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**The Impact of Predatory Loan Terms on Subprime Foreclosures:
*The Special Case of Prepayment Penalties and Balloon Payments***

by

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ABSTRACT

There are growing concerns about the way predatory mortgages erode housing equity. In this paper, we examine a potential additional impact: the relationship between abusive loan terms and foreclosure. Do predatory characteristics increase the likelihood of foreclosure once other risk factors are taken into account? We examine this question by estimating the impact of two loans characteristics—prepayment penalties and balloon-payment requirements—on foreclosure using a national database of subprime refinance first-lien loans originated in 1999.

We find that these predatory loan features lead to a significant increase in mortgage foreclosure risk, even after controlling for other risk factors. For instance, refinance loans with prepayment penalties and those with balloon payments are more likely to experience a foreclosure than loans without these characteristics—by about 20 percent and 50 percent, respectively. These findings suggest that predatory loans have the potential not only to erode household wealth but also to heighten the negative impacts on individuals, households, and communities associated with foreclosure. Furthermore, we estimate that the use of prepayment penalties and balloon payment requirements in 1999 refinance originations increased foreclosure-related losses by about \$465 and \$127 million nationally, respectively.

INTRODUCTION

There is growing interest in better understanding the performance of loans made to subprime borrowers.¹ This growing interest is understandable given the surge in subprime lending during the last few years and the greater risks associated with this type of lending. Nationally, subprime loan originations increased more than nine fold--from \$35 billion to about \$332 billion, in just 9 years (1994–2003) (Mortgage Market Statistical Annual 2004). Within metropolitan areas alone, between 1993 and 2001, the subprime share of all home purchase originations grew from 1.3 percent to 6.5 percent, while the subprime share of refinance loans climbed from 2.1 percent to 10.1 percent (FDIC 2004.) More recent data indicates that 2004 was another record year, with subprime securitizations topping \$401 billion (Inside B&C Lending, 2005)

While the inherently higher risk of subprime lending is expected to lead to a higher incidence of defaults and foreclosures, concerns have been raised about the level of foreclosures in this sector of the market (Bunce et al. 2001, 264). In the fourth quarter of 2003, 2.13 percent of all subprime loans across the country *entered* foreclosure, which was more than ten times higher than the rate for all conventional prime loans (MMSA 2004, 273). Including these new entrants, in the fourth quarter of 2003, more than one out of every 20 subprime borrowers was in the foreclosure pipeline, and thus at risk of losing their homes, compared to just 1 out of every hundred prime borrowers (MMSA 2004, 277).

Not only are subprime foreclosures disproportionately high, but they seem to be

¹Subprime borrowers are those with impaired credit and those with good credit who still represent additional risks due to high loan-to-value ratios, high debt-to-income ratios, unstable income, little or no documentation of income,

occurring much earlier in the loan term than are prime foreclosures which, Bunce et al suggest, is an indication that “the loans were not affordable for the mortgagors even at the time of origination” (Bunce et al. 2001: 265). To cite one example, a HUD study found that loans by subprime lenders in Baltimore were on average 1.8 years old at the start of foreclosure, compared to 3.2 years for prime and FHA loans (Bunce et al. 2001, 264). Underwriting home loans at unaffordable monthly costs is one indication of abusive or predatory lending practices, an issue to which we now turn.

While definitions of predatory lending abound, they all share in common the proposition that the loans contain some features not found in other subprime or prime loans that raise borrowing costs or increase default risk while providing no countervailing benefit to the borrower (Bunce et al. 2001, 257). In other words, predatory lending is rooted in “deceptive and in some cases illegal practices to coerce borrowers into unfavorable mortgage agreements” (Bourassa 2003, 4). While there is no catalogue of predatory loan features, those most often cited include underwriting loans based on the value of the collateral rather than on a borrower’s ability to repay the loan; inducing a borrower to repeatedly refinance for no other reason than to generate additional points and fees for the lender (“loan flipping”); and engaging in fraud and deception to conceal from an unsuspecting or unsophisticated borrower the true nature and cost of the loan obligation (Gramlich 2000).² Also considered predatory are loans with lengthy and costly prepayment penalties that prevent borrowers from refinancing when interest rates fall or their credit record improves; loans with balloon payments that exceed a borrower's ability to pay

or similar factors. See, for example, Crews Cutts and Van Order (2004).

²These practices (e.g., making loans based exclusively on the collateral and loan flipping) suggest that predatory practices are likely to be concentrated in the refinance market. Empirical evidence supports this contention (HUD 2000; Quercia, Stegman, and Davis 2004).

when they fall due, forcing yet another refinancing and new round of fees and charges; very high loan-to-value ratios, excessive interest rates that are not justified by the underlying credit risk; and single premium credit insurance that is financed within the mortgage, thus increasing the loan principal upon which high interest rates must be paid.³

When it comes to subprime lending, of which predatory lending is a subset, the controlling federal law is the Home Ownership and Equity Protection Act of 1994 (HOEPA), implemented by Section 226.32 of federal Regulation Z, revised in 2002. Under HOEPA, high cost loans are defined as those with either (1) interest rates eight percentage points higher than comparable treasuries (for first-lien loans) or (2) total points and fees exceeding 8 percent of the total loan amount or \$400 (subject to annual indexing), whichever is greater. HOEPA also limits the refinancing of high cost loans with another high cost loan within the first year unless the refinancing is “in the interest” of the borrower (Dreher, Langer, and Tomkies 2004). Since 1994, more than 25 states and localities have enacted predatory lending laws that generally set a much lower trigger than HOEPA, require fuller disclosure, or ban a broader array of abusive practices (Mortgage Bankers Association 2004; Kirchhoff 2004).

Legislators, regulators and community advocates are concerned about predatory lending because such practices can strip borrowers of their home equity wealth and destabilize neighborhoods if loan failures are highly concentrated. Data suggest that low-income, elderly, and minority borrowers may be especially vulnerable to this type of lending because of their greater susceptibility to “push marketing,” high-pressure sales pitches, lack of experience with

³For instance, loans with such characteristics are covered by North Carolina's anti-predatory law (Quercia, Stegman, and Davis 2004).

mortgage lending, and urgent need for credit. Stein (2001) estimates that U.S. borrowers lose \$9.1 billion annually to predatory mortgage practices. This includes equity stripping in the form of financed credit insurance (\$2.1 billion), excessive up-front fees (\$1.8 billion), subprime prepayment penalties (\$2.3 billion), and excess interest rate charges (\$2.9 billion).

