' fears of predation, thus stimulating higher-risk originations.

We find that higher previous and current unemployment rates lead lenders to be more cautious and originate safer loans. The estimate on HHI also has the expected sign: higher-risk loans are more likely to be originated in markets with severer competition among lenders. It implies market competition lead to an easing of underwriting standards. Higher-risk loans are also more likely to be originated at locations that conventional prime loan applications are more likely to be turned down before.

Higher-risk loans are less likely to be originated at locations that have especially low or high housing values. Similarly, when the average income to housing value ratio is high in an area, conventional prime loans are more utilized. However, with other things equal, higher income and higher tract income relative to the MSA seem to increase the probability of originating higher-risk loans.

The results also suggest that higher-risk loans are more likely to be originated for African-American, Hispanic or female borrowers or when an area has higher percentage of these types of borrowers. This finding is potentially consistent with the story of mortgage discrimination³⁵ and reverse-redlining³⁶. However, without controlling for borrowers' creditworthiness, we cannot draw a conclusion from this study. Finally, areas with high percentage of college educated population are more likely to see more conventional prime originations.

6.2 Probit Model of FHA vs. Subprime Originations

Table 4 presents the estimation results from the probit model, which only includes FHA loans and subprime home purchase loan originations. Marginal effects of the explanatory variables calculated at their mean values for the pooled regression are reported in Table 5. The estimates suggest that there is no clear pattern of the impact on FHA and subprime originations with respect to state foreclosure and bankruptcy laws under different market conditions. The judicial foreclosure requirement, the most influential provision of the foreclosure laws, has no statistically significant impact on the probability of originating a FHA loan or a subprime loan. We see the same pattern for bankruptcy homestead exemption. The same conclusion holds when we run the regression for each year. These results are consistent with the idea that subprime and FHA home purchase loans are close substitutes and dominate the mortgage market for riskier borrowers. Therefore, the impact of the foreclosure and bankruptcy laws on the origination of these two types of loans is anticipated to be similar.

³⁵ Discrimination is the practice of banks, governments or other lending institutions denying loans to one or more groups of people primarily on the basis of race, ethnic origin, sex or religion.

³⁶ Redlining is the practice by which mortgage lenders figuratively draw a red line around minority neighborhoods and refuse to make mortgage loans available inside the red lined area. Reverse redlining is the practice by which mortgage lenders specifically target and makes high cost loans available to minority neighborhoods.

The deficiency judgment and redemption provisions are shown to have smaller or even nonexistent impact on the mortgage market in previous literature (e.g. Pence, 2006). Interestingly and counterintuitively, we find that these two provisions have an impact on the probability of originating a FHA loan or a subprime loan. The regressions by year suggest the statistically significant impact comes from certain sample years. While we cannot draw a conclusion here and it is not the main focus of this paper, our finding implies that the deficiency judgment and redemption provisions may have effects on the choice of FHA and subprime loans and motivates future research.

The impact of the control variables is largely as expected. For example, higher percentage of minority population increases the probability of originating subprime loans; higher percentage of college education population decreases the probability of originating subprime loans. The estimates on some control variables are insignificant.³⁷ For example, unemployment rate, Hispanic status, tract income relative to MSA, and locating in a low cost area do not have a significant impact on the probability of originating a FHA loan or a subprime loan. We take these estimates on the control variables as a mix of evidence that subprime and FHA home purchase loans are close substitutes and that there is an ordering of credit risk and costs between FHA loans and subprime loans as we discussed.

7. Conclusion

This paper provides empirical evidence on the impact of state foreclosure and bankruptcy laws on the probability of originating conventional prime loans, FHA loans and subprime loans in the context of U.S. mortgage markets over the 2004-2008 periods. This paper looks for

³⁷ This could be caused by the smaller sample size in this set of regressions.

evidence that lenders tend to respond to higher-risk legal environment by modifying the types of loans that are issued. We contribute to the state policy and mortgage finance literature by focusing on the impact of state legislations on the origination of different types of mortgage loans with different level of risk and costs. The empirical analysis uses a border methodology by focusing on mortgage originations in 55 urban areas across state borders and comparing mortgages that are in the same urban area yet in different states. This identification strategy helps to address the endogeneity problem that arises from the unobserved loan characteristics.

We believe there is an ordering of associated credit risk and costs among conventional prime loans, FHA loans and subprime loans and thus exploit an ordered probit model as our main specification. We find that higher-risk loans are less likely to be originated in a state with defaulter-friendly foreclosure laws. Specifically, higher-risk loans are less likely to be originated in states with judicial foreclosure requirements. Permitting deficiency judgments in a state tends to increase the chance of originating higher-risk loans, but the evidence is inconsistent across years. As suggested by previous studies, right of redemption has no clear impact on the types of mortgages originated. The results also suggest that higher-risk loans are less likely to be originated in a state with a more generous homestead exemption. The rich set of control variables included in our analysis aids our identification and offers additional insight into the mortgage market. The multinomial logit regressions provide very similar results and suggest our conclusions are robust without the ordering assumption.

We also find that there is no clear pattern of the impact on FHA and subprime originations with respect to state foreclosure and bankruptcy laws under different market conditions using a probit model. This result is consistent with the idea that subprime and FHA loans are close substitutes, especially for home purchase loans. Our results provide some

rationale for the current governmental effort to promote FHA loans as the subprime market has collapsed. Promoting FHA loans could be one way to remedy the 2007 subprime crisis for the ability of FHA loans to adapt to changing purposes under different market conditions.³⁸

³⁸ Pennington-Cross and Yezer (2000) believe that FHA market share will be maintained and perhaps expanded in the new millennium with the ability to invent new purchases for itself.

