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Predatory Lending Practices and Subprime Foreclosures – Distinguishing Impacts by Loan Category\*

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A dramatic rise in subprime foreclosures over the past several years has led to calls for restrictions of or prohibitions against a range of lending practices loosely termed “predatory.” Several cities and states have enacted legislation or regulations aimed at eliminating predatory practices, and some advocacy groups have endorsed action at the national level. Using data on subprime refinance and home purchase mortgages from the Chicago metropolitan area, I examine the impact of long prepayment penalty periods, balloon payments and non-standard application process (i.e., low- and no-documentation) on the probability of foreclosure. Results suggest that the relationship between predatory lending practices and foreclosure rates is much more complicated than the arguments for restricting their use assume.

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## **I. Introduction**

Foreclosure rates have risen strongly over the past several years, with nearly half of U.S. states seeing their numbers of foreclosures rise between 24 and 115 percent just over 2001Q4-2003Q4.<sup>1</sup> The dramatic increase in foreclosures has been concentrated in the subprime lending market. Many groups have cited “predatory” lending practices as a significant culprit behind the increase in subprime foreclosures and have called for various restrictions at the local, state, and federal levels. This paper uses data for the Chicago metropolitan area, which has exhibited a large increase in foreclosures, to examine links between certain predatory lending practices and the probability of foreclosure on subprime refinance and home purchase mortgages.<sup>2</sup>

The findings indicate that the impacts of the examined loan features (described in the next section) on the probability of foreclosure vary significantly across subprime refinances and home purchase mortgages, and within these categories vary further across fixed-rate mortgages (FRMs) and adjustable-rate mortgages (ARMs). In some cases, these features are even associated with reductions in the probability of foreclosure. Findings also indicate that where there is an association between a particular “predatory” loan feature and a greater probability of foreclosure, the feature itself may not drive the association; rather, some associations appear driven by characteristics of the lender, the borrower, or both that are not fully captured in the available data.

These results weaken the case for federal legislation, such as the enactment of a national predatory lending law, or regulatory action to restrict these “predatory” lending practices. The

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<sup>1</sup> Federal Deposit Insurance Corporation, “Economic Conditions and Emerging Risks in Banking,” April 26, 2004. (Downloaded from [www.fdic.gov/deposit/insurance/risk/ecerb.pdf](http://www.fdic.gov/deposit/insurance/risk/ecerb.pdf).)

<sup>2</sup> There is a substantial body of research examining Chicago subprime lending and foreclosures, most notably a series of papers from researchers affiliated with the Woodstock Institute, a Chicago nonprofit organization that advocates greater governmental restrictions on subprime lending. These studies document that the number of foreclosure starts in Chicago rose from 4,046 in 1995 to 18,213 in 2002 (Immergluck and Smith, 2005).

effect of predatory lending practices on foreclosure rates appears more complex than a superficial view would suggest, raising the probability of unexpected and undesired consequences arising from broad restrictions or prohibitions of these practices. A sounder approach may be for lenders, regulators, and other major players (such as the government-sponsored enterprises) to emphasize prudent loan terms and underwriting standards rather than restricting particular loan features.<sup>3</sup>

The remainder of this paper is structured as follows. Section II provides background information on predatory lending practices and previous literature on the subject. Section III describes this paper's data sources and the econometric methodology for examining the data. Section IV presents results from the empirical analysis, and implications derived from the results are discussed in Section V. Section VI concludes.

## **II. Background**

### What Is Predatory Lending?

The phrase “predatory lending” has no precise and agreed-upon meaning, but generally refers to loan terms or lending practices that result in more onerous terms for a borrower than is warranted given a borrower's background and financing needs. Engel and McCoy (2002) defined predatory lending as “a syndrome of abusive loan terms or practices that involve one or more of the following five problems:

- (1) loans structured to result in seriously disproportionate net harm to borrowers;
- (2) harmful rent seeking;

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<sup>3</sup> This approach is consistent with that taken in the recently proposed Interagency Guidance on Nontraditional Mortgage Products (OCC *et al*, 2005), issued jointly by the Office of the Comptroller of the Currency, the Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation, the Office of Thrift Supervision, and the National Credit Union Administration.

- (3) loans involving fraud or deceptive practices;
- (4) other forms of lack of transparency in loans that are not actionable as fraud; and
- (5) loans that require borrowers to waive meaningful legal redress.”

They acknowledge that this definition is not suitable as a statutory definition for predatory lending, instead offering it as “a diagnostic tool for identifying problematic loan terms that require redress.”<sup>4</sup>

In empirical research and in legislation and regulations that have been proposed and enacted, predatory lending is generally defined with respect to a list of particular loan terms or lending practices. Predatory lending defined in this manner is often taken to encompass one or more of the following:<sup>5</sup>

- (1) Interest rates significantly higher (the number of percentage points varies but usually falls within 5-8 percent) than Treasury securities of comparable maturities
- (2) Long prepayment penalty periods, especially those lasting three years or more
- (3) Balloon payments
- (4) Excessively high points or fees
- (5) Lending based on borrowers’ asset values rather than abilities to repay
- (6) Frequent refinancing (“flipping”) without financial benefit for borrowers
- (7) Steering customers who qualify for lower-cost credit into higher-cost loans
- (8) Insufficient disclosure of the costs or risks associated with a loan
- (9) Inflated appraisals or income figures

In its guidelines and advisory letters, the Office of the Comptroller of the Currency (OCC) similarly has described predatory lending with respect to lists of practices rather than a single

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<sup>4</sup> Engel and McCoy (2002), pages 1260-1261.

definition.<sup>6</sup> While OCC communications have stated “a fundamental characteristic of predatory lending is the aggressive marketing of credit to prospective borrowers who simply cannot afford the credit on the terms being offered,” they also note “it is generally necessary to consider the totality of the circumstances to assess whether a loan is predatory.”<sup>7</sup>

### Previous Literature

Two studies by Immergluck and Smith (2004 and 2005) in affiliation with the Woodstock Institute make a case for stricter regulation of subprime lending using Chicago-area data. Immergluck and Smith (2004) present evidence that subprime (purchase and refinance) mortgages are far more strongly associated with foreclosures than prime mortgages. In Immergluck and Smith (2005), they present evidence that each foreclosure results in significant reductions in value of nearby single-family homes, with their calculations indicating that each Chicago foreclosure results in average cumulative property value losses of \$159,000-\$371,000 per foreclosure for the surrounding homes, depending on the assumptions used.

Combining the results of these papers creates the argument that (1) the expansion of subprime (compared to prime) mortgages is associated with a large increase in foreclosures, (2) foreclosures are associated with significant negative externalities in the form of lost wealth and decreased tax bases, and therefore (3) it is possible and appropriate to enhance social welfare by

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<sup>5</sup> A more exhaustive list of lending practices considered predatory can be found in Sturdevant and Brennan (1999), and is reproduced in Engel and McCoy (2002), Footnote 6.

<sup>6</sup> For examples, see “OCC Guidelines Establishing Standards for Residential Mortgage Lending Practices” (2005), OCC Advisory Letter 2003-2 (“Guidelines for National Banks to Guard Against Predatory and Abusive Lending Practices”), OCC Advisory Letter 2003-3 (“Avoiding Predatory and Abusive Lending Practices in Brokered and Purchased Loans”), and OCC Advisory Letter 2000-7 (“Abusive Lending Practices”).

<sup>7</sup> OCC Advisory Letter 2003-2 (“Guidelines for National Banks to Guard Against Predatory and Abusive Lending Practices”), Page 2.

restricting subprime lending, even if this also prevents some subprime borrowers from receiving beneficial credit.<sup>8</sup>

However, very little previous analysis has been conducted on the effects of predatory lending practices on subprime foreclosures. Most of the literature on predatory lending has examined the impact of particular anti-predatory lending laws on the quantity of subprime loans originated and the prevalence of the loan features and lending practices the laws target.

Harvey and Nigro (2003) find that after Chicago passed one of the earliest municipal predatory lending laws, which imposed sanctions on banks that make loans with interest rates 5 percentage points higher than Treasury securities with comparable maturities, banks moved away from subprime lending but nonbank lenders (not covered by the law) largely filled the gap, resulting in a relatively small reduction in subprime originations. A more extensive state anti-predatory law passed in 1999 in North Carolina prohibited prepayment penalties on low-value mortgages, and prohibited balloon payments, negative amortization products, and lending without regard to borrower's ability to repay in loans with fees in excess of 5 percent or interest rates more than 8 percentage points above comparable Treasury securities. An analysis by Quercia, Stegman, and Davis (2003) shows that this law did curtail the frequency of long prepayment penalty periods and balloon payments in subprime refinance loans. Harvey and Nigro (2004) also examine the North Carolina law and find that overall subprime lending

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<sup>8</sup> It is important to note that this argument in favor of placing greater restrictions on subprime lending is not made with respect to the soundness and safety of the banking or mortgage lending industries. The focus is instead on the effects of foreclosures on the surrounding communities. For that reason, the analysis of the present paper also ignores the potential effects of predatory lending restrictions on banks and other mortgage lenders, and is confined to examining whether the predatory lending practices in question are associated with higher or lower probabilities of foreclosure. Similarly, this paper does not address the loss of equity that borrowers can experience due to being trapped in a high cost loan or forced into an expensive refinancing ("equity stripping"), even if they do not lose their homes to foreclosure. While this can cause borrowers substantial harm, it is not clear that negative externalities associated with equity stripping are as straightforward or substantial as those associated with foreclosures.

contracted subsequent to passage, driven mainly by a fall in application volume and affecting nonbank subprime lending more, and more quickly, than bank subprime lending.

Li and Ernst (2006) examine differences in the prevalence of subprime loans with predatory features, the volume of subprime originations, and initial interest rates on subprime loans between states that had anti-predatory lending laws and states that did not. Using data covering 1998-2004, they find that states with anti-predatory laws had a lower percentage of subprime loans with predatory features (which they defined as prepayment penalties of any duration, balloon payments, and borrowers with high credit scores plus full documentation), no difference in overall subprime mortgage volume, and similar or lower subprime interest rates, compared to states without such laws. Ho and Pennington-Cross (2006) create an index of anti-predatory laws to analyze their impact on subprime applications, originations, and rejection rates. Their results indicate that the typical anti-predatory law has little impact on applications and originations but does reduce rejections. They also show that laws with more extensive restrictions or prohibitions can have significant impacts on applications and originations as well as rejections.

Although these studies do address predatory lending practices, variously defined, they do not examine the impacts of predatory lending practices specifically on foreclosures. One of the only studies to do so is Quercia, Stegman, and Davis (2005) (hereafter QSD). Using nationwide data on subprime refinance loans originated in 1999 and tracked through 2003, they find that long prepayment penalty periods and balloon payments are both associated with a significant increase in the probability of foreclosure.<sup>9</sup>

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<sup>9</sup> QSD's findings also indicate that a loan being an ARM rather than a FRM is associated with a greater increase in the probability of foreclosure than either a long prepayment penalty period or a balloon payment, an unexpected finding that is also found in this paper's data in unreported results.



The present paper performs an analysis similar to that of QSD but with substantive differences. While QSD examine only refinance loans and pool FRMs and ARMs together, here loans are divided by loan purpose (refinance or purchase) and loan type (FRM or ARM) into four loan categories so that differences among loan categories can be identified. Also, the interactive effects of the examined loan features are explicitly investigated here, allowing for deeper analysis of the impacts of certain lending practices on the probability of foreclosure. Additionally, although QSD use low- or no-documentation as a control variable, greater attention is paid to this variable here to examine how less demanding information requirements for borrowers can affect foreclosure rates across loan categories, and in particular the effects of the interactions of low- or no-documentation with long prepayment penalty periods and balloon payments.