Although a link between predatory lending and incrementally higher foreclosure rates has been suggested by Stein (2001) and others, there is little definitive empirical evidence of the nature or magnitude of this relationship which this paper attempts to address. Using a large database of securitized subprime loans licensed to us by the private company Loan Performance, Inc., we rigorously examine the relationship among loan, borrower, and other factors on the performance of subprime mortgages. We pay particular attention to the incremental effect that abusive or predatory loan terms have on foreclosure, after controlling for other risk factors.

The remainder of this paper is divided into four sections. First we review the few empirical studies on the suspected link between subprime/predatory lending and foreclosure. Then, we describe our data and methodology. Next, we present the results of a multinomial logit hazard model of foreclosure that controls for the competing risks posed by default (foreclosure) and prepayment. In the final section, we discuss the policy implications of our findings.

SUBPRIME LENDING AND FORECLOSURE

The dominant paradigm in mortgage default studies is the option-based model, the basic premise of which is that borrowers have an option to default on their mortgage at each payment period. The value of home equity plays a central role in this model (Foster and Van Order 1984;

Vandell 1995). Borrowers are assumed to be more likely to default if the equity in the home is negative, net of the transaction and other less tangible costs associated with default such as damage to their credit record. In these cases, the default, or put, option is said to be in the money.⁴ Even when in the money, borrowers may delay exercising the default option if they believe that it is beneficial to do so (Ambrose, Buttimer, and Capone 1997).⁵

Default and prepayment are considered to be interdependent competing risks because the exercise of the former precludes exercise of the latter, and vice-versa. According to Deng, Quigley, and Van Order (1996; 2000), from a borrower's perspective, the value of the default (put) option is affected by the value of the prepayment (call) option. This implies that an analysis of the default option should treat default and prepayment as interdependent competing risks to effectively examine the jointness of the put and call options.

Technically, data on the cure rate of foreclosed loans (Quercia, Cowan, and Moreno 2004; Crews Cutts and Green 2004) suggest that prepayment and the start of a foreclosure may not always be truly and fully competing risks because foreclosure does not necessarily mean that borrowers can't exercise the prepayment option later if they cure their default.⁶ Of course, loss of their home by borrowers is a competing risk to prepayment, because once lost, borrowers no

⁴Negative equity (the extent to which the default option is in the money) can be seen as a necessary but not sufficient condition for default. Most borrowers with negative equity never default. There is some type of trigger event that makes people check the extent to which the option is in the money (Vandell 1995; Quercia, McCarthy, and Stegman 1995; Ambrose and Capone 1998).

⁵ The authors introduced into the option framework the delay of foreclosure and the concept that the decision to stop making payments is determined by expected values of the property well into the future.

⁶Of course, it should be noted that although it is the borrower who decides to stop mortgage payment permanently (default), it is the lender who decides to foreclose (Quercia and Stegman 1992). The willingness and ability of lenders to delay initiating foreclosure proceedings depend on a number of factors, including whether the loan has been securitized, local economic conditions, and the legal environment in the locality (Phillips and Rosenblatt 1997; Springer and Waller 1993). The latter includes whether states allow for deficiency judgments and long redemption periods (Pence 2003).

longer have the ability to exercise the prepayment option. However, borrowers usually make their decision not to cure the default long before the foreclosure results in loss of the home (Ciochetti et al. 2002).

Prepayment penalties are distinct characteristics of subprime loans (Farris and Richardson 2004).⁷ Over the last few years, the proportion of subprime loans with prepayment penalties has increased significantly, from about 50 percent in 1998 to about 80 percent in 2000 (McDermott, Albergo, and Abrams 2001). Because they impose significant costs to the borrower for exercising the call option, prepayment penalties extend the average life of a typical mortgage, thereby increasing default risk. This is because when borrowers exercise the prepayment (call) option, they extinguish the default (put) option at the same time. If prepayment penalties slow down prepayment speed, they keep the default (put) option alive longer.⁸ From a quantitative standpoint, McDermott, Albergo, and Abrams (2001) estimate that prepayment penalties reduce the rate of prepayment on a pool of subprime loans by an average of 10 percent over the life of the prepayment penalty term.

It is not difficult to see how abusive or predatory loan terms might increase the probability of default and, thus the start of foreclosure. High fees and other unwarranted charges erode home equity. High back-end ratios, which allow borrowers to purchase more house than they can really afford in the long run, leave little cushion to address crises that may trigger the

⁷For a general discussion of trends in the subprime market, see for example Lax et al. (2004), Crews Cutts and Van Order (2004).

⁸Even when prepayment penalties are present, most borrowers can still prepay up to 20 percent of the original loan amount in any 12-month period without incurring penalties. Usually, penalties equal six months' interest on the amount prepaid, or on the amount prepaid in excess of 20 percent if applicable (Dopp 2003). The income from prepayment penalties is often pledged to net interest margin securities (NIMS) to stabilize the expected yield received by the NIMS holder (McDermott, Albergo, and Abrams 2001).

default option. Prepayment penalties and balloon-payment requirements slow down the repayment of the outstanding principal, increasing the likelihood that borrowers may experience negative equity in the event of a downturn in the market.⁹ In addition, prepayment penalties can reduce the refinancing and other choices available to borrowers when confronted with a crisis, or of refinancing into a lower cost prime loan as a result of improving their credit record, making the option to default more desirable (Berquist 2004). Borrowers with little ability to accumulate the large payments due on balloon loans are forced to refinance (which incurs fees and other charges), further eroding their equity position. Finally, while recent strong markets have kept the default option out of the money even for highly leveraged borrowers, a slowdown in local or regional appreciation rates will limit their ability to gain equity and could bring the put option back into play.

As indicated earlier, there is little convincing empirical research that directly ties predatory loan terms to incrementally higher foreclosure risk above and beyond that represented by the credit quality of the subprime borrower, although several recent studies are strongly suggestive of just such a link (Collins 2003; Gruenstein and Herbert 2000a; Gruenstein and Herbert, 2000b; Bunce et al. 2001; National Training and Information Center 1999; HUD 2000; Zimmerman, Wyly, and Botein 2002; Bourassa 2003; Immergluck and Smith 2004; The Reinvestment Fund 2004).¹⁰

⁹ Prepayment penalties have the potential to slow down the repayment of principal because they discourage borrowers from making additional payments to reduce the outstanding loan principal over and above the principal repayment in the periodic monthly payment.