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Figure 1: Mortgage Originations by Market Segments, 2001-2008

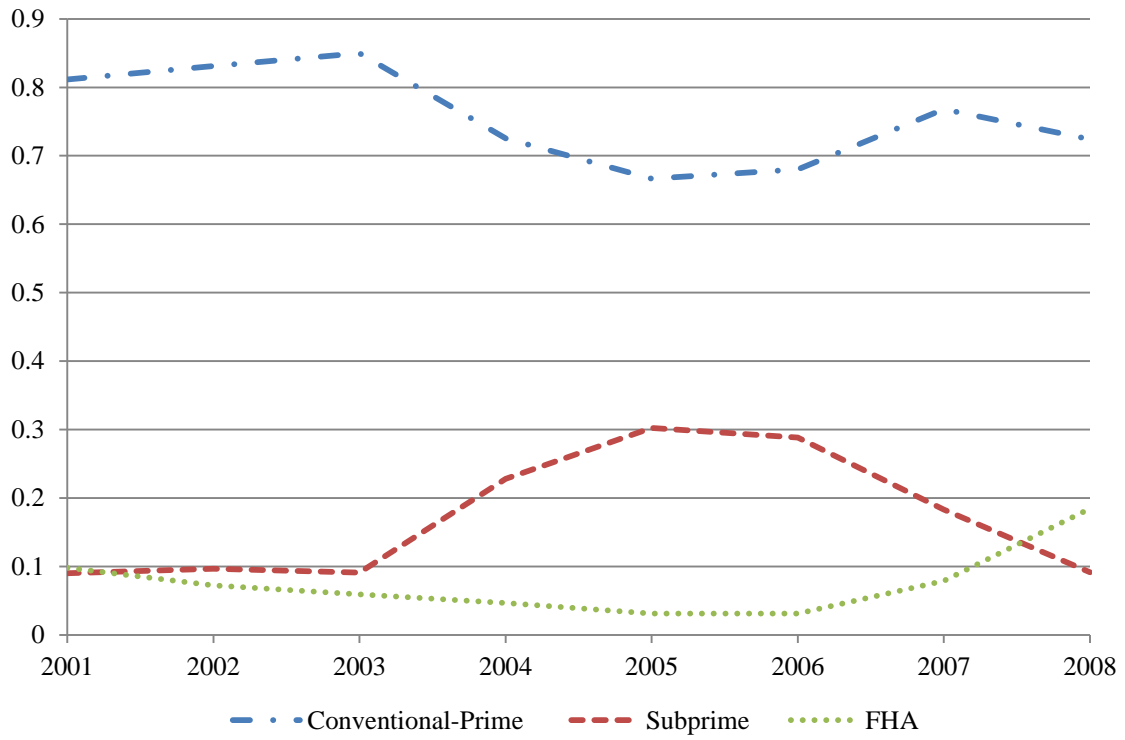


Table 1: Summary Statistics

Variables	Mean	Std. Dev.
Judicial foreclosure requirements	0.56	0.50
Deficiency judgment	0.94	0.23
Redemption	0.10	0.30
Bankruptcy homestead exemption	92124	164431
Foreclosure delay	43.26	52.80
Anti-predatory lending law	6.65	3.19
Unemployment rate in the county	5.04	1.18
Herfindahl-Hirschman Index of lenders	0.07	0.08
Conventional loan denial rate one year ago	0.19	0.08
Percent aged 15-29	0.19	0.05
Percent aged 30-54	0.39	0.05
Percent aged 55-64	0.20	0.07
Percent aged 65+	0.12	0.06
Percent female	0.52	0.03
Percent African-American	0.16	0.26
Percent Hispanic	0.08	0.15
Percent some high schools	0.12	0.07
Percent high school graduates	0.32	0.10
Percent some colleges	0.23	0.06
Percent college	0.28	0.17
Average house value (in 1,000 dollars)	156.07	87.06
Average income to house value	0.75	4.71
Low cost areas	0.19	0.39
High cost areas	0.22	0.42
Median rent	909.41	291.18
Percent unemployed	0.05	0.43
Tract income relative to MSA	1.01	0.36
African-American	0.13	0.34
Hispanic	0.004	0.062
Female	0.33	0.47
Co-applicants	0.37	0.48
Income (in 1,000 dollars)	80.69	85.66

Table 2: Ordered Probit Model of Home Purchase Originations
(t-ratios based on standard errors clustered at census tract level in parentheses)

	All Years	2004	2005	2006	2007	2008
Judicial foreclosure requirements	-0.0218 (-2.47)	-0.0396 (-3.03)	-0.0495 (-3.53)	-0.0508 (-3.68)	-0.0396 (-2.58)	-0.0136 (-0.93)
Deficiency judgment	0.0370 (1.41)	0.0506 (1.46)	-0.0539 (-1.52)	-0.1017 (-2.85)	0.0254 (0.61)	0.1035 (2.09)
Redemption	-0.0032 (-0.31)	-0.0186 (-1.27)	-0.0152 (-0.98)	-0.0317 (-1.98)	0.0124 (0.79)	0.0409 (2.32)
Bankruptcy homestead exemption	-0.0002 (-5.99)	-0.0002 (-4.27)	-0.0001 (-3.03)	-0.0001 (-3.13)	-0.0001 (-2.76)	-0.0003 (-5.64)
Foreclosure delay	-0.0003 (-3.57)	-0.0004 (-3.29)	-0.0005 (-4.66)	-0.0005 (-4.68)	-0.0003 (-2.57)	0.0000 (0.35)
Anti-predatory lending law	0.0075 (6.56)	0.0067 (4.00)	0.0097 (5.54)	0.0117 (6.29)	0.0171 (9.21)	0.0045 (2.31)
Unemployment rate in the county	-0.0155 (-4.86)	-0.0235 (-4.66)	-0.0217 (-4.07)	-0.0166 (-2.70)	0.0186 (2.93)	-0.0001 (-0.02)
Herfindahl-Hirschman Index of lenders	-1.5574 (-24.94)	-4.2146 (-6.27)	-6.1540 (-7.42)	-0.9349 (-7.62)	-4.4672 (-7.42)	-3.6268 (-7.43)
Conventional loan denial rate one year ago	1.8046 (32.48)	2.2320 (27.28)	2.1353 (23.80)	2.4338 (24.93)	2.7007 (28.25)	2.1443 (26.49)
Percent aged 15-29	-1.0359 (-12.29)	-0.7125 (-5.86)	-1.0367 (-8.91)	-1.0487 (-8.31)	-0.8629 (-7.02)	-0.6403 (-4.91)
Percent aged 30-54	-1.8269 (-14.00)	-1.2365 (-7.20)	-1.9043 (-10.71)	-1.8876 (-10.23)	-1.5316 (-8.47)	-1.1061 (-5.47)
Percent aged 55-64	-0.9161 (-6.06)	-0.6411 (-2.99)	-0.6057 (-2.95)	-0.9696 (-4.72)	-0.7899 (-3.76)	-1.1747 (-5.38)
Percent aged 65+	-0.3328 (-1.88)	-0.2078 (-0.85)	-0.7158 (-2.97)	-0.2407 (-0.98)	-0.2968 (-1.19)	0.1389 (0.53)
Percent female	0.2237 (1.81)	0.1129 (0.68)	0.1658 (0.95)	0.2452 (1.39)	-0.2274 (-1.24)	0.9063 (4.53)
Percent African-American	0.1044 (5.26)	0.0369 (1.41)	0.1155 (4.05)	0.1160 (4.30)	-0.0025 (-0.08)	-0.2278 (-7.24)
Percent Hispanic	0.5078 (12.70)	0.5148 (10.40)	0.6557 (11.63)	0.5787 (10.70)	0.2161 (3.78)	-0.0255 (-0.42)
Percent some high schools	0.5250 (4.22)	0.3358 (2.03)	0.4230 (2.27)	0.4895 (2.80)	0.4752 (2.58)	0.8292 (4.00)
Percent high school graduates	0.4801 (5.01)	0.6065 (4.75)	0.3891 (2.74)	0.5162 (3.96)	0.5305 (3.72)	0.7191 (4.88)
Percent some colleges	0.7130 (7.72)	0.7333 (6.08)	0.6299 (4.65)	0.7297 (5.80)	0.5473 (3.97)	1.2471 (8.29)
Percent college	-0.6728 (-7.39)	-0.5098 (-4.17)	-0.7969 (-5.97)	-0.6509 (-5.19)	-0.5015 (-3.70)	-0.1557 (-1.08)
Average house value (in 1,000 dollars)	-0.0006 (-9.32)	-0.0004 (-4.25)	-0.0003 (-3.45)	-0.0005 (-4.76)	-0.0006 (-6.48)	-0.0009 (-9.00)