This paper uses data from Chicago originations from the start of 1999 through mid-2003, rather than focusing on a single cohort (1999 originations) from across the country as in QSD. Narrowing the geographic range of the investigation limits regional forces that could potentially cloud the results, but necessarily restricts the number of loans available for study. This negative effect is mitigated by the extension the temporal range of originations included. QSD's analysis includes variables to control for state-level effects that are not relevant here, while this paper includes several demographic control variables at the ZIP code area level not present in QSD.

### **III. Data and Methodology**

In this section, I describe the data, their sources, and the methodology employed in this paper's analysis. I also present motivating evidence for analyzing separately for each of the four loan categories (refinance FRM, refinance ARM, purchase FRM, and purchase ARM) the

relationships between foreclosure rates and long prepayment penalty periods, balloon payments, and low- or no-documentation. In Section IV, results are provided from econometric estimation of the impact of these loan features on the probability of foreclosure, controlling for the impacts of a variety of other loan and demographic characteristics (detailed below).

The dataset used in this paper was purchased from LoanPerformance, Inc., a supplier of mortgage finance, servicing, and securitization information and analytical products. The dataset consists of quarterly loan-level data on subprime refinance and home purchase mortgages on properties in the Chicago metropolitan area (specifically, ZIP codes beginning with 606) that have been packaged into private-label mortgage-backed securities. Although the data includes loans originated from 1971 through the second quarter of 2003, it has relatively few loans per year until the late 1990s.<sup>10</sup> Therefore, the analysis here uses only loans originating on or after Jan. 1, 1999, after which the LoanPerformance data can more plausibly be taken to encompass a substantial portion of the Chicago subprime market (and after which the number of missing values for several variables is markedly lower).

This relatively short time period causes two notable limitations. First, the mortgages included in the sample are relatively unseasoned, so the empirical results described below may not be reflective of long-term mortgage performance. Second, because the sample period ends in mid-2003, some nontraditional mortgage types that have become widespread only more recently, such as payment-option loans, are not represented. The results below therefore may not be applicable to such potentially important loan types.

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<sup>10</sup> The number of loans included in the LoanPerformance dataset for Chicago doubled or tripled each year between 1995 (149 loans) and 1998 (4,325 loans), nearly doubled between 1998 and 1999 (7,441 loans), then grew at a more measured pace through 2002 (10,360 loans), the last full year in the dataset. Quercia, Stegman, and Davis (2003) estimate that by 1999 LoanPerformance data covered more than 40 percent of the nationwide subprime market, but do not provide state- or city-level estimates.

A multinomial logit model was selected for the econometric analysis. This model provides estimates of the impact explanatory variables have on the probability of one outcome (such as a foreclosure) relative to other outcomes (such as a loan remaining active or being prepaid). In order to include time-varying covariates, the data was converted into event history format, meaning that each quarter that a loan is active represents one observation. The multinomial logit model with event history data used here is expressed formally as:

$$\ln L = \sum_{t=1}^T \sum_{i=1}^{n_t} \sum_{j=0}^2 d_{ijt} \ln(\text{Prob}(y_{it} = j))$$

with

$$\text{Prob}(y_{it} = j) = \frac{e^{\beta_j' X_{it}}}{1 + \sum_{k=1}^J e^{\beta_k' X_{it}}} \quad \text{for } j = 1, 2$$

and

$$\text{Prob}(y_{it} = j) = \frac{1}{1 + \sum_{k=1}^J e^{\beta_k' X_{it}}} \quad \text{for } j = 0$$

where  $d_{ijt}$  is an indicator variable equaling one if outcome  $j$  occurs for loan  $i$  at time  $t$ ,  $n_t$  is the number of loans active at time  $t$ ,  $X_{it}$  is a vector of explanatory variable values for loan  $i$  at time  $t$ , and  $\beta_k$  is a vector of variable coefficients for outcome  $k$ . The  $j$  values 0, 1 and 2 refer to a loan remaining active, having a first foreclosure start, and being prepaid, respectively.<sup>11</sup> If a loan has been prepaid or seen its first foreclosure start in a given period it is no longer in the sample in subsequent periods. Because the model requires that the sum of the probabilities of all possible outcomes equal one, this model directly controls for the competing risks of foreclosure and

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<sup>11</sup> Due to the discretion lenders have in whether and when to begin foreclosure proceedings, a measure of delinquency or default might be better suited as an outcome to portray borrower distress. However, the arguments in favor of restrictions against predatory lending practices tend to stress the negative externalities of foreclosure in order to justify regulatory action. That, and the availability of first foreclosure start dates in the LoanPerformance data, motivates the use of first foreclosure start here.

prepayment. To control for unobserved heterogeneity and possible dependence among loan-quarter observations for the same loan, all econometric estimation was performed using robust standard errors allowing for clustering by loan.<sup>12</sup>

The multinomial model assumes that the odds ratio between any two outcomes is independent of any alternative outcomes (the “independence of irrelevant alternatives” assumption). It also assumes no unobserved heterogeneity across observations. An alternative model that could be used is a proportional hazard model, which allows for the estimation of the effect of explanatory variables on survival times without requiring any assumptions about the nature or shape of the underlying hazard function. This model assumes that given two observations with different values for the independent variables, the ratio of the observations’ hazard functions does not depend on time (the “proportionality assumption”). Clapp, Deng, and An (2006) use mortgage termination data to compare the results from a standard multinomial logit with event history data, a proportional hazard model accounting for competing risks, and versions of both of these models with a discrete mass-point approach to better incorporate unobserved heterogeneity.<sup>13</sup> They find general similarity in the results across the models, but that the standard multinomial logit model produced coefficient estimates closer to zero and with less statistical significance. This suggests that the results from the multinomial logit model used here may be taken as conservative estimates of the effects on the probability of foreclosure of the loan features of interest. As a robustness check, all of the econometric analyses described below

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<sup>12</sup> Preferably, the econometric analysis also would incorporate lender fixed effects, or at least control for the type of lender (bank, broker, etc.). The dataset used for this paper, described below, does not identify originating lenders and has far too many missing values for lender type (86 percent of the sample) to use that variable. Other potentially useful information about the supply side of the market, such as concentration of lenders by ZIP code area, also is not readily available.

<sup>13</sup> The discrete mass-point approach incorporates unobserved heterogeneity by modeling individual borrowers as coming from a finite number of distinct groups with unobserved characteristics. The proportional hazard model using this approach was developed by Deng, Quigley, and Van Order (2000). The multinomial logit version was developed by Clapp, Deng, and An (2006).

were also performed using a proportional hazard model. The two sets of results were similar in the magnitudes and statistical significances of the coefficient estimates in all specifications.

The LoanPerformance data contains loan-level information including purpose (refinance or purchase), type (FRM or ARM), origination date, date of first foreclosure start (if any), loan-to-value ratio at origination, borrower FICO score at origination,<sup>14</sup> whether the borrower withdrew cash out (for refinances), whether the loan terms were based on low- or no-documentation, the length of prepayment penalty period (if any), and whether the loan required a balloon payment.<sup>15</sup>

LoanPerformance does not include borrower demographic characteristics, so data from the 2000 Census served as proxies.<sup>16</sup> Specifically, the median household income, the percentage of residents who are black, the percentage who are Hispanic, the percentage who have at least a high school diploma or its equivalent, and the average number of adults per household were collected for each locale (defined by ZIP code) in the sample. Also included are interest rate indices taken from the Federal Housing Finance Board.<sup>17</sup> The exclusion of observations with

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<sup>14</sup> FICO score and loan-to-value ratio are treated as continuous variables in the analyses described below. Several papers have treated one or both of these as discrete variables, following the way many lenders use them in making origination decisions. The analysis presented in Section IV was repeated with FICO score as a discrete variable (breakpoints at 580, 620 and 660), with loan-to-value ratio as a discrete variable (breakpoints at 70, 80, 90, and 100), and with both as discrete variables. Similar results were found in each case.

<sup>15</sup> The LoanPerformance data includes the initial and current interest rates for each loan, but 42 percent of the sample observations have a value of zero, which I take to indicate a missing value, in one or both of these fields. As such, I do not include these variables in the analysis below.

<sup>16</sup> An attempt was made to combine the LoanPerformance data with publicly available data reported under Home Mortgage Disclosure Act (HMDA) of 1975, which includes borrower demographic information. However, there is not enough overlap of information to reliably match observations across datasets for each loan. A majority could be matched by linking ZIP codes (included in LoanPerformance data) to census tracts (included in HMDA data), but the variability of ZIP codes over time, the fact that census tracts often straddle ZIP codes, and the sheer number of census tracts in the Chicago area combine to make this a prohibitively time-consuming process.

<sup>17</sup> Most foreclosure studies also include a housing price index to control for trends in house values. An index for the Chicago MSA from the Federal Home Loan Mortgage Corporation was initially included here, but it rose so steadily over the sample period that its correlation with loan age was greater than 90 percent, requiring it to be dropped. Another frequently used control variable, the unemployment rate, was highly correlated with changes in interest rates and loan ages, and was also dropped. Including housing prices or unemployment rates, whether as levels or changes since origination, has no substantial effect on the findings regarding the loan features of interest, but does result in changes to some control variable estimates and significances.

missing values resulted in the final dataset comprising more than 200,000 loan-quarter observations tracking 32,618 loans.<sup>18</sup> Definitions and sources for all of the variables used in the empirical analysis are provided in Table 1, and summary statistics are provided by loan category in Table 2. Table 3 presents t-statistics indicating significant (at the 0.1 percent level in the great majority of cases) differences in means for most variables across all four loan categories, supporting the splitting of the sample by loan category.

Further evidence supporting the splitting of the sample by loan category is presented in Table 4. Each number represents the  $\chi^2$  statistic from a nonparametric Wilcoxon test of the equality of the survival curves across loan categories.<sup>19</sup> These tests indicate that when all loans are taken together, only the survival curve of purchase ARMs is significantly different from those of the other loan categories. On separating loans according to whether or not they feature a long prepayment penalty period, a balloon payment, or low- or no-documentation, statistically significant differences in survival curves are widespread across all loan categories. This suggests that each loan feature may have quite different effects on the probability of foreclosure for different loan categories, supporting contention that a thorough understanding of how long prepayment penalty periods, balloon payments, and low- or no-documentation affect the probability of foreclosure requires examining the loan categories separately.

To provide some context on how the Chicago subprime lending market compares to the market nationwide, Table 5 compares nationwide figures provided by Farris and Richardson (2004) for 2000-2002 originations (also taken from LoanPerformance data) with comparable

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<sup>18</sup> Only 27 refinance ARMs (255 observations) and eight purchase ARMs (98 observations) feature a balloon payment. Including the *BALLOON* indicator variable in models using only ARM loans prevented convergence of the parameter estimates, so these 35 loans were removed from the sample and *BALLOON* was dropped from ARM-only models. Sixty-three interest-only ARMs (196 observations) were also removed from the sample, although the results shown below are not substantially altered if these loans are included.

figures for the Chicago MSA. In the Chicago sample, ARMs outnumber FRMs two to one, while in the nationwide sample they are split approximately evenly.<sup>20</sup> The Chicago sample also has proportionately more refinances and fewer purchases than the nationwide sample. Other subprime loan characteristics are similar across the two samples.

Table 6a describes the number of subprime originations for each loan category, as well as the prevalence of long prepayment penalty periods, by year of origination. Tables 6b and 6c present the same information according to the prevalence of balloon payments and low- or no-documentation, respectively.<sup>21</sup> The number of refinance FRMs originated per year declined over the sample period, while that number increased for each of the other loan categories. For both refinance and purchase loans, there were approximately twice as many ARMs as FRMs, with the discrepancy widening for refinances and holding steady for purchases through the sample years. The prevalence of long prepayment penalty periods peaked in 2000 for most loan categories (it declined throughout the sample period for refinance ARMs). The proportion of balloon payment FRMs began dropping rapidly after 2001, more rapidly for refinance FRMs than purchase FRMs.<sup>22</sup> The prevalence of low- or no-documentation FRMs (refinances and purchases) rose throughout the sample period, while ARMs saw a dip in such loans in the first half of the sample period.<sup>23</sup>

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<sup>19</sup> See Breslow (1970) and Gehan (1965). To verify these results are not affected by differences in censoring patterns across loan categories, Peto-Peto-Prentice and Tarone-Ware tests were also run, with similar results. See Peto and Peto (1972), Prentice (1978), and Tarone and Ware (1977).