¹⁰ Using a hazard model with jointly estimated competing (prepayment/default) risks and unobserved heterogeneity, Alexander et al. (2002) examine the role of third party originators on the default with proprietary data from a sample of subprime fixed-rate loans secured by residential real estate that originated between 1996 and 1998. As expected, the authors find that third-party originations are more likely to default than loans originated by lenders (retail) and that initially this higher risk was not priced accordingly. With time, the authors find that interest rates were adjusted to account for the higher risk.

For instance, Immergluck and Smith (2004) examine the relationship between the level of subprime lending in a neighborhood and foreclosure levels in a subsequent period, while controlling for changes in economic and demographic characteristics that might also affect future foreclosure rates. Using foreclosure and HMDA data from the five-county Chicago metropolitan area, the authors find that subprime lending was the dominant driver of the increased and highly concentrated neighborhood foreclosure levels of the late 1990s through 2002. After controlling for important neighborhood (census tract) and economic factors such as changes in population, homeownership rate, median home value, median family income and unemployment rate, subprime loans experienced foreclosures at twenty or more times the rate for prime loans. Thus, the authors conclude that the benefit of subprime lending—an increased access to credit for credit-impaired families—needs to be balanced against the heavy social costs and neighborhood dislocations associated with foreclosure.

In its assessment of the growing foreclosure trend in Monroe County, Pennsylvania, The Reinvestment Fund (2004) made three key findings.¹¹ First, mortgage foreclosure filings tripled in Monroe County from 1995 through 2003 (from 388 to 940), pushing up the foreclosure rate from 1.8 percent to 2.3 percent of all occupied units for the period 2000-2002. Second, unlike typical home loans in Monroe County, foreclosed loans were more likely to involve an inflated sale price than non-foreclosed loans. These loans were also disproportionately subprime and

¹¹TRF relies on several data sources. U.S Census Data and census estimates for 1990, 2000, and 2002; U.S. Census 2000 5-Percent Public Use Microdata Sample (PUMS) for Pennsylvania; foreclosure files from the Prothonotary's office in Monroe County; property specific sale and mortgage data (fee-based) produced by RealQuest, by First American Real Estate Solutions, Inc., and Landex by Optical Storage Solutions, Inc.; data from the Homeowners Emergency Mortgage Assistance Program (HEMAP); one-on-one telephone interviews with approximately 75 homeowners in or on the verge of foreclosure; and copies of two lawsuits files by the Office of Attorney General against two developers in Monroe County.

went into foreclosure faster than loans made in other Pennsylvania counties for which comparable data were available. Finally, foreclosure filings were found to be geographically concentrated in just five townships and twelve subdivisions (p. 3).

Pennington-Cross compares risks in prime and subprime mortgages in two studies (2003; 2002). In a 2003 study that simulates lender losses from foreclosure in a sample of Fannie Mae and Freddie Mac mortgages, he estimates that expected mean losses for subprime loans are five to six times higher than for prime loans. In an earlier study (Pennington-Cross 2002), using Loan Performance data, he finds that subprime borrowers are at greater risk of both foreclosure and prepayment and that such borrowers do not respond the same to default and prepay options as prime borrowers. Nonprime borrowers are found to be less responsive to how much the option to prepay or refinance is in the money and less responsive to their equity position in exercising the default option.

Other studies more directly assess the impact on foreclosure of loan terms often identified as predatory or abusive in state predatory laws. Danis and Pennington-Cross (2004) examine the default and prepayment decisions of borrowers using data from a national sample of 5,000 randomly selected, securitized private-label subprime 30-year fixed-rate loans provided by Loan Performance, Inc. Specifying a nested logit model that allows a loan to be current, 30 days delinquent, 60 days delinquent, 90 days delinquent, defaulted, or prepaid in each month, Danis and Pennington-Cross determine that delinquent borrowers are sensitive to contemporaneous economic conditions, which affect their ability to make current payments and to cure a delinquency. Trigger events, proxied by the state-level monthly unemployment rate, are found to

decrease the probability of delinquency and increase the probability of default. Of particular interest, the authors examine the impacts of low- and no-documentation of income at origination, and prepayment penalties. Other things constant, low-documentation loans are less likely to both prepay and default, while no-documentation loans are significantly less likely to default but more likely to prepay. Finally, prepayment penalties are significantly and negatively correlated with prepayment and default. This latter finding is contrary to the earlier contention that prepayment penalties increase default risks.¹²

Bourassa (2003) examined predatory lending in Jefferson County (Louisville), Kentucky, using court records of 1,555 mortgage foreclosures that resulted in court-ordered auctions between January 2000 and December 2002. Finding that about one-third of the foreclosures appeared to involve loans with predatory terms, he concluded that predatory lending “accounts for a significant part of the growing foreclosure rate in Jefferson County” (p. 2). Of the predatory loans, 73 percent had prepayment penalties combined with high interest rates, 29 percent had balloon payments, 10 percent had very high interest rates, and 5 percent had high loan-to-value ratios (p. 2). Consistent with prior work, Bourassa found that predatory loans were concentrated in high-poverty and largely African-American neighborhoods in Louisville.¹³

¹² We have attempted to replicate their results, using the same variables and the same source for the sample loans, with no success. Perhaps their findings are the result of an odd random sample or an artifact of their model. Regardless, their sample is limited to fixed-rate loans, which are a declining share of the subprime market (Quercia, Stegman, and Davis 2004). It also pools together originations from several years and purchase and refinance loans, while predatory lending appears to take place mostly for refinance loans (see, for example, the Home Equity Protection Act of 1994 (HOEPA)). The sample also appears to include loans for which payment histories may not have been available until several months after origination.