Table 2 continue: Ordered Probit Model of Home Purchase Originations
(t-ratios based on standard errors clustered at census tract level in parentheses)

	All Years	2004	2005	2006	2007	2008
Average income to house value	-0.0081 (-2.66)	-0.0078 (-2.12)	-0.0068 (-1.80)	-0.0074 (-2.03)	-0.0058 (-2.78)	-0.0104 (-3.09)
Low cost areas	-0.0471 (-4.73)	0.0076 (0.26)	-0.0431 (-1.49)	-0.0763 (-2.80)	0.0813 (2.82)	0.1338 (3.44)
High cost areas	-0.0428 (-3.69)	-0.1657 (-6.52)	-0.0751 (-2.86)	-0.1864 (-6.80)	-0.1370 (-5.66)	-0.1717 (-4.09)
Median rent	0.0001 (7.05)	0.0001 (3.22)	0.0001 (5.10)	0.0001 (5.97)	0.0001 (2.82)	0.0001 (3.09)
Percent unemployed	-0.5191 (-5.46)	-0.4916 (-4.01)	-0.6075 (-4.53)	-0.6027 (-4.29)	-0.4286 (-2.94)	-0.4619 (-3.16)
Tract income relative to MSA	0.0471 (3.06)	0.0446 (1.99)	0.0230 (1.01)	0.0387 (1.78)	0.0917 (4.22)	0.0288 (1.18)
African-American	0.4798 (80.46)	0.4258 (47.69)	0.5379 (57.35)	0.5242 (56.32)	0.4147 (38.62)	0.3867 (33.37)
Hispanic	0.1783 (10.13)	0.1997 (5.90)	0.2293 (6.82)	0.1692 (4.82)	0.0632 (1.41)	0.1654 (3.41)
Female	0.0152 (6.05)	0.0306 (6.01)	0.0074 (1.52)	0.0047 (0.93)	0.0040 (0.66)	0.0454 (7.33)
Co-applicants	-0.2097 (-72.82)	-0.1913 (-35.20)	-0.3362 (-63.01)	-0.2985 (-53.06)	-0.0899 (-14.19)	0.1164 (15.95)
Income (in 1,000 dollars)	0.0001 (5.36)	0.0000 (0.70)	0.0003 (6.69)	0.0006 (8.40)	0.0001 (2.02)	-0.0023 (-14.21)
Constant	0.4773 (3.27)	0.5178 (2.66)	-0.4578 (-2.20)	-0.2381 (-1.17)	0.5742 (2.77)	0.9217 (4.02)
Year fixed effects	5	-	-	-	-	-
Urban area fixed effects	55	55	55	55	55	55
Observations	1,744,289	381,654	430,392	414,025	298,607	219,611

Table 3: Multinomial Logit Model of Home Purchase Originations
(t-ratios based on standard errors clustered at census tract level in parentheses)

	FHA	Subprime
Judicial foreclosure requirements	-0.0322 (-1.27)	-0.0686 (-3.69)
Deficiency judgment	0.2426 (2.83)	-0.0287 (-0.61)
Redemption	-0.1165 (-4.10)	-0.0034 (-0.16)
Bankruptcy homestead exemption	-0.00019 (-2.46)	-0.00025 (-5.27)
Foreclosure delay	0.0005 (2.11)	-0.0008 (-5.61)
Anti-predatory lending law	0.0300 (9.21)	0.0125 (5.40)
Unemployment rate in the county	-0.0206 (-2.58)	-0.0247 (-3.96)
Herfindahl-Hirschman Index of lenders	-0.2556 (-1.38)	-2.2781 (-20.69)
Conventional loan denial rate one year ago	4.6085 (33.81)	3.6419 (34.71)
Percent aged 15-29	-0.6435 (-2.69)	-1.8352 (-11.38)
Percent aged 30-54	-1.3377 (-3.92)	-3.0829 (-12.66)
Percent aged 55-64	-3.1909 (-7.31)	-1.2142 (-4.33)
Percent aged 65+	2.2004 (4.43)	-0.9242 (-2.84)
Percent female	1.8703 (5.09)	-0.0279 (-0.12)
Percent African-American	-0.6154 (-12.70)	0.2107 (5.85)
Percent Hispanic	0.5256 (4.84)	0.8730 (12.38)
Percent some high schools	1.4083 (3.72)	0.9077 (4.01)
Percent high school graduates	1.7153 (5.05)	0.8690 (4.98)
Percent some colleges	2.8647 (9.69)	0.8660 (5.13)
Percent college	0.0242 (0.08)	-1.1778 (-7.12)
Average house value (in 1,000 dollars)	-0.0021 (-6.49)	-0.0008 (-6.71)