<sup>20</sup> Farris and Richardson (2004) classify loans as FRMs, ARMs, or Balloon loans, while in this paper loans are either FRMs or ARMs, with a balloon payment treated as a separate characteristic.

<sup>21</sup> Differing totals of originations in these and subsequent tables reflect different numbers of observations with missing values for long prepayment penalty periods, balloon payments, and low- or no-documentation.

<sup>22</sup> Recall that the small number of ARMs with balloon payments was dropped from the sample. See Footnote 18, Page 12.

<sup>23</sup> T-test results (omitted here) indicate that for each loan category, the change in prevalence of each of the three loan features from one origination year to the next is in most cases statistically significant at the 0.1 percent level. The change in the proportion of originations with no- or low-documentation from 2002 to 2003 was not statistically significant for refinance FRMs and refinance ARMs, and was significant at the 10 percent level for purchase FRMs. The change in this proportion from 1999 to 2000 was not significant for refinance FRMs, nor was the change from

#### IV. Empirical Analysis

Tables 7 and 8 present a broad overview of the relationships between long prepayment penalty periods, balloon payments, and low- or no-documentation loans on the one hand and the probability of foreclosure on the other. Table 7 shows, for each loan category, the percentage of loans that had a first foreclosure start in the sample period, broken out by whether a loan did or did not have the loan feature of interest. These figures indicate that for all four loan categories, loans with long prepayment penalty periods ( $PREPAY36 = 1$ ) are more likely to have a foreclosure start than those without ( $PREPAY36 = 0$ ). The same is true of loans with balloon payments ( $BALLOON = 1$ ) for the two FRM loan categories, although the difference is smaller for purchase FRMs than refinance FRMs. Low- and no-documentation loans ( $LOWNODOC = 1$ ) are less likely to have a foreclosure start in the sample period than full-documentation loans ( $LOWNODOC = 0$ ), but the difference is much more pronounced for purchase FRMs and ARMs than for refinance FRMs and ARMs.

These figures would seem to confirm the findings of QSD, who found that long prepayment penalty periods and balloon payments are associated with greater probabilities of foreclosure for subprime refinance loans. Table 8, however, shows that the relationships between combinations of the loan features of interest and foreclosures are more complex. For each loan category, the top grid shows originations and foreclosures exhibiting the possible permutations of long prepayment penalty periods and balloon payments. The middle grid does

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2000 to 2001 for purchase ARMs. The change in the proportion of originations with balloon payments from 2000 to 2001 was not significant, and the change in the proportion of originations with long prepayment penalty periods from 2001 to 2002 was significant at the 5 percent level. All other year-to-year changes in the proportion of originations with a given loan feature are significant at the 0.1 percent level. This might suggest against pooling loans originated in different years into one sample; however, as noted near the end of Section IV, splitting the sample by origination cohort does not alter the pattern of results reported in that section.



the same for long prepayment penalty periods and low- or no-documentation loans, and the bottom for balloon payments and low- or no-documentation loans. The number of asterisks between two cells indicates the significance level from a t-test of their difference in foreclosure starts as a percentage of originations. Using the top grid for refinance FRMs as an example, the difference between 8 percent ( $PREPAY36 = 0$ ,  $BALLOON = 0$ ) and 17.2 percent ( $PREPAY36 = 0$ ,  $BALLOON = 1$ ) is significant at the 1 percent level, while the difference between 8 percent and 6.6 percent ( $PREPAY36 = 1$ ,  $BALLOON = 0$ ) is not statistically significant.

Generally, the presence of a long prepayment penalty period ( $PREPAY36 = 1$ ) is associated with a greater percentage of foreclosures than the feature's absence ( $PREPAY36 = 0$ ), regardless of the presence or absence of balloon payments and low- or no-documentation loans. For refinance FRMs and purchase FRMs, however, there is no significant difference in the percentage of foreclosures for loans that do not have a balloon payment ( $BALLOON = 0$ ). To take another example, in most cases, full-documentation loans ( $LOWNODOC = 0$ ) are associated with a greater probability of foreclosure than low- or no-documentation loans ( $LOWNODOC = 1$ ), but the pattern is reversed for refinance FRMs with long prepayment penalty periods. Even in loan feature combinations that have the same general pattern across loan categories, the magnitudes of the differences in foreclosure rates can vary substantially.

To establish more clearly the relationships between the loan features of interest and the probability of foreclosure, and how these relationships differ across loan categories, several multinomial logit analyses of the data were performed for each loan category.<sup>24</sup> Table 9 shows the results of the basic specifications, in which  $PREPAY36$ ,  $BALLOON$ , and  $LOWNODOC$  are

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<sup>24</sup> Likelihood ratio tests support splitting the full sample into the four loan categories. They also support splitting subsamples of the full sample (for example, all refinances) into the relevant loan categories (refinance FRMs and refinance ARMs). The probabilities associated with these likelihood ratio tests are all less than 0.0001.

included separately, without interactions.<sup>25</sup> The coefficient estimates do not have an intuitive interpretation, so they are presented graphically in the charts of Figure 1. Each value in the charts equals the percentage change in the probability of a first foreclosure start, relative to the probability of a loan remaining active, associated with a one-unit change in a given explanatory variable. For example, the −19.1 percent associated with *PREPAY36* for refinance FRMs in Figure 1 indicates that the probability of a first foreclosure start (relative to that of a loan remaining active) is 19.1 percent lower for a refinance FRM with a long prepayment penalty period (*PREPAY36* = 1) than a refinance FRM without one (*PREPAY36* = 0).<sup>26</sup>

Table 9 and Figure 1 indicate that *PREPAY36*, *BALLOON*, and *LOWNODOC* affect the probability of foreclosure differently, depending on loan category. *PREPAY36* is associated with a lower probability of foreclosure for refinance FRMs but a higher one for purchase FRMs, and has no statistically significant relationship with either category of ARMs. The estimates for refinance FRMs and purchase FRMs are different from each other at the 1 percent significance level, and both are different from the estimate for refinance ARMs at the 10 percent and 5 percent levels, respectively.

A refinance FRM with a balloon payment is estimated to have an almost 57 percent greater probability of foreclosure than one without a balloon payment, an impact significantly different at the 1 percent level from both zero and the impact of *BALLOON* on a purchase FRM. (Recall that the small number of balloon ARMs was removed from the sample.)

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<sup>25</sup> Because the focus of this paper is the impact of predatory lending practices on the probability of foreclosure, for these and subsequent specifications the results concerning the probability of prepayment are presented in the Appendix rather than alongside the results concerning the probability of a first foreclosure start.

<sup>26</sup> For a given coefficient estimate  $\beta$ , the percentage change is calculated as  $e^\beta - 1$ . So, for example, the −0.212 shown for *PREPAY36* in the refinance FRM column of Table 9 coincides with  $e^{(-0.212)} - 1 = -19.1$  percent in Figure 1.

Low- or no-documentation is associated with a greater probability of foreclosure for refinance FRMs and ARMs, a lesser probability of foreclosure for purchase FRMs, and has no significant impact for purchase ARMs. Each pair of estimates for *LOWNODOC* is significantly different at the 10 percent level or better with the exception of the estimates for refinance FRMs and refinance ARMs.

The results for the control variables show much less variation across loan categories than those for *PREPAY36*, *BALLOON*, and *LOWNODOC* do. With only limited exceptions, a given control variable's coefficient estimates, particularly those that are significantly different from zero, tend to point in the same direction across loan categories. Higher FICO scores are associated with lesser probabilities of foreclosure. The *FICO* coefficient estimates are generally significantly different from each other (usually at the 1 percent level), implying that the impact of a higher score is greater for refinance loans compared to purchase loans, and for FRMs compared to ARMs. A greater  $\Delta$ *INTRATE* since origination is associated with a greater probability of foreclosure for all loan categories except refinance ARMs.

The probability of foreclosure increases at a decreasing rate with *AGEOFLOAN*. For purchase FRMs and refinance ARMs, LTV at origination is negatively related to the probability of foreclosure, while the interaction of *LTV* and *AGEOFLOAN* is positively related to it. In the short term, a high LTV implies greater liquidity, but as a loan ages the high LTV becomes associated with a greater probability of foreclosure. For unclear reasons, this pattern is reversed for purchase ARMs. *CASHOUT* is only statistically significant for refinance ARMs, and its interaction with loan age is never significant.<sup>27</sup>

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<sup>27</sup> Note that by definition a purchase mortgage cannot be a cashout.

The estimates for *ADULTS/HH* for refinance FRMs and ARMs are each significantly different from zero, indicating that an increase by one person in the average number of adults per household in a locale is associated with a drop in the probability of foreclosure of 50 percent or more. Of the coefficient estimates for *INCOME*, only that for refinance ARMs is significantly different from zero.

*%BLACK* is associated with a greater probability of foreclosure across all loan categories. The impact of *%BLACK* is greater (at the 10 percent significance level) for purchase FRMs than for refinance FRMs, and is greater (at the 1 percent significance level) for purchase ARMs than for refinance ARMs. *%HISPANIC* is never significantly different from zero. *%HIGHSCHOOL* is associated with a lesser probability of foreclosure across all loan categories except purchase ARMs. For most loan categories, the estimated impact of an additional percent of a locale's population having at least a high school diploma or its equivalent is three or more times larger (in absolute value) than the estimated impact of an additional percent of a locale's population being black or Hispanic.

Looking at the coefficient estimates for the vintage dummies, a loan originating in any sample year other than 1999 is associated with a greater probability of foreclosure than a 1999 origination. This holds for all loan categories except for refinance ARMs.

As was illustrated in Table 8, examining the effects of combinations of long prepayment penalty periods, balloon payments, and low- or no-documentation loans can provide a more thorough understanding of those loan features' relationships with the probability of foreclosure than merely examining each feature's impact in isolation. Table 10 presents results from specifications that include bilateral interactions of *PREPAY36*, *BALLOON*, and *LOWNODOC*, as well as an interaction term for all three loan features. Results for the control variables are not

substantively different than those found in Table 9, and are omitted. Figure 2 presents graphical representations of the results from Table 10. The values in Figure 2 indicate the total impact on the probability of foreclosure of each possible combination of loan features, compared to the probability of foreclosure for a loan without any of the loan features. For example, the values under the heading “*PREPAY36 and BALLOON*” describe the combined effects of *PREPAY36*, *BALLOON*, and the interaction term *PREPAY36\*BALLOON*. This representation allows for more intuitive comparisons between different loan feature combinations.

The results for each loan feature individually (coefficient estimates *PREPAY36*, *BALLOON*, and *LOWNODOC* in Table 10, and the first three columns of Figure 2) show a similar pattern as in the earlier specifications’ results, the only notable differences being that for purchase FRMs, neither *PREPAY36* nor *LOWNODOC* are statistically significant in Table 10. The coefficient estimates for *PREPAY36*, *BALLOON*, or *LOWNODOC* in Table 10 are not significantly different from their counterparts in Table 9, with the lone exception of the estimates for *PREPAY36* for refinance FRMs, which are different at the 10 percent significance level.

The results show that for FRMs but not ARMs, combinations of the loan features of interest are significantly related to the probability of foreclosure and can have impacts of greater magnitude than the loan features have individually.<sup>28</sup> For refinance FRMs, the total effect of a long prepayment penalty period and low- or no-documentation (that is, of *PREPAY36*, *LOWNODOC*, and *PREPAY36\*LOWNODOC* each equaling one) is more than a tripling of the probability of foreclosure, significant at the 1 percent level. The total effect of any other combination of two loan features, or all three, is an increase in the probability of foreclosure that is significant at the 5 percent level.