¹³ In 1998, subprime refinance loans accounted for 26 percent of total refinance loans in low-income neighborhoods, compared with 11 percent in moderate-income neighborhoods and just 7 percent in upper-income neighborhoods. The disproportionate concentration in African-American neighborhoods is even greater; in 1998 subprime lending accounted for 51 percent of refinance loans in predominantly African-American neighborhoods

While all of the above studies suggest a link between subprime lending and foreclosure, and some indicate a relationship between specific predatory loan terms and foreclosure, none of them rigorously examine these relationships across a broad range of loan types (i.e., fixed-rate, adjustable-rate, balloons, with and without prepayment penalties) while controlling for other risk factors.¹⁴ Nor, do they focus on subprime first lien refinance loans, which are where predatory practices seem to be concentrated. This paper attempts to fill that void.

DATA AND METHODOLOGY

The mortgage data for this analysis come from the Loan Performance (LP) Subprime Asset-Based Securities (ABS) loan-level database (through period #183, April 2004). The LP database represents a significant share of the overall subprime market, ranging from approximately 39 percent in 1998 to about 67 percent in 2002 (Quercia, Stegman, and Davis 2004, Table 1).

The data for our analysis is limited to subprime conventional mortgage originations that refinance the first liens of owner-occupants. The sample was further limited to loans with a 30-year term or a balloon loan with the payment due within 10 years or more, that were originated by retail lenders, for which payment histories were available within at least the first 6 months of origination,¹⁵ and had data on prepayment penalties and other variables of interest in our

compared with only 9 percent in predominantly white neighborhoods (Bunce et al. 2001, 258).

¹⁴ An open question is whether certain predatory characteristics may both impact the risk of foreclosure and be reflective of the risk of foreclosure, i.e. that they would be endogenous to the system. However, it is difficult to see how prepayment penalties or balloon loans would help lenders reduce foreclosure risk.

¹⁵ Loan Performance arranges with lenders and servicers to receive payment histories on securitized subprime loans. Because of when a particular pool of loans is securitized or when LP enters into an agreement with a lender or servicer, several months of payment history may be missed. For 1999 subprime first lien refinances, approximately 33 percent did not have payment histories beginning within 6 months of the first payment date, 19 percent did not have payment histories for the first year, and about 11 percent did not have payment histories for the first two years.

analysis. Payment histories were tracked through the end of 2003. The data used in our multivariate model are further restricted to 1999 originations, totaling 122,456 loans.

We chose 1999 for the model because the LP database contains a large portion of all subprime originations in that year (41.4% -- see Quercia, Stegman and Davis 2004, Table 1), borrowers would have at least 4 years of payment history, and the 1999 LP database has substantially fewer missing values for the variables of interest than the 1998 database. Finally, this limitation simplifies computational requirements: these 122,456 loans generate nearly 3.8 million loan-month observations, so extending the analysis to all cohort years would slow our analysis considerably.

We also draw data for our analysis from several other sources, including the Bureau of Labor Statistics (BLS), the Office of Federal Housing Enterprise Oversight (OFHEO), Freddie Mac, and Economy.com's *Data Buffet* (2004). Data on which states have judicial foreclosures were drawn from Pence (2003).

We reflect the competing risks of prepayment and default using a multinomial logit model. Allison (1984; 1995) shows that the logit model, with data restructured such that each month a loan is active supplies an observation, produces the same likelihood function as a proportional hazards model with time treated as discrete. The multinomial logit model treats the outcome as polytomous and, via the restriction that the sum of the probabilities of each outcome must equal one, controls directly for competing risks, i.e., the increase in the probability of one

Given the speed with which subprime loans enter foreclosure or are prepaid, including loans without early payment histories may bias the sample.

outcome necessitates a decrease in the probability of at least one competing outcome. Formally, the log-likelihood function is defined as:

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

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

$$\Pr(y_{it} = j) = \frac{1}{1 + \sum_{k=1}^2 e^{\beta_k Z_{it}}} \quad \text{for } j = 0$$

where d_{ijt} is an indicator variable taking on the value 1 if outcome j occurs to loan i at time t and zero otherwise.

The multinomial logit model has several advantages over a proportional hazards model. Competing risks are handled easily with no assumption of proportionality; the model can be estimated with commercial software; and the restructuring of the data into loan-months facilitates the inclusion of time-varying covariates. The model, however, assumes the “independence of irrelevant alternatives,” which means that the odds ratio for any pair of outcomes should be independent of any alternative outcomes. This model also assumes that outcomes at any one point in time are independent of outcomes in any previous point in time. See Clapp, Deng, and An (2004) for a more extensive discussion of the choices available for modeling the competing risks of mortgage loan outcomes.

This functional form also assumes no unobserved heterogeneity. Following Deng, Quigley, and Van Order (2000), Clapp, Deng, and An (2004) develop a “mass-point” multinomial logistic model that incorporates unobserved heterogeneity through the assumption

that distinct but unmeasured groups exist in the population. Unfortunately, software to estimate these models is not commercially available and we were unable to obtain the code to estimate such models. However, in their comparison of different competing risk models, Clapp, Deng, and An (2004) found that while the mass-point models performed better, the standard multinomial model produced coefficients of similar magnitude and significance and that, if anything, the standard multinomial model produced conservative estimates (i.e., coefficients attenuated towards zero).

To provide some control for unobserved heterogeneity and to correct for any dependence among observations drawn from the same loan, we used robust standard errors allowing for observations (months) clustered within loans. We estimated the model using *Stata/SE v. 8.2 for Windows* (StataCorp 2004).

The covariates in the model included several measured at loan origination: whether the loan had a prepayment penalty term of between 12 months and 35 months, or of 36 months or greater (vs. no prepayment penalty); whether the loan was an adjustable-rate mortgage (ARM) or balloon loan (vs. fixed-rate mortgage, or FRM);¹⁶ the loan-to-value ratio (LTV); a series of dummy variables representing the credit score of the borrower (a prime credit score of 660 or higher is the omitted category); the interest rate at origination; whether the borrower's income was fully documented or not (fully documented is the omitted category); whether the loan was a cash-out refinance (vs. rate-term refinance); and whether the property was a multi-family (2-4) unit, a condo or townhouse, or manufactured housing (vs. a single-family residence, or SFR). All of these variables were drawn from the LP ABS database. Phillips and Rosenblatt (1997)

found that loans in states with a judicial foreclosure process had a higher foreclosure rate so we include a dummy variable for judicial foreclosure states, drawn from Pence (2003).