Table 3 continue: Multinomial Logit Model of Home Purchase Originations
(t-ratios based on standard errors clustered at census tract level in parentheses)

	FHA	Subprime
Average income to house value	-0.2358 (-5.30)	-0.0149 (-2.54)
Low cost areas	-0.0816 (-3.46)	-0.1318 (-6.05)
High cost areas	-0.4028 (-10.97)	-0.0826 (-3.62)
Median rent	0.0001 (3.05)	0.0002 (7.28)
Percent unemployed	-0.8372 (-2.82)	-1.1145 (-6.35)
Tract income relative to MSA	0.1616 (2.82)	0.0518 (1.78)
African-American	0.7731 (55.81)	0.8799 (78.19)
Hispanic	0.3415 (7.47)	0.3081 (8.84)
Female	0.1201 (18.02)	0.0042 (0.82)
Co-applicants	0.4966 (60.73)	-0.5764 (-91.57)
Income (in 1,000 dollars)	-0.0098 (-48.65)	0.0010 (15.66)
Constant	-2.5679 (-6.18)	-1.4451 (-5.35)
Year fixed effects		5
Urban area fixed effects		55
Observations		1,744,289

Table 4: Probit Model of Home Purchase Originations (FHA = 0; Subprime = 1)
(t-ratios based on standard errors clustered at census tract level in parentheses)

	All Years	2004	2005	2006	2007	2008
Judicial foreclosure requirements	-0.0242 (-1.21)	0.0164 (0.59)	0.0156 (0.58)	-0.0869 (-3.33)	-0.0410 (-1.18)	0.0751 (2.25)
Deficiency judgment	-0.1497 (-2.65)	-0.1541 (-1.82)	-0.1174 (-1.64)	-0.3631 (-4.56)	-0.1041 (-1.10)	0.0351 (0.41)
Redemption	0.0418 (2.11)	0.0412 (1.47)	0.0664 (2.57)	0.0296 (1.00)	0.0399 (1.24)	-0.0653 (-1.62)
Bankruptcy homestead exemption	0.00003 (0.49)	-0.00006 (-0.79)	-0.00002 (-0.24)	0.00009 (1.03)	0.00006 (0.67)	-0.00003 (-0.25)
Foreclosure delay	-0.0011 (-7.22)	-0.0010 (-4.55)	-0.0011 (-5.60)	-0.0014 (-6.61)	-0.0008 (-3.44)	-0.0008 (-3.06)
Anti-predatory lending law	-0.0135 (-5.90)	-0.0172 (-5.19)	-0.0168 (-5.28)	-0.0154 (-4.33)	-0.0221 (-5.49)	0.0001 (0.02)
Unemployment rate in the county	0.0017 (0.33)	0.0117 (1.29)	0.0479 (5.71)	0.0365 (3.52)	0.0074 (0.61)	-0.0066 (-0.54)
Herfindahl-Hirschman Index of lenders	-1.1762 (-10.58)	2.3679 (1.98)	-0.1307 (-0.11)	0.3530 (1.45)	1.4624 (1.00)	6.4878 (7.24)
Conventional loan denial rate one year ago	-0.8730 (-7.90)	-0.7833 (-4.37)	-0.7878 (-4.48)	-0.1589 (-0.81)	0.5349 (3.05)	0.1090 (0.65)
Percent aged 15-29	-0.3635 (-2.23)	0.0958 (0.36)	-0.1277 (-0.53)	-0.4682 (-1.99)	-0.5098 (-1.90)	-0.8108 (-2.70)
Percent aged 30-54	-0.4272 (-1.87)	-0.0427 (-0.12)	-0.1856 (-0.53)	-0.3134 (-0.96)	-0.4810 (-1.27)	-1.1884 (-2.87)
Percent aged 55-64	1.4572 (5.34)	2.1167 (4.73)	1.0689 (2.81)	0.6428 (1.74)	1.4852 (3.25)	2.6745 (5.89)
Percent aged 65+	-1.8739 (-6.02)	-2.1502 (-4.26)	-1.1855 (-2.65)	-0.9361 (-2.19)	-2.0275 (-3.81)	-3.8828 (-7.10)
Percent female	-1.0212 (-4.20)	-0.7566 (-1.98)	-1.2080 (-3.31)	-0.5155 (-1.52)	-1.5368 (-3.76)	-1.3962 (-3.20)
Percent African-American	0.4789 (15.80)	0.4948 (10.51)	0.4642 (9.49)	0.3733 (8.47)	0.3924 (7.34)	0.2385 (4.14)
Percent Hispanic	0.1779 (2.57)	0.0115 (0.11)	0.2480 (2.40)	0.4536 (4.90)	0.2927 (2.44)	-0.3115 (-2.68)
Percent some high schools	-0.0882 (-0.35)	-0.1525 (-0.42)	0.0780 (0.22)	-0.1188 (-0.37)	-0.6056 (-1.66)	-0.2357 (-0.59)
Percent high school graduates	-0.4932 (-2.18)	-0.2447 (-0.77)	-0.5506 (-1.72)	-0.3938 (-1.51)	-0.7272 (-2.15)	-0.6837 (-2.22)
Percent some colleges	-1.2645 (-6.45)	-1.4446 (-5.36)	-0.8463 (-2.99)	-0.8791 (-3.46)	-1.6419 (-5.51)	-2.2345 (-7.51)
Percent college	-0.4885 (-2.46)	-0.3087 (-1.09)	-0.4195 (-1.42)	-0.3681 (-1.48)	-0.5265 (-1.75)	-0.6721 (-2.33)
Average house value (in 1,000 dollars)	0.0003 (1.66)	0.0014 (3.83)	0.0008 (2.84)	0.0013 (4.02)	0.0014 (3.92)	-0.0006 (-2.01)