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<sup>28</sup> Likelihood ratio tests provide strong support for including the loan feature interaction terms for refinance FRMs (probability = 0.0000), but not for purchase FRMs (0.2912), refinance ARMs (0.3743), or purchase ARMs (0.9421).

For purchase FRMs, no loan feature individually has a significant impact on the probability of foreclosure, but certain combinations do. A balloon payment combined with a long prepayment penalty period is associated with a greater probability of foreclosure, while a balloon payment combined with low- or no-documentation is associated with a lesser probability of foreclosure (both at the 5 percent significance level).

Table 11 provides more context of the economic significance of the results from Tables 9 and 10. In each panel, the top row (in italics) provides the predicted probability of a first foreclosure start calculated for each loan category after setting all independent variables equal to their medians. Subsequent rows indicate the change in percentage points in the probability of foreclosure associated with the presence of each loan feature and, in the lower panel, each loan feature interaction. (Note that for every loan category, the median value of each loan feature variable and interaction term is zero.) For example, given median values for all independent variables, the predicted probability of a first foreclosure start for a refinance FRM is 0.56 percent. If the loan has a long prepayment penalty (*PREPAY36* changes from 0 to 1), the predicted probability falls 0.11 percentage points to 0.45 percent. If instead it has a balloon payment, the predicted probability rises 0.32 percentage points to 0.88 percent. With only a few exceptions, the economic impact, as measured by percentage point change in the probability of foreclosure, of each loan feature and loan feature interaction is larger for refinance FRMs than for the other loan categories.

Another potential complexity in the relationship between *PREPAY36*, *BALLOON*, and *LOWNODOC* and the probability of foreclosure is the extent to which the loan features' impacts may depend on borrower characteristics such as credit history or leverage. Within each loan category, the mean *FICO* and *LTV* values for loans with and without each of the three loan

features of interest were calculated. In each case, the mean value for loans with a given loan feature is within one standard deviation of the mean value for loans without that feature, suggesting that the impacts of *PREPAY36*, *BALLOON*, and *LOWNODOC* do not vary greatly with *FICO* or *LTV*.<sup>29</sup>

In August 2000, Chicago passed one of the earliest municipal anti-predatory lending statutes.<sup>30</sup> To ensure that the effects of this law do not drive this paper's results, an indicator variable equaling one if a loan originated on or after Oct. 1, 2000, was added to the specifications discussed above. Results were not substantively different.<sup>31</sup> The specifications also were run using only loans originated before Oct. 1, 2000, then run again using only loans originated on or after Oct. 1, 2000. Each subsample obviously contains many fewer observations, resulting in higher standard errors and reductions in significance for several variables, but the same pattern of results holds in each case.

To ensure that the very small number of foreclosures seen for 2003 originations does not skew the results, the specifications were run after dropping all 2003 originations, with no substantive changes to the results. The results also were largely unchanged when the specifications were performed only on the 87 percent of sample loans that involved owner-occupied properties (a restriction employed by QSD). To verify that the results are not driven by

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<sup>29</sup> This is corroborated by two unreported regression specifications. In the first, each of the loan feature variables was interacted with indicator variables indicating whether a given loan had a FICO score above or below the median FICO score for that loan category. The second specification was similar, using LTV values rather than FICO scores. Results from these specifications indicate that in only a few cases are there significant differences in the impact of one of the loan features depending on a high or low FICO score or LTV, with no consistent pattern either across loan categories or between the FICO score and LTV specifications.

<sup>30</sup> The Chicago law defined predatory lending according to the difference between the interest rate charged and that of comparable-maturity Treasury securities, rather than the presence of particular loan features. See Harvey and Nigro (2003). Their results are described above on Page 5.

<sup>31</sup> The presence of the post-law indicator variable does not affect the significance of any other variables, with the exception of the vintage indicators. In each refinance specification, the post-law indicator is significant and positive, the significances of the vintage indicators are reduced, and the sum of the coefficient estimates for the post-law indicator and 2002/03 is nearly equal to the coefficient estimate for 2002/03 shown in Table 9. In the purchase specifications, the post-law indicator is not significant and no other coefficient estimates are appreciably affected.

the selection of the multinomial logit model, the econometric analysis discussed above was also run using a proportional hazard model, with similar results throughout.

## **V. Discussion of Results**

The primary findings from the previous section regarding loan features that might be characterized as predatory are:

- Long prepayment penalty periods are not associated with greater probabilities of foreclosure for ARMs (refinances or purchases).
- Long prepayment penalty periods are associated with greater probabilities of foreclosure for purchase FRMs if the loans also feature a balloon payment.
- Long prepayment penalty periods are associated with *lesser* probabilities of foreclosure for refinance FRMs.
- Balloon payments (in the absence of long prepayment penalty periods) are only associated with greater probabilities of foreclosure for refinance FRMs.
- Low- or no-documentation is associated with greater probabilities of foreclosure for refinances, but not purchases.

These findings indicate that the relationships between long prepayment penalty periods, balloon payments and low- or no-documentation loans and the probability of foreclosure are more complicated than many arguments for greater regulation of predatory lending practices suggest. These loan features' effects vary widely across loan categories, and their combined effects can have as important an impact on the probability of foreclosure as their individual effects.



Long prepayment penalty periods do not appear to have significant influence on the probability of foreclosure for refinance ARMs or purchase ARMs, whether or not interactive effects are considered. The positive relationship between long prepayment penalty periods and the probability of foreclosure for purchase FRMs is consistent with arguments for greater restrictions on predatory lending practices if the interactive effects of long prepayment penalty periods and balloon payments are not considered. If the interactions are considered, then the combination of a long prepayment penalty period and a balloon payment increases a loan's probability of foreclosure, but neither feature is problematic in the absence of the other.<sup>32</sup>

The negative relationship between long prepayment penalty periods and the probability of foreclosure for refinance FRMs is inconsistent with long prepayment penalty periods causing more foreclosures, and suggests that, in some cases, long prepayment penalty periods can play a useful role. One possibility is that they may act as a sorting device with regard to borrowers' self-perception of their ongoing ability to keep up with their mortgages. Borrowers who recognize that their future ability to make loan payments is better or more stable than their loan application and financial history portrays may accept long prepayment penalty periods to provide a meaningful signal to lenders that they are worthwhile credit risks. Assuming that such signals may be both more necessary for refinances (which a borrower may seek due to current but temporary financial difficulties) than purchases, and more credible for FRMs (with known payments throughout the loans) than ARMs, a negative relationship between long prepayment penalty periods and the probability of foreclosure for refinance FRMs would result. This explanation is consistent with the dominating increase in the probability of foreclosure associated with the presence of both a long prepayment penalty period and low- or no-documentation

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<sup>32</sup> Recall that for purchase FRMs, as well as both categories of ARMs, a specification with loan feature interactions is not preferred over one without interactions. For refinance FRMs, discussed next, a specification with interactions

( $PREPAY36 * LOWNODOC = 1$ ) – borrowers intending to send a favorable signal about their ability to repay are unlikely to actively seek reduced documentation. This is not offered as a definitive explanation for the results found, but merely an example of how this so-called predatory lending practice could be serving a beneficial purpose for certain subprime borrowers.

Balloon payments are positively related to the probability of foreclosure for refinance FRMs but not purchase FRMs, although the interaction of long prepayment penalty periods with balloon payments has a large positive impact on the probability of foreclosure for purchase FRMs. While these findings appear to fall in line with the argument for restricting balloon payment loans, it is not evident how balloon payments per se are the cause of the greater probability of foreclosure. The shortest time between origination and a balloon payment coming due for this sample is seven years, with the vast majority being 10 years or more, so even a balloon loan that originated at the start of the sample period (Jan. 1, 1999) was more than two years from having the balloon payment due at the end of the sample period (June 30, 2003). This strongly suggests that the inability of borrowers to come up with sizable balloon payments is not the cause of the greater probabilities of foreclosures on balloon loans found in this data. This in turn suggests that restricting the use of balloon payments would not address an underlying cause of increased foreclosures.

For both types of refinance loans, low- or no-documentation is associated with significantly greater probabilities of foreclosure. In contrast, low- or no-documentation is associated with lesser probabilities of foreclosure for purchase FRMs and has no significant effects for purchase ARMs. These findings suggest that loosened lending standards, at least with regard to the information required of borrowers, are significant contributors to higher probabilities of foreclosure for refinances, but not purchases.

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is preferred. See Footnote 28, Page 19.

## **VI. Conclusion**

The results discussed above do not portray a subprime mortgage market in which loan features often characterized as “predatory” uniformly drive higher foreclosure rates in a consistent or straightforward manner. The reality appears much more complex, and, in light of this, any proposal to address rising foreclosure rates through restricting or prohibiting particular loan features would seem unlikely to be an unmitigated success.

While long prepayment penalty periods are associated with greater probability of foreclosure for purchase FRMs, they appear to be benign in ARMs and are associated with lesser probability of foreclosure in FRMs. Balloon payments are associated with greater probability of foreclosure, but this effect occurs years prior to the balloon payments coming due, calling into serious question whether the balloon payments themselves are the underlying cause. Low- and no-documentation, which may be thought of as a rough proxy for loose lending practices more generally, is unambiguously associated with greater probabilities of foreclosure for refinances and has important interactive effects when present with either long prepayment penalty periods or balloon payments. These results taken together suggest that broad federal regulatory action designed to restrict or prohibit the use of long prepayment penalty periods or balloon payments will likely not have the direct or sole effect of reducing subprime foreclosure rates. The use of such a blunt policy instrument would eliminate potentially valuable contractual possibilities from subprime loans, despite the fact that, in many cases, those loan features would not be problematic.

A stronger candidate for action at a national level would be encouraging subprime lenders to review and where appropriate tighten their lending practices to ensure that their borrowers, especially those seeking refinances, are not taking on more debt than they are able to

handle given any other financial obligations they have, and that all information relevant to a potential borrower's ability to repay a loan is taken into consideration before extending a loan. This approach is consistent with the recently proposed Interagency Guidance on Nontraditional Mortgage Products (OCC *et al*, 2005), which encourages prudent loan terms and underwriting standards rather than restricting particular loan features. It should be acknowledged that such an approach would likely be more difficult to implement and monitor than blanket prohibitions on certain lending practices because it involves lenders' evaluation processes and relies on full disclosure by both borrower and lender. Still, this approach has the major benefits of addressing the key role that this paper's findings indicate low- or no-documentation plays and being less likely to cause unintended and undesired distortions in the subprime lending market.

Despite the general similarity of Chicago subprime loan characteristics with those nationwide (see Table 5), it remains possible that this paper's results are not applicable beyond Chicago and so basing national policy recommendations on them is inappropriate. Regarding this concern, there are three relevant scenarios. First, if there is a fairly consistent national subprime lending market, of which Chicago is representative, then basing a recommendation against broad federal predatory lending restrictions on these results is valid. Second, if there is a fairly consistent national subprime lending market, but Chicago is not representative, then basing a recommendation against broad federal predatory lending restrictions on these results is not valid. Third, if there is no consistent national subprime lending market, with significant differences from one city or region to the next, then a recommendation against broad federal predatory lending restrictions is valid regardless of this paper's results. The recommendation given above therefore carries an assumption that the second scenario is farthest from the truth. Examining cross-market variation in the use and impact of long prepayment penalty periods,

balloon payments, and low- or no-documentation in subprime lending is beyond the scope of this paper and a promising subject of future research.