The model also includes several time-varying covariates. For ARM loans, we include the difference between a given month's interest rate (from the LP database) and the origination rate. To capture changes in house prices (following Danis and Pennington-Cross 2004), we include the change in the quarterly state-level house price index since origination (Office of Federal Housing Enterprise Oversight 2004).¹⁷ Also following Danis and Pennington-Cross (2004), we include the BLS' state-level unemployment rate for the previous month to capture general economic conditions and trigger events like job loss; the difference between the current month's average prime interest rate (from Freddie Mac's Prime Mortgage Market Survey) and the average prime interest rate at origination as a proxy for the change in subprime interest rates.¹⁸ Finally we include the loan age (in months) and its quadratic term to test for nonlinearity in the loan-age foreclosure relationship.¹⁹

¹⁶ It should be noted that none of the balloon payments were due over the course of our study period.

¹⁷ Danis and Pennington-Cross (2004) argue for the importance of including both the house price index and its estimated standard error; however, these variables were so highly correlated in our sample that including them both was untenable.

¹⁸ The monthly state-level unemployment rate and the monthly prime interest rate were downloaded from Economy.com's *Data Buffet* (2004), under license to the Center for Community Capitalism.

¹⁹ Alternative model specifications were estimated. In one model, we added the (total) debt-to-income ratio. Unfortunately approximately half the sample is missing data on this variable. Those model results were consistent with the model presented in this paper. The magnitude of the coefficients for the variables of primary interest (prepayment penalty terms, balloon/ARM loans) was actually slightly greater. In another model, we added interaction terms between prepayment penalty terms and ARM/balloon loans. These interaction terms were generally significant but of little practical impact, so were not presented for reasons of parsimony. Similarly, we added interactions between the variables of primary interest and the time variables. Only the ARM*time-squared variable was significant, consistent with Calhoun and Deng (2002), but again it was a small impact and excluded to simplify presentation and interpretation. In all alternative models, the effects of prepayment penalty terms and balloon/ARM loans were significant and our main substantive conclusions were unchanged.

Following estimation of the above model, we estimate the impact that prepayment penalties and balloon loans have on monetary losses due to foreclosure for the lenders and investors who own the loans. This requires a multi-step estimation process, which we discuss below. We refer readers who are more interested in the results of our estimations than in the methodology to the discussion that directly follows this section.

Treating our sample as a “portfolio,” we first use standard methods for estimating the expected loss for a portfolio of loans over a given period of time (see e.g. Bluhm, Overbeck, and Wagner 2002).²⁰ We begin by defining the expected loss for any given loan i (EL_i) as:

$$EL_i = PD_i * LGD_i$$

where PD_i is the probability of default for loan i over some time horizon (we have chosen a loan’s first three years because that is the most common term for a prepayment penalty) and LGD_i is the expected total loss given loan i defaults (including the outstanding principal plus other foreclosure-related costs).

It is useful to consider at least two different types of final foreclosures, real-estate owned (REO) and a sale of the property while in foreclosure, because, in our sample, these generate quite different levels of losses. So we rewrite the above equation as:

$$EL_i = P(REO)_i * LGR_i + P(FSale)_i * LGFS_i$$

where $P(REO)_i$ is the probability of loan i ending up in REO within three years of origination, $P(FSale)_i$ is the probability of a loan being sold while in foreclosure within three years of

origination, and LGR_i and $LGFS_i$ are the expected losses given a loan results in an REO or a sale in foreclosure, respectively.

In the LP database, not all loans that end up in REO or “sold in foreclosure” report losses, but to estimate LGR_i and $LGFS_i$ we first calculated the average percentage loss (of the origination amount) for REOs and sales in foreclosures for all years in the LP database.²¹ Then for any given loan i , we calculate LGR_i and $LGFS_i$ as the expected percentage loss for that type of default multiplied by the origination amount.

To estimate $P(\text{REO})_i$ and $P(\text{FSale})_i$, we begin with our competing risks model. One thing to keep in mind is that $P(\text{REO})_i$ and $P(\text{FSale})_i$ are cumulative probabilities of a loan ending up in REO or being sold in foreclosure within the first three years of origination while our model is based on monthly loan payment observations. We will use p in place of P to denote monthly probabilities.

From the competing risks model we can derive an estimate of the expected probability of a loan entering its first foreclosure in any given month, which we label $p(\text{Fore})_{im}$ where i indexes loan and m indexes the month.²² However, not all foreclosures result in the borrower losing his or her home -- some foreclosures may cure or, in some cases, the final disposition of the

²⁰ It should be noted that most such treatments spend most of their pages on the estimation of unexpected losses to determine the required amount of capital reserve, but our concern in this paper is the simpler task of estimating the expected loss.

²¹ According to Loan Performance documentation: “generally the [reported] loss amounts are ‘total’ losses and include losses due to missed principal and interest payments as well as other fees and costs associated with the disposal of the loan and or property” (Loan Performance 2004). To the extent that any reported losses are not total losses, our estimate of portfolio and hence national losses will be biased downwards.

²² For loans which prepaid or foreclosed in less than three years, it was necessary to “simulate” additional months to calculate the cumulative density function across the full three years.

foreclosure had not been determined by the end of our observation period. Therefore to move from $p(\text{Fore})_{im}$ to $p(\text{REO})_{im}$ and $p(\text{FSale})_{im}$, we define the latter two as:

$$p(\text{REO})_{im} = p(\text{Fore})_{im} * p(\text{REO} | \text{Fore})_{im}$$

$$p(\text{FSale})_{im} = p(\text{Fore})_{im} * p(\text{FSale} | \text{Fore})_{im}$$

That is, the probability that a loan will begin its first foreclosure this month and eventually end up in REO (or sale in foreclosure) equals the probability that it will experience its first foreclosure this month multiplied by the probability that it will end up in REO (or sale in foreclosure) given it experienced its first foreclosure this month. $p(\text{REO} | \text{Fore})_{im}$ and $p(\text{FSale} | \text{Fore})_{im}$, were calculated in two steps. First, using the eventual outcome for all observed foreclosures in our sample, we estimated a multinomial logit model of REO, sale in foreclosure, and “other” outcomes as a function of the model variables in the month of first foreclosure. Second, we applied the resulting coefficients to each loan-month to provide an estimated value of $p(\text{REO} | \text{Fore})_{im}$ and $p(\text{FSale} | \text{Fore})_{im}$ for each loan-month.