Table 4 continue: Probit Model of Home Purchase Originations (FHA = 0; Subprime = 1)
(t-ratios based on standard errors clustered at census tract level in parentheses)

	All Years	2004	2005	2006	2007	2008
Average income to house value	0.0632 (3.08)	0.1367 (3.69)	0.0339 (1.61)	0.0682 (2.05)	0.2067 (4.28)	0.0542 (1.87)
Low cost areas	0.0022 (0.11)	-0.2288 (-4.04)	-0.1862 (-3.52)	-0.2301 (-3.81)	0.0882 (1.09)	-0.2834 (-3.77)
High cost areas	0.2292 (9.40)	0.0735 (1.32)	0.3937 (5.88)	0.2453 (3.84)	0.1890 (3.21)	0.1203 (1.37)
Median rent	0.00004 (1.52)	0.00006 (1.45)	0.00007 (1.48)	0.00010 (2.25)	0.00005 (1.09)	-0.00013 (-2.81)
Percent unemployed	-0.0492 (-0.25)	0.0672 (0.20)	-0.6766 (-2.02)	-0.0418 (-0.18)	-0.0427 (-0.16)	0.5565 (1.77)
Tract income relative to MSA	-0.0300 (-0.88)	-0.1642 (-2.78)	-0.1513 (-3.01)	-0.1126 (-2.22)	-0.0784 (-1.30)	0.1559 (2.76)
African-American	0.0766 (9.38)	0.0931 (6.42)	0.1346 (9.54)	0.1373 (9.22)	-0.0112 (-0.60)	-0.1685 (-7.57)
Hispanic	-0.0112 (-0.34)	-0.0834 (-1.35)	0.2095 (3.04)	-0.0799 (-1.16)	-0.1397 (-1.56)	-0.1058 (-0.78)
Female	-0.0505 (-7.99)	-0.0354 (-3.24)	-0.0343 (-3.56)	-0.0624 (-5.36)	-0.0703 (-5.81)	-0.0575 (-4.49)
Co-applicants	-0.5209 (-30.19)	-0.5133 (-21.99)	-0.6034 (-42.99)	-0.5696 (-21.18)	-0.5469 (-41.90)	-0.2802 (-20.48)
Income (in 1,000 dollars)	0.0031 (3.09)	0.0020 (1.45)	0.0059 (8.49)	0.0037 (2.17)	0.0035 (13.46)	0.0025 (13.18)
Constant	-0.5693 (-2.03)	-1.1760 (-2.90)	-2.0632 (-5.18)	-1.9077 (-4.62)	-1.8061 (-4.10)	-0.7149 (-1.52)
Year fixed effects	5	-	-	-	-	-
Urban area fixed effects	55	55	55	55	55	55
Observations	528,308	97,920	157,697	138,649	62,334	71,708

Table 5: Marginal Probabilities (at the mean values of the covariates)

	Ordered Probit All-Year			Multinomial Logit All-Year			Probit All-Year
	Conventional	FHA	Subprime	Conventional	FHA	Subprime	Subprime
Judicial foreclosure requirements	0.0074	-0.0016	-0.0057	0.0106	-0.0011	-0.0095	-0.0080
Deficiency judgment	-0.0125	0.0028	0.0097	-0.0077	0.0144	-0.0067	-0.0497
Redemption	0.0011	-0.0002	-0.0008	0.0060	-0.0067	0.0008	0.0139
Bankruptcy homestead exemption	0.00005	-0.00001	-0.00004	0.00004	-0.000009	-0.00003	0.000009
Foreclosure delay	0.00009	-0.00002	-0.00007	0.00009	0.00004	-0.00012	-0.00036
Anti-predatory lending law	-0.0025	0.0006	0.0020	-0.0031	0.0016	0.0015	-0.0045
Unemployment rate in the county	0.0053	-0.0012	-0.0041	0.0042	-0.0009	-0.0033	0.0006
Herfindahl-Hirschman Index of lenders	0.5267	-0.1168	-0.4099	0.3137	0.0096	-0.3233	-0.3902
Conventional loan denial rate one year ago	-0.6104	0.1353	0.4751	-0.7010	0.2293	0.4717	-0.2896
Percent aged 15-29	0.3504	-0.0777	-0.2727	0.2735	-0.0178	-0.2557	-0.1206
Percent aged 30-54	0.6179	-0.1369	-0.4809	0.4716	-0.0448	-0.4269	-0.1417
Percent aged 55-64	0.3099	-0.0687	-0.2412	0.3123	-0.1728	-0.1395	0.4834
Percent aged 65+	0.1126	-0.0249	-0.0876	0.0178	0.1381	-0.1559	-0.6216
Percent female	-0.0757	0.0168	0.0589	-0.0852	0.1093	-0.0241	-0.3387
Percent African-American	-0.0353	0.0078	0.0275	0.0013	-0.0381	0.0368	0.1589
Percent Hispanic	-0.1717	0.0381	0.1337	-0.1405	0.0212	0.1193	0.0590
Percent some high schools	-0.1776	0.0394	0.1382	-0.1870	0.0723	0.1148	-0.0293
Percent high school graduates	-0.1624	0.0359	0.1264	-0.1965	0.0906	0.1059	-0.1636
Percent some colleges	-0.2412	0.0535	0.1877	-0.2507	0.1576	0.0931	-0.4194
Percent college	0.2276	-0.0504	-0.1771	0.1548	0.0141	-0.1688	-0.1620
Average house value (in 1,000 dollars)	0.0002	-0.0000	-0.0002	0.0002	-0.0001	-0.0001	0.0001
Average income to house value	0.0027	-0.0006	-0.0021	0.0132	-0.0136	0.0004	0.0209
Low cost areas	0.0159	-0.0035	-0.0124	0.0213	-0.0033	-0.0179	0.0007
High cost areas	0.0145	-0.0032	-0.0113	0.0301	-0.0226	-0.0075	0.0760
Median rent	-0.00003	0.00000	0.00002	-0.00003	0.00000	0.00002	0.00001
Percent unemployed	0.1756	-0.0389	-0.1367	0.1873	-0.0368	-0.1505	-0.0163
Tract income relative to MSA	-0.0159	0.0035	0.0124	-0.0145	0.0089	0.0057	-0.0099
African-American	-0.1623	0.0359	0.1263	-0.1532	0.0356	0.1176	0.0254
Hispanic	-0.0603	0.0134	0.0469	-0.0570	0.0166	0.0404	-0.0037
Female	-0.0052	0.0011	0.0040	-0.0063	0.0069	-0.0007	-0.0168
Co-applicants	0.0709	-0.0157	-0.0552	0.0527	0.0351	-0.0878	-0.1728
Income (in 1,000 dollars)	-0.00004	0.00000	0.00003	0.00033	-0.0006	0.00025	0.00104