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**Table 1: Variable Definitions and Sources**

Variable	Definition	Source
<u>Loan Features:</u>		
<i>PREPAY36</i>	Equals one if the loan has a prepayment penalty period longer than 36 months from origination; equals 0 otherwise	LoanPerformance
<i>BALLOON</i>	Equals 1 if the loan has a balloon payment; equals 0 otherwise	LoanPerformance
<i>LOWNODOC</i>	Equals 1 if the loan is low- or no-documentation; equals 0 otherwise	LoanPerformance
<u>Loan Characteristic Controls:</u>		
<i>FICO</i>	Borrower's FICO score at origination	LoanPerformance
<i>AGEOFLOAN</i>	Age of the loan (months since origination)	LoanPerformance
<i>LTV</i>	Loan-to-value ratio at origination	LoanPerformance
<i>CASHOUT</i>	Equals 1 if the loan is a cashout refinancing; equals 0 otherwise	LoanPerformance
<u>Macroeconomic and Demographic Controls:</u>		
<i>ΔINTRATE</i>	Change in the average effective interest rate since origination <sup>34</sup>	FHFB's Monthly Interest Rate Survey
<i>INCOME</i>	Median household income for the borrower's locale (defined by ZIP code), in thousands	2000 Census
<i>%BLACK</i>	Percent of population in the borrower's locale (defined by ZIP code) that is black	2000 Census
<i>%HISPANIC</i>	Percent of population in the borrower's locale (defined by ZIP code) that is Hispanic	2000 Census
<i>ADULTS/HH</i>	Average number of adults (18 years old or older) per household in the borrower's locale (defined by ZIP code)	2000 Census
<i>%HIGHSCHOOL</i>	Percent of population in the borrower's locale (defined by ZIP code) that has at least a high school diploma or equivalent	2000 Census
<u>Vintage Controls:</u>		
<i>1999</i>	Equals 1 if the loan originated in 1999; equals 0 otherwise	LoanPerformance
<i>2000</i>	Equals 1 if the loan originated in 2000; equals 0 otherwise	LoanPerformance
<i>2001</i>	Equals 1 if the loan originated in 2001; equals 0 otherwise	LoanPerformance
<i>2002/03</i>	Equals 1 if the loan originated in 2002 or the first two quarters of 2003; equals 0 otherwise	LoanPerformance

<sup>34</sup> The effective interest rate is the interest rate reflecting amortization of initial fees and charges. The Federal Housing Finance Board (FHFB) provides monthly estimates of national average effective interest rates.



**Table 2: Summary Statistics**

Variable	Refinance FRMs					Refinance ARMs				
	Obs.	Mean	St. Dev.	Min.	Max.	Obs.	Mean	St. Dev.	Min.	Max.
<i>PREPAY36</i>	69,754	0.142	0.349	0	1	105,740	0.087	0.281	0	1
<i>BALLOON</i>	76,036	0.386	0.487	0	1	109,208	0	0	0	0
<i>LOWNODOC</i>	64,699	0.156	0.363	0	1	108,453	0.222	0.416	0	1
<i>FICO</i>	76,036	612.189	63.843	400	850	109,208	585.942	57.743	350	850
<i>AGEOFLOAN</i>	76,031	17.141	12.462	1	54	109,198	13.348	10.358	1	54
<i>LTV</i>	76,036	76.336	17.712	11	125	109,208	76.474	11.942	10	121.38
<i>CASHOUT</i>	76,036	0.873	0.333	0	1	109,208	0.826	0.379	0	1
<i>ΔINRATE</i>	76,031	-0.357	0.845	-2.950	1.610	109,198	-0.395	0.683	-2.880	1.610
<i>INCOME</i>	75,624	35.455	9.484	14.205	100.377	108,774	36.277	9.517	14.205	100.377
<i>%BLACK</i>	75,624	62.804	35.944	0.363	98.198	108,774	54.375	37.599	0.363	98.198
<i>%HISPANIC</i>	75,624	18.829	22.383	0.695	70.367	108,774	22.817	23.735	0.695	70.367
<i>ADULTS/HH</i>	76,036	2.115	0.228	1.381	2.441	109,208	2.107	0.245	1.381	2.441
<i>%HIGHSCHOOL</i>	76,036	67.393	11.950	40.105	99.076	109,208	66.984	12.359	40.105	99.076
<i>1999</i>	76,036	0.478	0.499	0	1	109,208	0.281	0.450	0	1
<i>2000</i>	76,036	0.238	0.426	0	1	109,208	0.246	0.431	0	1
<i>2001</i>	76,036	0.176	0.380	0	1	109,208	0.233	0.422	0	1
<i>2002/03</i>	76,036	0.109	0.311	0	1	109,208	0.240	0.427	0	1

Variable	Purchase FRMs					Purchase ARMs				
	Obs.	Mean	St. Dev.	Min.	Max.	Obs.	Mean	St. Dev.	Min.	Max.
<i>PREPAY36</i>	16,970	0.086	0.281	0	1	33,598	0.039	0.193	0	1
<i>BALLOON</i>	17,672	0.477	0.499	0	1	34,224	0	0	0	0
<i>LOWNODOC</i>	16,718	0.290	0.454	0	1	34,091	0.246	0.431	0	1
<i>FICO</i>	17,672	637.916	62.067	438	850	34,224	617.166	62.766	427	850
<i>AGEOFLOAN</i>	17,671	13.434	10.561	1	54	34,219	12.399	9.806	1	54
<i>LTV</i>	17,672	88.262	10.938	19.16	125.00	34,224	83.417	8.398	26.00	100.00
<i>CASHOUT</i>	17,672	0	0	0	0	34,224	0	0	0	0
<i>ΔINRATE</i>	17,671	-0.439	0.727	-2.950	1.610	34,219	-0.402	0.649	-2.880	1.430
<i>INCOME</i>	17,576	36.258	10.476	14.205	100.377	34,067	36.549	10.794	14.205	100.377
<i>%BLACK</i>	17,576	57.215	37.193	0.363	98.198	34,067	55.296	37.580	0.363	98.198
<i>%HISPANIC</i>	17,576	19.595	22.121	0.695	70.367	34,067	18.981	21.710	0.695	70.367
<i>ADULTS/HH</i>	17,672	2.078	0.255	1.381	2.441	34,224	2.050	0.267	1.381	2.441
<i>%HIGHSCHOOL</i>	17,672	68.380	12.188	40.105	99.076	34,224	69.179	12.300	40.105	99.076
<i>1999</i>	17,672	0.253	0.435	0	1	34,224	0.213	0.410	0	1
<i>2000</i>	17,672	0.248	0.432	0	1	34,224	0.240	0.427	0	1
<i>2001</i>	17,672	0.257	0.437	0	1	34,224	0.268	0.443	0	1
<i>2002/03</i>	17,672	0.242	0.428	0	1	34,224	0.279	0.448	0	1

*Table 2 (continued): Summary Statistics*

Variable	Obs.	Mean	All Loan Categories		
			St. Dev.	Min.	Max.
<i>PREPAY36</i>	226,062	0.096	0.295	0	1
<i>BALLOON</i>	237,140	0.159	0.366	0	1
<i>LOWNODOC</i>	223,961	0.212	0.408	0	1
<i>FICO</i>	237,140	602.737	63.078	350	850
<i>AGEOFLOAN</i>	237,119	14.434	11.178	1	54
<i>LTV</i>	237,140	78.310	14.117	10	125
<i>CASHOUT</i>	237,140	0.661	0.474	0	1
<i>ΔINRATE</i>	237,119	-0.387	0.738	-2.950	1.610
<i>INCOME</i>	236,041	36.052	9.784	14.205	100.377
<i>%BLACK</i>	236,041	57.420	37.235	0.363	98.198
<i>%HISPANIC</i>	236,041	20.746	22.984	0.695	70.367
<i>ADULTS/HH</i>	237,140	2.099	0.245	1.381	2.441
<i>%HIGHSCHOOL</i>	237,140	67.536	12.232	40.105	99.076
<i>1999</i>	237,140	0.332	0.471	0	1
<i>2000</i>	237,140	0.243	0.429	0	1
<i>2001</i>	237,140	0.221	0.415	0	1
<i>2002/03</i>	237,140	0.204	0.403	0	1

**Table 3: Results from t-tests for Differences of Means across Loan Categories**

Numbers are t-statistics from two-tailed difference of means tests for each variable across each pair of loan categories. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12). By definition, a purchase mortgage cannot be a cashout. Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent and 1 percent, respectively.

Variable	Refi FRM vs. Refi ARM	Refi FRM vs. Purch FRM	Refi FRM vs. Purch ARM	Refi ARM vs. Purch FRM	Refi ARM vs. Purch ARM	Purch FRM vs. Purch ARM
<i>PREPAY36</i>	36.56***	19.15***	50.68***	-0.01	29.16***	22.49***
<i>BALLOON</i>	---	-22.35***	---	---	---	---
<i>LOWNODOC</i>	-33.33***	-40.36***	-34.09***	-19.62***	-8.70***	11.14***
<i>FICO</i>	91.25***	-48.51***	-13.11***	-109.07***	-85.95***	34.99***
<i>AGEOFLOAN</i>	71.13***	36.61***	62.28***	-0.93	15.01***	11.02***
<i>LTV</i>	-2.14**	-85.79***	-70.91***	123.04***	-100.55***	55.79***
<i>CASHOUT</i>	27.52***	---	---	---	---	---
<i>ΔINRATE</i>	10.61***	11.99***	8.70***	8.00***	1.65*	-6.05***
<i>INCOME</i>	-18.56***	-9.91***	-17.79***	0.41	-5.136***	-3.48***
<i>%BLACK</i>	48.29***	18.45***	32.45***	-9.34***	-3.13***	6.10***
<i>%HISPANIC</i>	-36.16***	-4.09***	-1.19	16.75***	26.34***	2.93***
<i>ADULTS/HH</i>	8.35***	19.15***	42.58***	13.96***	36.97***	12.03***
<i>%HIGHSCHOOL</i>	6.74***	-9.85***	-23.43***	-13.74***	-29.14***	-7.48***
<i>1999</i>	87.93***	55.08***	85.49***	7.98***	24.80***	9.95***
<i>2000</i>	-3.53***	-2.71***	-0.15	-0.72	2.53**	2.33**
<i>2001</i>	-29.53***	-24.93***	-34.88***	-7.27***	-12.98***	-2.27**
<i>2002/03</i>	-72.70***	-47.44***	-73.46***	-0.43	-14.95***	-9.40***

**Table 4: Results from Wilcoxon Tests for Equality of Survival Curves, by Loan Feature**

Numbers are  $\chi^2$  statistics from Wilcoxon tests across each pair of loan categories for loans with or without a given loan feature. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12). Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent, and 1 percent, respectively.

	Refi FRM vs. Refi ARM	Refi FRM vs. Purch FRM	Refi FRM vs. Purch ARM	Refi ARM vs. Purch FRM	Refi ARM vs. Purch ARM	Purch FRM vs. Purch ARM
All Loans	0.00	1.68	25.47***	1.79	33.18***	24.58***
<i>PREPAY36</i> = 0	4.25**	1.09	64.78***	5.67**	55.59***	45.74***
<i>PREPAY36</i> = 1	36.72***	3.35*	10.52***	3.32*	0.33	1.00
<i>BALLOON</i> = 0	58.80***	5.14**	129.17***	4.74**	33.18***	24.23***
<i>BALLOON</i> = 1	---	28.84***	---	---	---	---
<i>LOWNODOC</i> = 0	7.95***	18.44***	81.13***	7.33***	56.69***	3.65*
<i>LOWNODOC</i> = 1	1.99	28.71***	0.00	46.19***	1.83	32.89***

**Table 5: Comparison of Chicago and Nationwide Subprime Loan Characteristics, 2000-2002**

Nationwide data is taken from Farris and Richardson (2004). They classify loans as FRMs, ARMs, or Balloon loans, while in this paper loans are either FRMs or ARMs, with a balloon payment treated as a separate characteristic.