This gives us all the elements we need to calculate the monthly hazards of REO and sale in foreclosure, given observed loan characteristics and other information included in the model. To determine the impact of prepayment penalties, all of the above quantities were re-estimated after treating all loans with prepayment penalties as if they had no penalties (but were otherwise identical). This was repeated for balloon loans. These monthly probabilities for each loan formed the basis of the cumulative hazards of REO ($P(\text{REO})_i$) and a sale in foreclosure ($P(\text{FSale})_i$) over the first three years for each loan.

We now estimate losses for the entire sample as:

$$EL^S = \sum_{i=1}^N P(\text{REO})_i * LGR_i + P(\text{FSale})_i * LGFS_i$$

where EL^S is expected loss for the entire sample and N is the total number of loans. This is repeated using the “no prepay penalties” and “no balloon” probabilities.

To generalize the estimated losses in our sample to the national subprime market in 1999, we first estimated losses to lenders in the LP database for all 1999 originations. It will be recalled that the sample for our model is drawn from loans for owner-occupied refinanced first liens; these totaled \$33.9 billion or 51.2% of the entire LP database for 1999. To provide some control for potential selection bias due to missing data in our model sample, we used non-model variables (state of origination, month of origination, origination amount, and whether the loan had been assigned a grade by LP) to predict inclusion in the model sample, and used the inverse of the estimated probability of inclusion as sample weights.

We then calculated a weighted sum of the losses due to REO and foreclosure sale, with and without prepayment penalties and with and without balloon loans. These weighted sums represent the total expected losses, with and without prepayment penalties, in the LP database of owner-occupied refinanced first lien originations in 1999. The difference between those sums gives us an estimate of the amount of money lost due to foreclosures arising from prepayment penalties within the LP database.

Unfortunately, there is no way to precisely weight the LP loans to enable us to generate a representative sample of the national subprime market. Since owner-occupied refinanced first liens constitute 51.2% of all originations in the LP subprime database, we estimated losses in the

national subprime market due to prepayment penalty induced foreclosures, assuming that such originations constitute between 40 and 60 percent of the national subprime market. We discuss the results of our empirical analysis below.

THE EMPIRICAL RESULTS

Descriptive Analysis

Although we estimate a full competing (foreclosure/prepayment) risk model, we are specifically interested in examining the incremental impacts of two specific predatory loan terms on foreclosure. Tables 1 through 3 describe the foreclosure experience of all subprime refinance loans originated from 1998 to 2003 that meet our selection criteria. For the three years of loans with a substantial payment history (1998–2000), about 20 percent were foreclosed upon at least once by year-end 2003 (Table 1).

The cumulative prepayment rate has also been quite high, ranging from about 66 percent for the 1998 cohort to about 58 percent for 2000 originations. Even with a relatively short payment history the 2001 cohort (which we do not use in our model) already shows a cumulative prepayment rate of more than 50 percent. These high prepayment rates are probably due in part to declining interest rates from 2001 onwards.

Overall, a little less than one in five loans from the 1998–2000 aggregate book of business has never been foreclosed on and remain active as of December 31, 2003. Whether prepaid or currently active, eight in ten loans with substantial payment histories (i.e. 1998–2000

originations) have never experienced a single foreclosure episode, while between 5.5 percent and 6.6 percent have experienced more than one foreclosure episode (Table 2).

Unfortunately, most homeowners who experienced at least one foreclosure episode eventually lost their homes (Table 3). This is true for approximately 60 percent of all ever-foreclosed borrowers from 1998–2000, while another 10 percent to 20 percent were still in foreclosure as of December 2003, with their ultimate fate unknown.²³ At best, only about one in four loans that experienced a foreclosure had cured and remained active, or were prepaid. This evidence suggests that it is very difficult for a subprime borrower who has refinanced a first mortgage loan to recover from the initiation of a foreclosure action.²⁴

From this point forward, we focus our analysis just on the 1999 cohort. Following our prior work (Quercia, Stegman, and Davis 2004), we examine the effects of two loan terms that are frequently proscribed in state predatory lending laws and are available in the LP database—extended prepayment penalties (36 months or greater) and balloon payments—on the foreclosure experience of subprime first lien refinance loans originated in 1999.²⁵ Of the 122,456 loans in this cohort, more than 70 percent have a prepayment penalty, with over 55 percent of the total having a penalty term of 3 years or longer (Table 4). Moreover, about one in six refinance loans

²³The actual incidence of troubled loans is likely higher, because the category “active loans” includes delinquent loans that are not currently in foreclosure.

²⁴Although not fully comparable because these numbers represent final outcomes, the findings can be compared with figures reported in other studies on the success of post-purchase services that provide alternatives to foreclosure (see for example Crews Cutts and Green 2004 and Quercia, Cowan, and Moreno 2004).

²⁵Quercia, Stegman, and Davis (2004) also examine high LTV loans. However, these consisted almost entirely of second or higher liens. These loans are not included in this analysis because we do not have information on the underlying first lien.

(14 percent) originated in 1999 are not fully amortizing and thus require a balloon-payment (Table 5).

Interestingly, in a year in which just 22 percent of all conventional prime loans were adjustable rate mortgages (MMSA 2004, 14), almost half (49 percent) of all 1999 subprime refinance originations were ARMs; fixed-rate fully amortizing loans accounted for about 37 percent of all refinance originations while balloon loans accounted for the remaining 14 percent (Table 5).²⁶ The preponderance of ARMs, a subject to which we return later, seems to be a growing trend, with two-thirds of all subprime mortgages securitized in 2004 having adjustable rates (Inside B&C Lending, 2005).