Appendix A: The Geography of Sample

Group	County	State	Group	County	State
1	Baldwin County	Alabama	20	Wood County	West Virginia
1	Escambia County	Florida	21	Cook County	Illinois
2	Jackson County	Mississippi	21	Kankakee County	Illinois
2	Mobile County	Alabama	21	Lake County	Indiana
3	Hancock County	Mississippi	21	Will County	Illinois
3	St. Tammany Parish	Louisiana	22	Aiken County	South Carolina
4	Muscogee County	Georgia	22	Columbia County	Georgia
4	Russell County	Alabama	22	Richmond County	Georgia
5	Crittenden County	Arkansas	23	Jefferson County	Missouri
5	DeSoto County	Mississippi	23	Madison County	Illinois
5	Shelby County	Tennessee	23	St. Charles County	Missouri
5	Tipton County	Tennessee	23	St. Clair County	Illinois
6	Bowie County	Texas	23	St. Louis County	Missouri
6	Miller County	Arkansas	23	St. Louis City	Missouri
7	Crawford County	Arkansas	24	Rock Island County	Illinois
7	Sebastian County	Arkansas	24	Scott County	Iowa
7	Sequoyah County	Oklahoma	25	Boone County	Illinois
8	Placer County	California	25	Rock County	Wisconsin
8	Washoe County	Nevada	25	Winnebago County	Illinois
9	Laramie County	Wyoming	26	Kenosha County	Wisconsin
9	Larimer County	Colorado	26	Lake County	Illinois
9	Weld County	Colorado	26	McHenry County	Illinois
10	Catoosa County	Georgia	27	Clark County	Indiana
10	Hamilton County	Tennessee	27	Floyd County	Indiana
10	Walker County	Georgia	27	Harrison County	Indiana
11	Dakota County	Minnesota	27	Jefferson County	Kentucky
11	St. Croix County	Wisconsin	27	Oldham County	Kentucky
11	Washington County	Minnesota	28	Henderson County	Kentucky
12	Dona Ana County	New Mexico	28	Vanderburgh County	Indiana
12	El Paso County	Texas	28	Warrick County	Indiana
13	Brunswick County	North Carolina	29	Christian County	Kentucky
13	Horry County	South Carolina	29	Montgomery County	Tennessee
14	Gaston County	North Carolina	30	Caddo Parish	Louisiana
14	Mecklenburg County	North Carolina	30	Harrison County	Texas
14	York County	South Carolina	31	Calcasieu Parish	Louisiana
15	Hawkins County	Tennessee	31	Orange County	Texas
15	Sullivan County	Tennessee	32	Baltimore County	Maryland
15	Washington County	Virginia	32	Carroll County	Maryland
16	Ashtabula County	Ohio	32	Harford County	Maryland
16	Chautauqua County	New York	32	Lancaster County	Pennsylvania
16	Erie County	Pennsylvania	32	York County	Pennsylvania
17	Belmont	Ohio	33	Hampden County	Massachusetts
17	Marshall	West Virginia	33	Hartford County	Connecticut
17	Ohio County	West Virginia	33	Tolland County	Connecticut
18	Beaver County	Pennsylvania	34	Dutchess County	New York
18	Hancock County	West Virginia	34	Fairfield County	Connecticut
18	Jefferson County	Ohio	34	Putnam County	New York
18	Washington County	Pennsylvania	35	Essex County	Massachusetts
19	Mahoning County	Ohio	35	Rockingham County	New Hampshire
19	Mercer County	Pennsylvania	36	Hillsborough County	New Hampshire
19	Trumbull County	Ohio	36	Middlesex County	Massachusetts
20	Washington County	Ohio	36	Worcester County	Massachusetts

37	Bristol County	Massachusetts	48	Clark County	Washington
37	Bristol County	Rhode Island	48	Multnomah County	Oregon
37	Hampden County	Massachusetts	49	Rockingham County	New Hampshire
37	Norfolk County	Massachusetts	49	Strafford County	New Hampshire
37	Providence County	Rhode Island	49	York County	Maine
37	Windham County	Connecticut	50	Bergen County	New Jersey
37	Windham County	Connecticut	50	Bronx County	New York
38	New London County	Connecticut	50	Fairfield County	Connecticut
38	Washington County	Rhode Island	50	Hudson	New Jersey
39	Burlington County	New Jersey	50	Middlesex County	New Jersey
39	Camden County	New Jersey	50	New York	New York
39	Cecil County	Maryland	50	Passaic County	New Jersey
39	Chester County	Pennsylvania	50	Richmond County	New York
39	Delaware County	Pennsylvania	50	Rockland County	New York
39	Gloucester County	New Jersey	50	Union County	New Jersey
39	New Castle County	Delaware	50	Westchester County	New York
39	Philadelphia County	Pennsylvania	51	Orange County	New York
40	Boone County	Kentucky	51	Sussex County	New Jersey
40	Butler County	Ohio	52	Bucks County	Pennsylvania
40	Campbell County	Kentucky	52	Hunterdon County	New Jersey
40	Clermont County	Ohio	52	Mercer County	New Jersey
40	Dearborn County	Indiana	53	Northampton County	Pennsylvania
40	Hamilton County	Ohio	53	Warren County	New Jersey
40	Kenton County	Kentucky	54	Arlington County	Virginia
41	Douglas County	Nebraska	54	District of Columbia	DC
41	Pottawattamie County	Iowa	54	Fairfax County	Virginia
41	Sarpy County	Nebraska	54	Frederick County	Maryland
42	Cass County	Missouri	54	Loudoun County	Virginia
42	Clay County	Missouri	54	Montgomery County	Maryland
42	Jackson County	Missouri	54	Prince George's County	Maryland
42	Johnson County	Kansas	55	Douglas County	Wisconsin
42	Leavenworth County	Kansas	55	St. Louis County	Minnesota
42	Platte County	Missouri			
42	Wyandotte County	Kansas			
43	Boyd County	Kentucky			
43	Cabell County	West Virginia			
43	Greenup County	Kentucky			
43	Lawrence County	Ohio			
43	Wayne County	West Virginia			
44	Fulton County	Ohio			
44	Lenawee County	Michigan			
44	Lucas County	Ohio			
44	Monroe County	Michigan			
45	Cass County	North Dakota			
45	Clay County	Minnesota			
46	Berrien County	Michigan			
46	St. Joseph County	Indiana			
47	Grand Forks County	North Dakota			
47	Polk County	Minnesota			