	<b>Chicago MSA</b>		<b>Nationwide</b>	
	Mean	St. Dev.	Mean	St. Dev.
Refinance	0.75	0.43	0.65	0.48
Purchase	0.25	0.43	0.34	0.47
FRM	0.34	0.47	0.44	0.50
ARM	0.66	0.47	0.47	0.50
Balloon Loan	0.14	0.35	0.09	0.28
Prepayment Penalty Period $\geq$ 36 Months <sup>35</sup>	0.37	0.48	0.33	0.47
Full Documentation	0.78	0.42	0.73	0.45
FICO	603.15	62.51	627.94	72.33
LTV	78.78	13.80	83.56	16.11
Number of loans	24,286		1,960,283	

<sup>35</sup> Farris and Richardson (2004) provide evidence on the prevalence of prepayment penalty periods of 36 months or more for 2002 originations only. The nationwide numbers above were calculated from their Table 4. Numbers for the Chicago MSA also reflect prepayment penalty periods of 36 months or more for 2002 originations. However, following most of the literature on long prepayment penalty periods and foreclosures, in the present paper's analysis *PREPAY36* equals one only if a prepayment penalty period is greater than 36 months.

**Table 6a: Prevalence of Long Prepayment Penalty Periods, by Loan Category and Vintage**

Vintage		Refinance FRM	Purchase FRM	Refinance ARM	Purchase ARM
1999	Total originations	2,468	357	2,890	686
	Originations with <i>PREPAY36</i> = 1	308	23	493	25
	<b>% of total originations</b>	<b>12.5%</b>	<b>6.4%</b>	<b>17.1%</b>	<b>3.6%</b>
2000	Total originations	1,782	482	2,961	969
	Originations with <i>PREPAY36</i> = 1	384	66	353	71
	<b>% of total originations</b>	<b>21.5%</b>	<b>13.7%</b>	<b>11.9%</b>	<b>7.3%</b>
2001	Total originations	1,815	653	3,648	1,395
	Originations with <i>PREPAY36</i> = 1	215	60	95	26
	<b>% of total originations</b>	<b>11.8%</b>	<b>9.2%</b>	<b>2.6%</b>	<b>1.9%</b>
2002	Total originations	1,694	925	5,497	2,043
	Originations with <i>PREPAY36</i> = 1	167	57	117	59
	<b>% of total originations</b>	<b>9.9%</b>	<b>6.2%</b>	<b>2.1%</b>	<b>2.9%</b>
2003 (first two quarters only)	Total originations	637	286	1,616	644
	Originations with <i>PREPAY36</i> = 1	31	1	13	4
	<b>% of total originations</b>	<b>4.9%</b>	<b>0.4%</b>	<b>0.8%</b>	<b>0.6%</b>
1999-2003	Total originations	8,396	2,703	16,612	5,737
	Originations with <i>PREPAY36</i> = 1	1,105	207	1,071	185
	<b>% of total originations</b>	<b>13.2%</b>	<b>7.6%</b>	<b>6.4%</b>	<b>3.2%</b>

**Table 6b: Prevalence of Balloon Payments, by Loan Category and Vintage**

Vintage		Refinance FRM	Purchase FRM	Refinance ARM	Purchase ARM
1999	Total originations	2,980	423	3,085	731
	Originations with <i>BALLOON</i> = 1	1,130	173	0	0
	<b>% of total originations</b>	<b>37.9%</b>	<b>40.9%</b>	<b>0.0%</b>	<b>0.0%</b>
2000	Total originations	1,868	487	3,093	981
	Originations with <i>BALLOON</i> = 1	849	226	0	0
	<b>% of total originations</b>	<b>45.5%</b>	<b>46.4%</b>	<b>0.0%</b>	<b>0.0%</b>
2001	Total originations	1,842	664	3,691	1,405
	Originations with <i>BALLOON</i> = 1	821	376	0	0
	<b>% of total originations</b>	<b>44.6%</b>	<b>56.6%</b>	<b>0.0%</b>	<b>0.0%</b>
2002	Total originations	1,713	945	5,539	2,059
	Originations with <i>BALLOON</i> = 1	317	421	0	0
	<b>% of total originations</b>	<b>18.5%</b>	<b>44.6%</b>	<b>0.0%</b>	<b>0.0%</b>
2003 (first two quarters only)	Total originations	637	286	1,617	644
	Originations with <i>BALLOON</i> = 1	81	84	0	0
	<b>% of total originations</b>	<b>12.7%</b>	<b>29.4%</b>	<b>0.0%</b>	<b>0.0%</b>
1999-2003	Total originations	9,040	2,805	17,025	5,825
	Originations with <i>BALLOON</i> = 1	3,198	1,280	0	0
	<b>% of total originations</b>	<b>35.4%</b>	<b>45.6%</b>	<b>0.0%</b>	<b>0.0%</b>

**Table 6c: Prevalence of Low- or No-Documentation, by Loan Category and Vintage**

Vintage		Refinance FRM	Purchase FRM	Refinance ARM	Purchase ARM
1999	Total originations	2,090	338	3,040	727
	Originations with <i>LOWNODOC</i> = 1	312	42	671	200
	<b>% of total originations</b>	<b>14.9%</b>	<b>12.4%</b>	<b>22.1%</b>	<b>27.5%</b>
2000	Total originations	1,836	472	3,084	974
	Originations with <i>LOWNODOC</i> = 1	274	97	616	208
	<b>% of total originations</b>	<b>14.9%</b>	<b>20.6%</b>	<b>20.0%</b>	<b>21.4%</b>
2001	Total originations	1,839	658	3,690	1,405
	Originations with <i>LOWNODOC</i> = 1	335	173	839	280
	<b>% of total originations</b>	<b>18.2%</b>	<b>26.3%</b>	<b>22.7%</b>	<b>19.9%</b>
2002	Total originations	1,690	938	5,537	2,055
	Originations with <i>LOWNODOC</i> = 1	447	545	1,578	676
	<b>% of total originations</b>	<b>26.4%</b>	<b>58.1%</b>	<b>28.5%</b>	<b>32.9%</b>
2003 (first two quarters only)	Total originations	635	286	1,616	642
	Originations with <i>LOWNODOC</i> = 1	181	176	461	238
	<b>% of total originations</b>	<b>28.5%</b>	<b>61.5%</b>	<b>28.5%</b>	<b>37.0%</b>
1999-2003	Total originations	8,090	2,692	16,967	5,803
	Originations with <i>LOWNODOC</i> = 1	1,549	1,033	4,165	1,602
	<b>% of total originations</b>	<b>19.1%</b>	<b>38.4%</b>	<b>24.5%</b>	<b>27.6%</b>

**Table 7: Originations and Foreclosure Starts by Loan Category and Loan Feature**

Each t-statistic is from a two-tailed test of the difference in foreclosure starts as a percentage of originations in loans with versus without a given loan feature. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12). Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent, and 1 percent, respectively.

	<b>Refinance FRM</b>		<b>Purchase FRM</b>		<b>Refinance ARM</b>		<b>Purchase ARM</b>	
	<i>PREPAY36 = 0</i>	<i>PREPAY36 = 1</i>	<i>PREPAY36 = 0</i>	<i>PREPAY36 = 1</i>	<i>PREPAY36 = 0</i>	<i>PREPAY36 = 1</i>	<i>PREPAY36 = 0</i>	<i>PREPAY36 = 1</i>
Originations	7,291	1,105	2,496	207	15,541	1,071	5,552	185
Foreclosure Starts	788	166	264	42	1,833	221	926	46
<b>As % of Originations</b>	<b>10.8%</b>	<b>15.0%</b>	<b>10.6%</b>	<b>20.3%</b>	<b>11.8%</b>	<b>20.6%</b>	<b>16.7%</b>	<b>24.9%</b>
	t-statistic = -4.12***		t-statistic = -4.25*		t-statistic = -8.52***		t-statistic = -2.92***	
	<i>BALLOON = 0</i>	<i>BALLOON = 1</i>	<i>BALLOON = 0</i>	<i>BALLOON = 1</i>	<i>BALLOON = 0</i>	<i>BALLOON = 1</i>	<i>BALLOON = 0</i>	<i>BALLOON = 1</i>
Originations	5,842	3,198	1,525	1,280	17,025	0	5,820	0
Foreclosure Starts	507	605	167	171	2,129	0	978	0
<b>As % of Originations</b>	<b>8.7%</b>	<b>18.9%</b>	<b>11.0%</b>	<b>13.4%</b>	<b>12.5%</b>	<b>NA</b>	<b>16.8%</b>	<b>NA</b>
	t-statistic = -14.33***		t-statistic = -1.95**		t-statistic = NA		t-statistic = NA	
	<i>LOWNODOC=0</i>	<i>LOWNODOC=1</i>	<i>LOWNODOC=0</i>	<i>LOWNODOC=1</i>	<i>LOWNODOC=0</i>	<i>LOWNODOC=1</i>	<i>LOWNODOC=0</i>	<i>LOWNODOC=1</i>
Originations	6,541	1,549	1,659	1,033	12,802	4,165	4,201	1,602
Foreclosure Starts	779	145	261	51	1,669	452	809	167
<b>As % of Originations</b>	<b>11.9%</b>	<b>9.4%</b>	<b>15.7%</b>	<b>4.9%</b>	<b>13.0%</b>	<b>10.9%</b>	<b>19.3%</b>	<b>10.4%</b>
	t-statistic = 2.84***		t-statistic = 8.62***		t-statistic = 3.70***		t-statistic = 8.09***	

**Table 8: Originations and Foreclosure Starts by Loan Category and Loan Feature Combinations**

Within each grid, I perform a two-tailed test of the difference in foreclosure starts as a percentage of origination for each horizontally contiguous pair of cells and each vertically contiguous pair of cells. Asterisks between two cells indicate the significance level from the test. Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent, and 1 percent, respectively. For example, the top grid of the Refinance FRM column indicates that 8 percent of refinance FRMs with no long prepayment penalty period and no balloon payment had a foreclosure start during the sample period. That is different from the 17.2 percent for refinance FRMs with no long prepayment penalty period but with a balloon payment at the 1 percent significance level. The 8 percent is not significantly different from the 6.6 percent for refinance FRMs with a long prepayment penalty period but no balloon payment. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12).

Refinance FRM					Refinance ARM				
		PREPAY36 = 0		PREPAY36 = 1			PREPAY36 = 0		PREPAY36 = 1
Originations	BALLOON = 0	5,046		411	BALLOON = 0		15,551		1,071
Foreclosure Starts		403		27			1,834		221
As % of Originations		8.0%		6.6%			11.8%	***	20.6%
		***		***					
Originations	BALLOON = 1	2,250	*	693	BALLOON = 1		0		0
Foreclosure Starts		386		139			0		0
As % of Originations		17.2%		20.1%			NA		NA
		PREPAY36 = 0		PREPAY36 = 1			PREPAY36 = 0		PREPAY36 = 1
Originations	LOWNODOC=0	5,391		931	LOWNODOC=0		11,642		886
Foreclosure Starts		604		132			1,431		187
As % of Originations		11.2%	***	14.2%			12.3%	***	21.1%
		***		**			***		
Originations	LOWNODOC=1	1,319	***	164	LOWNODOC=1		3,855	***	185
Foreclosure Starts		96		33			396		34
As % of Originations		7.3%		20.1%			10.3%		18.4%
		BALLOON = 0		BALLOON = 1			BALLOON = 0		BALLOON = 1
Originations	LOWNODOC=0	4,217		2,328	LOWNODOC=0		12,809		0
Foreclosure Starts		333		447			1,670		0
As % of Originations		7.9%	***	19.2%			13.0%		NA
				***			***		
Originations	LOWNODOC=1	1,091	**	458	LOWNODOC=1		4,168		0
Foreclosure Starts		90		55			452		0
As % of Originations		8.2%		12.0%			10.8%		NA



**Table 8 (continued): Originations and Foreclosure Starts by Loan Category and Loan Feature Combinations**

Within each grid, I perform a two-tailed test of the difference in foreclosure starts as a percentage of origination for each horizontally contiguous pair of cells and each vertically contiguous pair of cells. Asterisks between two cells indicate the significance level from the test. Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent, and 1 percent, respectively. For example, the top grid of the Refinance FRM column indicates that 8 percent of refinance FRMs with no long prepayment penalty period and no balloon payment had a foreclosure start during the sample period. That is different from the 17.2 percent for refinance FRMs with no long prepayment penalty period but with a balloon payment at the 1 percent significance level. The 8 percent is not significantly different from the 6.6 percent for refinance FRMs with a long prepayment penalty period but no balloon payment. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12).