Prepayment penalties are prevalent in all types of subprime refinance loans (Table 6). More than half of FRMs (51 percent) and ARMs (55 percent) had prepayment penalties of 3 or more years in 1999. More than four in every five loans with balloon payments also had prepayment penalties (81 percent). In addition to the large share of loans with extended prepayment penalties, about one in four ARMs had shorter prepayment penalties, of less than 3 years.²⁷

As expected, loans with prepayment penalties have substantially higher ever-foreclosed rates (Table 7). Loans with long prepayment penalties are more likely to end up in foreclosure than those without such penalties (24 compared with 15 percent). Moreover, loans with such a

²⁶ In our sample, most loans with a balloon payment have fixed rates.

penalty slow down debt prepayment (from 66 to 56 percent). However, this lower prepayment rate is not reflected in a higher incidence of active loans. Among all loans with such penalties, more end up in foreclosure (24 percent) than remain active (21 percent). Loans with prepayment penalties under 3 years have a foreclosure rate about 30 percent higher than those with no penalty. Similarly, loans with balloon payments have about a 55 percent higher ever-foreclosed rate than do thirty-year fully amortizing loans (Table 8). ARMs also exhibit a substantially higher ever-foreclosed rate—about 25 percent higher than fixed-rate loans.²⁸

Consistent with previous research (summarized in Bunce et al. 2001), the average time to foreclosure in our sample for foreclosed loans is just under two years (23.6 months). The time to foreclosure for loans with prepayment penalties is about 1 month shorter than foreclosures on loans without prepayment penalties. ARM and balloon foreclosure times are about 2 months shorter than those for FRM foreclosures.

The Competing Risk Model Results

Table 9 presents the summary statistics for the model variables across all loan-months. Table 10 displays the results of our multinomial logit model. Although our primary focus is on

²⁷ These findings are consistent with recent work by Ernst (2005).

²⁸ This finding is consistent with prior work. Calhoun and Deng (2002) estimate conditional probabilities of default and prepayment with a sample of FRMs and ARMs. The authors find that the embedded option values for prepayment and default are generally similar across both FRMs and ARMs. They find that although default rates are higher initially for ARMs, they subsequently rise less rapidly with age and eventually decline more rapidly than the corresponding estimates for FRMs. The authors contend that the more rapid decline in the underlying age-specific conditional probabilities of default for ARM borrowers may indicate a greater level of unobserved heterogeneity in the determinants of mortgage default that exists for FRM borrowers, or additional differences related to the mortgage selection process (p. 24). Fahey, a Fannie Mae economist, contends that “borrowers take ARMs because the low initial rate allows them to stretch their resources in the purchase of a home without a real perception of the

foreclosure risk, our model also includes the competing risk of prepayment, whose coefficients are also presented.

The coefficients and odds ratios give the impact of each variable on the monthly odds of a loan entering foreclosure or prepaying relative to staying “active” (which includes both current and delinquent but not-foreclosed loans). Overall, the model is highly significant with a chi-square of 45,418 with 44 degrees of freedom ($p < .001$). As expected, prepayment penalties have a strong, positive impact on the odds of being foreclosed. Net of other variables, the odds of foreclosure increase by about 20 percent with a 3+ year penalty and by about 16 percent with a shorter penalty, compared to the foreclosure odds of loans with no prepayment penalty.

Balloon loans also have a significantly higher foreclosure rate than fully amortizing loans (on average, all else equal), with odds about 50 percent higher. Thus, these two predatory loan terms that are frequently banned in state predatory lending laws put borrowers at risk of losing their homes over and above the foreclosure risks that are reflected in other factors, such as the borrower’s credit history or debt-to-income ratio.

Other variables in the model are generally significant and the effects are in the expected direction (Table 10). Consistent with prior work (Calhoun and Deng 2002), adjustable-rate mortgages have 50 percent greater odds of foreclosure than fixed-rate loans. Higher loan-to-value ratios, lower credit scores, higher initial interest rates, low/no documentation, lower

risks they face. This is probably at least part of the reason why delinquency and foreclosure rates with ARMs are

appreciation rates, periods of increasing market interest rates, periods of high unemployment, and loans in states with judicial foreclosure are all associated with greater foreclosure risk. The quadratic term for loan age produces a predicted foreclosure risk that increases at a decreasing rate over the first 30 months of the loan term.

Although not the main focus of this research, we also present the impacts of predatory loan terms on prepayment propensities (Table 10). Prepayment penalties achieve their stated purpose of decreasing the odds of prepayment. Prepayment penalties of 3 years or more decrease the odds of prepayment by about 20 percent relative to an otherwise identical loan with no prepayment penalty. The impact of shorter prepayment penalties is less, about a 7 percent reduction. These slower rates are consistent with a Standard & Poor's estimates that show an average decrease of 10% in prepayment speed over the life of the prepayment penalty term. (McDermott, Albergo, and Abrams 2001)

Loans with balloon terms are 24 percent more likely to prepay even though none of the loans had balloon payments due during our study period. Adjustable-rate mortgages are also associated with higher prepayment propensities. ARMs are about 40 percent more likely to experience a prepayment than otherwise identical fixed-rate loans.

Generalizing our foreclosure analysis to the national subprime market, we estimate that prepayment penalties increased loan costs to lenders and investors due to additional foreclosures by approximately \$465 million in 1999, with an estimated range of \$372 million to \$558 million

significantly higher than for fixed rate mortgages" (Inside Mortgage Finance 2004, 8).

depending on what percentage of the national subprime market consists of owner-occupied refinanced first lien originations in that year. Similarly, we estimate that balloon loans increased costs due to additional foreclosures by approximately \$127 million (with a range of \$102 million to \$152 million).²⁹

We should note that the existence of a prepayment penalty does not prevent borrowers from exercising the call option. Within our 1999 LP analysis database, just over 32,000 loans with prepayment penalties (26% of the entire sample and 37% of sample loans with prepayment penalties) were paid off while the penalty was still in effect. These penalties, if fully enforced, generated hundreds of millions of dollars for lenders at the expense of borrower equity.³⁰

CONCLUSIONS

Using a competing risk model, we examined the impacts of two predatory loan terms—prepayment penalties and balloon-payment requirements—on foreclosure and prepayment propensities within the subprime 1st lien refinance market, while controlling for other risk factors.

Significantly, we found that holding constant other risk factors, extended prepayment penalties increase the odds of foreclosure by an additional 20 percent, and aggregate lender and investor costs by around \$500 million (1999 \$). A balloon-payment requirement increases the incremental odds of foreclosure by 50 percent, causing approximately \$130 million in additional

²⁹ Note that these estimates do not include any prepayment penalty or balloon requirement-induced foreclosure losses that may occur among subprime purchase loans, or second liens.

costs. Given that about 60 percent of all loans that entered foreclosure, (or were ever foreclosed) will eventually result in the loss of a home, the additional risks posed by these predatory lending features are cause for significant policy concern at all levels of government.