Source: Pence (2006)

**Appendix B: Multinomial Logit Model of Home Purchase Originations by Year
(t-ratios based on standard errors clustered at census tract level in parentheses)**

	2004		2005		2006		2007		2008	
	FHA	Subprime	FHA	Subprime	FHA	Subprime	FHA	Subprime	FHA	Subprime
Judicial foreclosure requirements	-0.0985 (-2.57)	-0.0848 (-3.05)	-0.0987 (-2.31)	-0.1018 (-3.85)	0.0249 (0.59)	-0.1201 (-4.62)	-0.0264 (-0.62)	-0.1068 (-3.06)	-0.0671 (-2.36)	0.0448 (0.84)
Deficiency judgment	0.2324 (2.13)	0.0149 (0.20)	0.0844 (0.70)	-0.1063 (-1.67)	0.4187 (3.11)	-0.2500 (-3.95)	0.1559 (1.20)	-0.0080 (-0.10)	0.1655 (1.74)	0.1117 (0.85)
Redemption	-0.1754 (-4.24)	-0.0103 (-0.35)	-0.2598 (-5.84)	-0.0234 (-0.82)	-0.2026 (-4.19)	-0.0505 (-1.66)	-0.0891 (-2.07)	0.0542 (1.53)	0.1098 (3.03)	0.0123 (0.19)
Bankruptcy homestead exemption	-0.00009 (-0.83)	-0.00029 (-3.61)	-0.00005 (-0.41)	-0.00016 (-2.35)	-0.00015 (-1.10)	-0.00020 (-2.72)	-0.00011 (-0.85)	-0.00021 (-2.30)	-0.00045 (-4.73)	-0.00053 (-3.23)
Foreclosure delay	0.0000 (-0.06)	-0.0009 (-3.83)	0.0005 (1.32)	-0.0010 (-4.80)	0.0008 (2.22)	-0.0012 (-5.42)	0.0002 (0.57)	-0.0007 (-2.84)	0.0003 (1.18)	-0.0006 (-1.36)
Anti-predatory lending law	0.0319 (6.55)	0.0075 (2.15)	0.0452 (8.20)	0.0142 (4.37)	0.0455 (7.77)	0.0184 (5.26)	0.0591 (10.61)	0.0254 (6.20)	0.0054 (1.35)	0.0114 (1.73)
Unemployment rate in the county	-0.0604 (-4.36)	-0.0351 (-3.52)	-0.1187 (-8.21)	-0.0377 (-3.81)	-0.0764 (-4.42)	-0.0234 (-2.07)	0.0183 (1.08)	0.0433 (3.20)	0.0025 (0.22)	0.0108 (0.54)
Herfindahl-Hirschman Index of lenders	-8.5014 (-4.44)	-7.7113 (-5.45)	-8.0048 (-4.77)	-12.4814 (-6.82)	-1.1471 (-3.01)	-1.6414 (-7.22)	-8.9602 (-4.76)	-7.9415 (-5.95)	-11.1052 (-10.53)	-1.3155 (-1.02)
Conventional loan denial rate one year ago	4.5926 (17.87)	4.0968 (25.50)	4.9375 (15.38)	4.0341 (24.76)	4.3112 (16.51)	4.6043 (26.27)	3.8695 (15.84)	5.2448 (27.57)	3.9302 (24.11)	4.2700 (16.86)
Percent aged 15-29	-0.8830 (-2.23)	-1.2455 (-5.29)	-1.1974 (-2.88)	-1.8219 (-8.61)	-0.3116 (-0.79)	-1.8989 (-8.21)	-0.3566 (-0.96)	-1.8986 (-7.21)	-0.3811 (-1.45)	-1.9347 (-4.04)
Percent aged 30-54	-1.2281 (-2.35)	-2.0956 (-6.27)	-2.0500 (-3.27)	-3.2165 (-9.99)	-1.3383 (-2.35)	-3.2051 (-9.63)	-1.0452 (-2.02)	-2.9251 (-7.87)	-1.0376 (-2.55)	-3.3176 (-5.44)
Percent aged 55-64	-3.5941 (-5.16)	-0.3976 (-1.00)	-2.7642 (-3.95)	-1.0126 (-2.75)	-2.4078 (-3.63)	-1.7681 (-4.81)	-2.8629 (-4.50)	-1.0677 (-2.45)	-3.5186 (-7.36)	1.3210 (1.89)
Percent aged 65+	2.6257 (3.47)	-1.0308 (-2.19)	1.3069 (1.66)	-1.2280 (-2.84)	1.5998 (2.08)	-0.3027 (-0.69)	2.1764 (2.92)	-1.1419 (-2.22)	2.4846 (4.37)	-4.3395 (-5.13)
Percent female	1.1307 (1.87)	-0.1894 (-0.57)	2.0781 (3.29)	0.1298 (0.41)	1.4873 (2.46)	0.2376 (0.76)	1.6647 (2.91)	-1.1130 (-2.98)	2.5418 (5.59)	-0.1649 (-0.27)
Percent African-American	-0.5441 (-7.28)	0.1409 (2.78)	-0.6006 (-6.71)	0.1706 (3.37)	-0.5171 (-6.51)	0.1683 (3.56)	-0.5808 (-7.37)	0.0620 (1.08)	-0.5273 (-7.95)	-0.1238 (-1.34)
Percent Hispanic	1.0094 (6.50)	0.9151 (9.69)	0.8081 (3.89)	1.0765 (11.00)	0.2715 (1.62)	0.9340 (10.13)	-0.0432 (-0.26)	0.4116 (3.77)	0.2460 (2.07)	-0.2909 (-1.63)
Percent some high schools	0.9610 (1.82)	0.4634 (1.42)	0.9894 (1.49)	0.8254 (2.49)	1.5277 (2.70)	0.8873 (2.89)	1.7892 (3.33)	0.6457 (1.82)	1.7612 (4.34)	1.4118 (2.23)