Purchase FRM						Purchase ARM						
		PREPAY36 = 0		PREPAY36 = 1				PREPAY36 = 0		PREPAY36 = 1		
Originations	BALLOON = 0	1,403		68	BALLOON = 0	5,557		185	BALLOON = 0	926		46
Foreclosure Starts		144		9		16.7%	***	24.9%				
As % of Originations		10.3%		13.2%								
				*								
Originations	BALLOON = 1	1,094	***	139	BALLOON = 1	0		0	BALLOON = 1	0		0
Foreclosure Starts		120		33		NA		NA				
As % of Originations		11.0%		23.7%								
		PREPAY36 = 0		PREPAY36 = 1				PREPAY36 = 0		PREPAY36 = 1		
Originations	LOWNODOC=0	1,495		142	LOWNODOC=0	4,030		132	LOWNODOC=0	772		35
Foreclosure Starts		219		35		19.2%	**	26.5%				
As % of Originations		14.6%	***	24.6%								
		***		**		***						
Originations	LOWNODOC=1	951	***	65	LOWNODOC=1	1,513	***	52	LOWNODOC=1	154		11
Foreclosure Starts		40		7		10.2%		21.2%				
As % of Originations		4.2%		10.8%								
		BALLOON = 0		BALLOON = 1				BALLOON = 0		BALLOON = 1		
Originations	LOWNODOC=0	915		745	LOWNODOC=0	4,205		0	LOWNODOC=0	809		0
Foreclosure Starts		127		134		19.2%		NA				
As % of Originations		13.9%	**	18.0%			***					
		***		***		***						
Originations	LOWNODOC=1	552		481	LOWNODOC=1	1,603		0	LOWNODOC=1	167		0
Foreclosure Starts		31		20		10.4%		NA				
As % of Originations		5.6%		4.2%								

**Table 9: Predatory Lending Practices and Changes in the Probability of a Foreclosure Start**

This table reports the results of multinomial logit regressions for subprime loans originated on or after Jan. 1, 1999, using quarterly data through June 30, 2003. Variables are defined as described in Table 1. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12). Each coefficient estimate represents the impact on the probability of a foreclosure start, relative to the probability of the loan remaining active, of a one-unit change in the corresponding variable. Associated results concerning the probability of prepayment are presented in Table A1 of the Appendix. Robust standard errors clustered by loan are in parentheses. Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent, and 1 percent, respectively.

	Refinance FRM	Purchase FRM	Refinance ARM	Purchase ARM
<i>PREPAY36</i>	-0.212** (.101)	0.415** (.178)	0.016 (.077)	0.082 (.174)
<i>BALLOON</i>	0.448*** (.074)	0.007 (.122)		
<i>LOWNODOC</i>	0.322*** (.106)	-0.362** (.177)	0.224*** (.058)	-0.004 (.097)
<i>FICO</i>	-0.009*** (.0006)	-0.005*** (.0011)	-0.007*** (.0004)	-0.003*** (.0006)
<i>AGEOFLOAN</i>	0.172*** (.018)	0.149*** (.034)	0.134*** (.017)	0.312*** (.038)
<i>(AGEOFLOAN)<sup>2</sup></i>	-0.003*** (.0002)	-0.003*** (.0004)	-0.004*** (.0002)	-0.004*** (.0004)
<i>LTV</i>	-0.005 (.004)	-0.041*** (.007)	-0.024*** (.004)	0.016** (.008)
<i>AGEOFLOAN * LTV</i>	0.0003* (.0002)	0.0010*** (.0004)	0.0011*** (.0002)	-0.0008** (.0004)
<i>CASHOUT</i>	-0.155 (.219)		-0.321*** (.128)	
<i>AGEOFLOAN * CASHOUT</i>	-0.003 (.008)		0.005 (.006)	
<i>ΔINRATE</i>	0.175*** (.070)	0.397*** (.133)	0.049 (.050)	0.273*** (.097)
<i>INCOME</i>	0.015 (.012)	0.026 (.019)	0.018*** (.007)	-0.0008 (.010)
<i>%BLACK</i>	0.005** (.003)	0.015*** (.005)	0.007*** (.002)	0.014*** (.003)
<i>%HISPANIC</i>	-0.006 (.005)	0.0007 (.009)	-0.002 (.003)	0.005 (.005)
<i>ADULTS/HH</i>	-0.782*** (.313)	-0.638 (.549)	-0.693*** (.192)	-0.426 (.278)
<i>%HIGHSCHOOL</i>	-0.028** (.012)	-0.051*** (.020)	-0.023*** (.007)	-0.016 (.011)
<i>2000</i>	0.668*** (.129)	0.910*** (.241)	0.192** (.083)	0.636*** (.162)
<i>2001</i>	0.726*** (.131)	0.728*** (.237)	0.154** (.077)	1.011*** (.135)
<i>2002/03</i>	0.591*** (.212)	1.481*** (.298)	-0.256** (.107)	1.129*** (.172)
<i>Constant</i>	1.611 (1.140)	2.439 (1.922)	2.076*** (.748)	-4.473*** (1.147)
# of observations:	61,788	16,374	104,565	33,311
# of loans:	7,774	2,639	16,505	5,700
# of foreclosure starts:	856	299	2,035	968
Pseudo R <sup>2</sup>	0.079	0.103	0.090	0.093

**Table 10: Interactions Between Predatory Lending Practices and Changes in the Probability of a Foreclosure Start**

This table reports the results of multinomial logit regressions for subprime loans originated on or after Jan. 1, 1999, using quarterly data through June 30, 2003. Variables are defined as described in Table 1. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12). Each coefficient estimate represents the impact on the probability of a foreclosure start, relative to the probability of the loan remaining active, of a one-unit change in the corresponding variable. Associated results concerning the probability of prepayment are presented in Table A2 of the Appendix. Robust standard errors clustered by loan are in parentheses. Results for control variables are similar to those in Table 9 and are omitted here. Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent, and 1 percent, respectively.

	Refinance FRM	Purchase FRM	Refinance ARM	Purchase ARM
<i>PREPAY36</i>	-0.606*** (.247)	0.026 (.359)	0.035 (.084)	0.062 (.198)
<i>BALLOON</i>	0.482*** (.086)	0.004 (.142)		
<i>LOWNODOC</i>	0.369*** (.145)	-0.162 (.244)	0.234*** (.061)	-0.009 (.100)
<i>PREPAY36 * BALLOON</i>	0.375 (.278)	0.563 (.434)		
<i>PREPAY36 * LOWNODOC</i>	1.422*** (.429)	-0.636 (1.112)	-0.123 (.202)	0.088 (.411)
<i>BALLOON * LOWNODOC</i>	-0.381 (.246)	-0.484 (.373)		
<i>PREPAY36 * BALLOON * LOWNODOC</i>	-1.066** (.547)	0.886 (1.226)		
# of observations:	61,788	16,374	104,565	33,311
# of loans:	7,774	2,639	16,505	5,700
# of foreclosure starts:	856	299	2,035	968
Pseudo R <sup>2</sup>	0.080	0.104	0.090	0.093

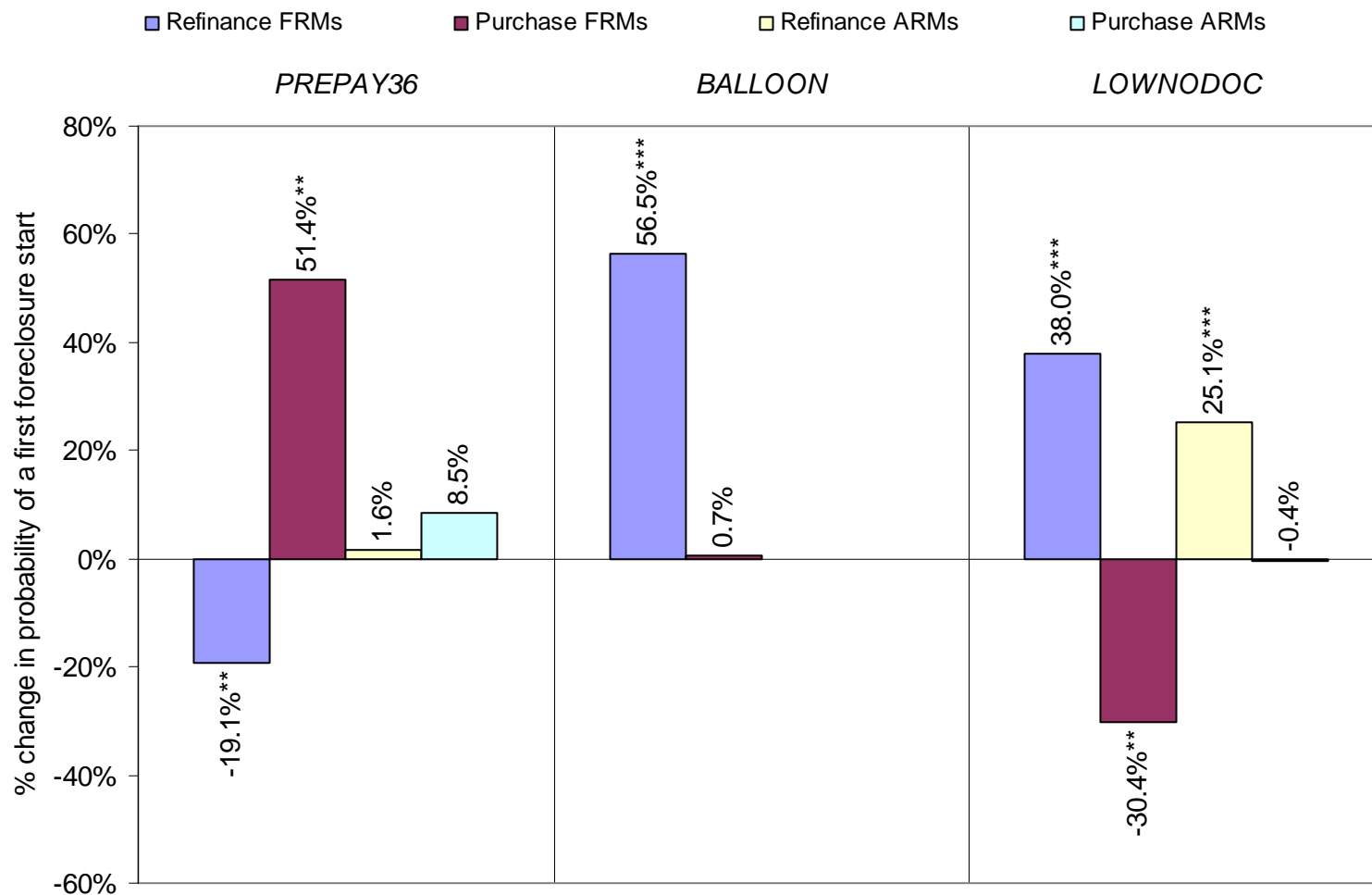
**Table 11: Marginal Effects of Loan Features and Interactions on the Probability of a Foreclosure Start**

The predicted probabilities of a foreclosure start shown in italics below are calculated with all independent variables set to their median values. The median value of every loan feature variable and interaction term is zero. Changes in predicted probabilities are calculated by changing the value of the variable in question from zero to one, holding other variables at their median values. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12). Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent, and 1 percent, respectively.