Percent high school graduates	1.4840 (2.95)	1.0575 (4.15)	2.1463 (3.32)	0.7070 (2.83)	1.8395 (4.05)	0.9428 (4.15)	1.9135 (4.31)	0.8353 (2.89)	1.8606 (5.84)	0.8569 (1.89)
Percent some colleges	2.9586 (7.35)	0.7379 (3.11)	2.7216 (4.97)	0.9461 (3.95)	2.6260 (5.91)	1.1379 (5.15)	2.8290 (6.74)	0.5118 (1.88)	3.5793 (11.67)	-0.2170 (-0.47)
Percent college	-0.2220 (-0.50)	-0.9619 (-3.97)	0.0337 (0.06)	-1.2645 (-5.40)	0.0310 (0.07)	-1.0229 (-4.68)	-0.0698 (-0.17)	-1.0074 (-3.74)	0.3241 (1.09)	-0.8321 (-1.87)
Average house value (in 1,000 dollars)	-0.0032 (-5.06)	-0.0004 (-1.99)	-0.0027 (-3.96)	-0.0004 (-2.43)	-0.0036 (-5.06)	-0.0007 (-4.36)	-0.0047 (-8.04)	-0.0011 (-5.62)	-0.0021 (-5.48)	-0.0023 (-6.70)
Average income to house value	-0.3286 (-4.19)	-0.0128 (-1.45)	-0.1680 (-2.08)	-0.0138 (-2.22)	-0.2975 (-2.98)	-0.0188 (-2.51)	-0.4791 (-5.99)	-0.0102 (-3.07)	-0.2052 (-2.95)	-0.0057 (-1.94)
Low cost areas	0.1025 (1.33)	-0.0576 (-0.91)	0.1470 (1.57)	-0.1057 (-1.98)	0.1157 (1.28)	-0.1852 (-3.41)	-0.0100 (-0.09)	0.1786 (2.67)	0.3546 (4.63)	0.0428 (0.36)
High cost areas	-0.2933 (-3.27)	-0.2931 (-6.11)	-0.8709 (-6.31)	-0.1072 (-2.37)	-0.7840 (-6.23)	-0.2916 (-6.03)	-0.3978 (-4.83)	-0.1721 (-3.30)	-0.3346 (-3.66)	-0.0997 (-0.75)
Median rent	0.00005 (0.71)	0.00014 (0.29)	0.00002 (0.29)	0.00019 (5.33)	0.00007 (0.95)	0.00022 (6.20)	0.00005 (0.69)	0.00014 (3.23)	0.00020 (4.74)	-0.00002 (-0.23)
Percent unemployed	-0.8491 (-1.50)	-1.0840 (-4.38)	0.1527 (0.28)	-1.0914 (-4.49)	-0.7599 (-1.88)	-1.1168 (-4.48)	-0.5819 (-1.52)	-0.9839 (-3.40)	-1.4585 (-4.45)	-0.6577 (-1.52)
Tract income relative to MSA	0.3946 (3.75)	0.0051 (0.11)	0.2986 (2.79)	0.0053 (0.13)	0.3356 (3.37)	0.0375 (0.94)	0.3999 (4.40)	0.1724 (3.80)	0.0641 (0.99)	0.2385 (3.38)
African-American	0.6875 (29.99)	0.8014 (44.51)	0.7429 (27.52)	0.9603 (56.70)	0.7139 (25.55)	0.9204 (55.43)	0.7823 (28.10)	0.7361 (34.22)	0.9155 (39.05)	0.5887 (13.90)
Hispanic	0.4637 (5.41)	0.3290 (4.56)	0.0324 (0.26)	0.4035 (7.00)	0.3637 (3.15)	0.2798 (4.44)	0.3052 (2.59)	0.0634 (0.65)	0.3938 (4.48)	0.1713 (0.72)
Female	0.0961 (7.20)	0.0388 (3.57)	0.1050 (6.69)	0.0077 (0.87)	0.1387 (8.42)	0.0001 (0.01)	0.1438 (8.45)	-0.0369 (-2.86)	0.1191 (10.17)	0.0087 (0.39)
Co-applicants	0.4753 (26.91)	-0.5776 (-45.51)	0.5102 (29.47)	-0.6644 (-65.44)	0.5714 (29.19)	-0.6187 (-58.07)	0.6219 (34.98)	-0.3811 (-26.70)	0.4218 (33.97)	-0.1494 (-6.25)
Income (in 1,000 dollars)	-0.0130 (-17.81)	0.0011 (6.92)	-0.0143 (-31.02)	0.0009 (8.29)	-0.0131 (-20.02)	0.0017 (14.59)	-0.0074 (-21.81)	0.0009 (8.08)	-0.0070 (-38.08)	-0.0011 (-3.45)
Constant	-2.4578 (-4.08)	-1.0012 (-2.65)	-3.1577 (-4.37)	0.7049 (1.90)	-3.5344 (-5.05)	0.3666 (1.01)	-3.9107 (-6.12)	-0.7429 (-1.80)	-2.8879 (-6.20)	-1.7338 (-2.41)
Year fixed effects	-	-	-	-	-	-	-	-	-	-
Urban area fixed effects	55	55	55	55	55	55	55	55	55	55
Observations	381,654	430,392	414,025	298,607	219,611					