	Refinance FRM	Purchase FRM	Refinance ARM	Purchase ARM
<b>From Table 9 Specifications:</b>				
<i>Predicted probability of foreclosure</i>	<i>0.56%</i>	<i>0.38%</i>	<i>1.15%</i>	<i>0.92%</i>
Change in predicted probability of foreclosure due to each loan feature:				
<i>PREPAY36</i>	-0.11%**	0.20%*	0.02%	0.08%
<i>BALLOON</i>	0.32%***	0.01%	---	---
<i>LOWNODOC</i>	0.21%***	-0.12%**	0.28%***	-0.01%
<b>From Table 10 Specifications:</b>				
<i>Predicted probability of foreclosure</i>	<i>0.56%</i>	<i>0.39%</i>	<i>1.15%</i>	<i>0.92%</i>
Change in predicted probability of foreclosure due to each loan feature and interaction term:				
<i>PREPAY36</i>	-0.25%***	0.01%	0.04%	0.06%
<i>BALLOON</i>	0.34%***	0.00%	---	---
<i>LOWNODOC</i>	0.24%**	-0.06%	0.29%***	-0.01%
<i>PREPAY36*BALLOON</i>	0.25%	0.29%	---	---
<i>PREPAY36*LOWNODOC</i>	1.75%*	-0.18%	-0.13%	0.09%
<i>BALLOON*LOWNODOC</i>	-0.17%*	-0.15%	---	---
<i>PREPAY36*BALLOON</i>	-0.38%***	0.54%	---	---
<i>*LOWNODOC</i>				

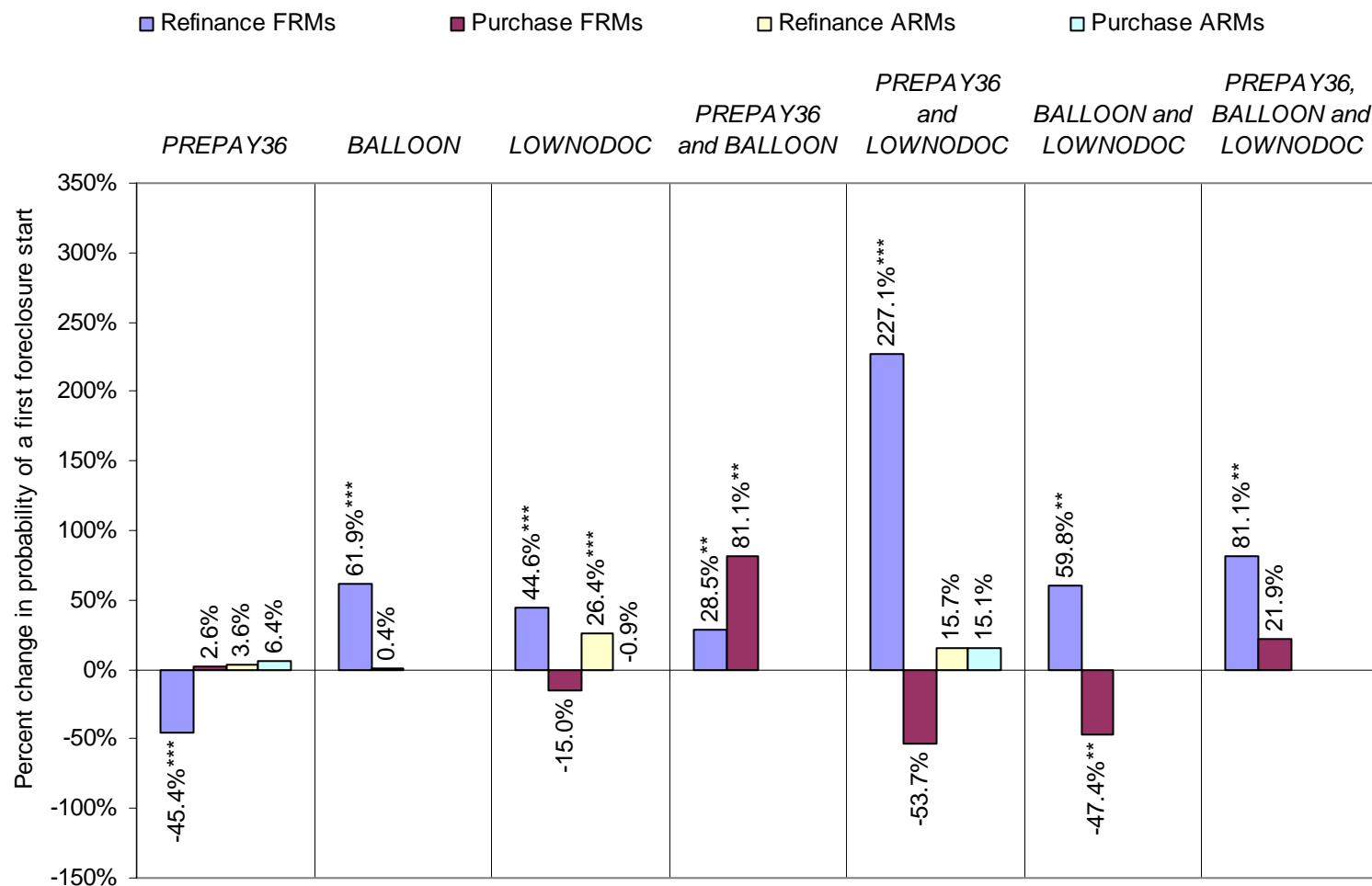
**Figure 1: Percentage Changes in the Probability of a First Foreclosure Start Due to Loan Features**

Each value below equals the percentage change in the probability of a first foreclosure start, relative to the probability of a loan remaining active, associated with the presence of a long prepayment penalty period, a balloon payment, or low- or no-documentation. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12). Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent, and 1 percent, respectively.



**Figure 2: Percentage Changes in the Probability of a First Foreclosure Start Due to Combinations of Loan Features**

Each value below equals the percentage change in the probability of a first foreclosure start, relative to the probability of a loan remaining active, associated with each possible combination of a long prepayment penalty period, a balloon payment, and low- or no-documentation. The omitted combination is the absence of all three loan features. Note that values under headings indicating two or more loan features refer to the combined effects of all indicated loan features, not just the effect of the interaction term from Table 10. For example, the values under the heading “*PREPAY36 and BALLOON*” describe the combined effects of *PREPAY36*, *BALLOON*, and the interaction term *PREPAY36\*BALLOON*. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12). Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent, and 1 percent, respectively.



## **Appendix – Multinomial Logit Results Concerning the Probability of Prepayment**

The tables in this Appendix provide the multinomial logit results concerning the probability of prepayment (relative to the probability of a loan remaining active) that coincide with the results concerning the probability of foreclosure presented in Tables 9 and 10. Although the main focus of the paper is the relationship between the loan features of interest and the probability of foreclosure, these results concerning the probability of prepayment are presented for the sake of completeness.

**Table A1: Predatory Lending Practices and Changes in the Probability of Prepayment**

This table reports the results of multinomial logit regressions for subprime loans originated on or after Jan. 1, 1999, using quarterly data through June 30, 2003. Variables are defined as described in Table 1. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12). Each coefficient estimate represents the impact on the probability of prepayment, relative to the probability of the loan remaining active, of a one-unit change in the corresponding variable. Associated results concerning the probability of a foreclosure start are presented in Table 9. Robust standard errors clustered by loan are in parentheses. Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent, and 1 percent, respectively.

	Refinance FRMs	Purchase FRMs	Refinance ARMs	Purchase ARMs
<i>PREPAY36</i>	-0.170*** (.063)	-0.056 (.136)	-0.014 (.054)	-0.229* (.137)
<i>BALLOON</i>	-0.069 (.045)	-0.384*** (.076)		
<i>LOWNODOC</i>	0.305*** (.055)	0.082 (.089)	0.143*** (.035)	0.182*** (.065)
<i>FICO</i>	-0.002*** (.0003)	0.002*** (.0006)	0.0001 (.0002)	0.0004 (.0004)
<i>AGEOFLOAN</i>	0.177*** (.011)	0.194*** (.035)	0.201*** (.010)	0.158*** (.028)
<i>(AGEOFLOAN)<sup>2</sup></i>	-0.003*** (.0002)	-0.004*** (.0004)	-0.004*** (.0001)	-0.004*** (.0003)
<i>LTV</i>	-0.011*** (.002)	-0.011* (.007)	-0.018*** (.002)	-0.030*** (.007)
<i>AGEOFLOAN * LTV</i>	0.0001 (.0001)	0.0005 (.0004)	0.0006*** (.0001)	0.0011*** (.0003)
<i>CASHOUT</i>	-0.054 (.124)		0.084 (.085)	
<i>AGEOFLOAN * CASHOUT</i>	-0.005 (.005)		-0.007* (.004)	
<i>ΔINRATE</i>	-0.041 (.045)	0.078 (.095)	-0.013 (.034)	-0.044 (.068)
<i>INCOME</i>	-0.008 (.006)	-0.0003 (.009)	-0.009** (.004)	-0.004 (.006)
<i>%BLACK</i>	-0.008*** (.0013)	-0.011*** (.002)	-0.009*** (.0009)	-0.008*** (.001)
<i>%HISPANIC</i>	-0.0005 (.003)	-0.011** (.005)	-0.0005 (.002)	0.001 (.003)
<i>ADULTS/HH</i>	-0.234 (.171)	-0.497** (.248)	-0.219** (.110)	-0.285 (.170)
<i>%HIGHSCHOOL</i>	0.001 (.007)	-0.020** (.011)	0.005 (.004)	0.0007 (.007)
<i>2000</i>	0.315*** (.080)	0.627*** (.175)	0.064 (.056)	0.146 (.109)
<i>2001</i>	0.921*** (.075)	1.232*** (.164)	0.360*** (.050)	0.528*** (.096)
<i>2002/03</i>	0.976*** (.102)	1.244*** (.206)	0.460*** (.064)	0.555*** (.123)
<i>Constant</i>	-2.211*** (.662)	-2.852** (1.219)	-3.346*** (.464)	-2.367*** (.876)
# of observations:	61,788	16,374	104,565	33,311
# of loans:	7,774	2,639	16,505	5,700
# of prepayments:	2,574	859	5,521	1,696
Pseudo R <sup>2</sup>	0.079	0.103	0.090	0.093



**Table A2: Interactions Between Predatory Lending Practices and Changes in the Probability of Prepayment**

This table reports the results of multinomial logit regressions for subprime loans originated on or after Jan. 1, 1999, using quarterly data through June 30, 2003. Variables are defined as described in Table 1. The small number of ARMs with balloon payments was dropped from the sample (see Footnote 18, Page 12). Each coefficient estimate represents the impact on the probability of prepayment, relative to the probability of the loan remaining active, of a one-unit change in the corresponding variable. Associated results concerning the probability of a foreclosure start are presented in Table 10. Robust standard errors clustered by loan are in parentheses. Results for control variables are similar to those in Table A1, and are omitted here. Levels of significance are indicated by \*, \*\*, and \*\*\* for 10 percent, 5 percent, and 1 percent, respectively.

	Refinance FRMs	Purchase FRMs	Refinance ARMs	Purchase ARMs
<i>PREPAY36</i>	-0.282*** (.109)	-0.157 (.273)	0.016 (.059)	-0.206 (.167)
<i>BALLOON</i>	-0.049 (.054)	-0.300*** (.094)		
<i>LOWNODOC</i>	0.454*** (.067)	0.216* (.117)	0.155*** (.036)	0.184*** (.066)
<i>PREPAY36 * BALLOON</i>	0.263* (.137)	0.165 (.339)		
<i>PREPAY36 * LOWNODOC</i>	-1.206*** (.426)	-0.068 (.450)	-0.164 (.131)	-0.075 (.289)
<i>BALLOON * LOWNODOC</i>	-0.411*** (.130)	-0.341** (.171)		
<i>PREPAY36 * BALLOON * LOWNODOC</i>	1.219*** (.478)	0.138 (.570)		
# of observations:	61,788	16,374	104,565	33,311
# of loans:	7,774	2,639	16,505	5,700
# of prepayments:	2,574	859	5,521	1,696
Pseudo R <sup>2</sup>	0.080	0.104	0.090	0.093