The negative impacts of these loan terms have important policy implications. Currently under HOEPA, it is legal for a lender to impose a prepayment penalty of up to five years. HOEPA also permits lenders to require a large balloon payment after the fifth year of the loan term. Many state predatory lending laws appropriately ban these practices. In our view, HOEPA should be modified to take our findings into effect.

Our findings also have implications for the Comptroller of the Currency's recent preemption order exempting national banks and their operating subsidiaries from state and local predatory lending laws (Comptroller of the Currency 2004). By effectively exempting certain lenders from state laws banning extended prepayment penalties and balloon loan terms, OCC has become an unwitting player in a growing foreclosure crisis in the subprime market. Given the current mood among many in Congress to adopt a national predatory lending law that would preempt state and local laws now in effect, our findings are especially relevant. Failure to ban the kinds of detrimental lending practices with which this paper deals should not be an option.

Finally, while a byproduct of our analysis, we believe that the lending, advocacy, and policy communities need to take a closer look at the growing use of adjustable rate mortgages in the subprime refinance arena. With subprime refinance ARMs in our 1999 dataset 50 percent

³⁰ Gruenstein Bacian and Zhai (2005) estimate that a borrower with a \$150,000 mortgage would incur a \$6,000 fee for prepaying this loan. On the basis of this estimate, for the 32,000 prepaid loans in our sample, this represents an

more likely to end up in foreclosure than fixed rate loans, even after controlling for other risk factors, the growing reliance of subprime borrowers on adjustable rate mortgages should be cause for considerable policy concern. This is especially the case in light of the fact that ARMs now represent as much as two-thirds of the subprime market, and that such non-traditional mortgages such as interest-only loans are also on the rise. In 2004, for example, about 11 percent of all securitized subprime originations were interest-only loans (Inside B&C Lending, 2005).

While we refrain from labeling ARMs a predatory loan term, the odds that a subprime borrower who refinances a first lien with an adjustable rate loan instead of a fixed rate mortgage will experience foreclosure are 25% greater than the odds of foreclosure facing a borrower whose loan has an extended prepayment penalty.

Clearly, more research is needed to determine the reasons for the disproportionate shift to ARMs and other loan terms that preclude borrowers from systematically paying down their loan principal in a low interest rate environment. Fannie Mae and others have documented that ARMs have become the loan of choice for many borrowers in high-priced housing markets, as a means of increasing their purchasing power (Inside Mortgage Finance 2004; FDIC 2004) ³¹ However, such reasoning is insufficient to explain the disproportionate reliance on ARMs for refinancing 1st lien loans in the subprime market.

aggregate reduction of \$192 million in homeowner equity.

³¹ A recent Fannie Mae study of the rise in ARM originations when market interest rates were falling suggests that borrowers are opting to maximize their purchasing power without perceiving the risks they face if interest rates rise (Inside Mortgage Finance 2004).

The analogy would be that borrowers are attempting to maximize the amount of cash they can take out of their home, and/or the amount of non-housing debt they can consolidate into a new first lien. Given high interest rates in the overall subprime market, perhaps lower teaser rates associated with ARMs enable cash-strapped borrowers to do just that.

Another possibility is that some subprime lenders may be offering ARMs featuring a combination of low teaser rates and extended prepayment requirements which enables them to avoid triggering the interest-rate threshold that define high-cost loans under HOEPA and other predatory lending laws. Despite higher risks of foreclosure, these loans, whose payment requirements, for all practical purposes, can only rise over time, may be attractive to debt-strapped borrowers who need to maximize the amount of cash they can take out of a refinancing.

In short, lenders, regulators policymakers, and academics should carefully consider our findings given that ARMs' have a strong association with heightened foreclosure risk and potential loss of borrowers' homes.

Table 1

Foreclosure Starts & Prepaid Status by Origination Year
Subprime Refinance 30-year 1st Lien Loans, 1998-2003

Year	Never In Foreclosure, Active		Never in Foreclosure, Prepaid		In Foreclosure at least Once		Total
	Count	Percent	Count	Percent	Count	Percent	
1998	9,223	14.7	41,390	65.9	12,214	19.4	62,827
1999	23,172	18.9	73,906	60.4	25,378	20.7	122,456
2000	29,664	22.5	76,206	57.7	26,198	19.8	132,068
2001	74,630	37.0	103,410	51.3	23,724	11.8	201,764
2002	198,501	66.1	87,422	29.1	14,306	4.8	300,229
2003	211,279	94.7	10,432	4.7	1,351	0.6	223,062

Source: Loan Performance ABS Database (April 2004) and authors' calculations

Table 2

Number of Foreclosure Starts per Loan by Origination Year
Subprime Refinance 30-year 1st Lien Loans, 1998-2003

Year	Number of Foreclosure Starts								Total
	0		1		2		3+		
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	
1998	50,613	80.6	8,213	13.1	2,633	4.2	1,368	2.2	48,292
1999	97,078	79.3	17,199	14.1	5,674	4.6	2,505	2.1	106,212
2000	105,870	80.2	19,197	14.5	5,301	4.0	1,700	1.3	141,765
2001	178,040	88.2	19,104	9.5	3,919	1.9	701	0.4	161,238
2002	285,923	95.2	13,082	4.4	1,145	0.4	79	0.0	260,416
2003	221,711	99.4	1,330	0.6	20	0.0	1	0.0	332,446

Source: Loan Performance ABS Database (April 2004) and authors' calculations

Table 3

December 2003 Status of Loans Ever in Foreclosure by Origination Year
Subprime Refinance 30-year 1st Lien Loans, 1998-2003

Year	Cured, Active		Cured, Prepaid		In Foreclosure		Lost Home		Total
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	
1998	1,898	15.5	1,282	10.5	1,229	10.1	7,805	63.9	12,214
1999	4,711	18.6	2,257	8.9	3,276	12.9	15,134	59.6	25,378
2000	4,990	19.1	1,881	7.2	4,432	16.9	14,895	56.9	26,198
2001	5,489	23.1	1,304	5.5	6,509	27.4	10,422	43.9	23,724
2002	3,377	23.6	364	2.5	6,971	48.7	3,594	25.1	14,306
2003	208	15.4	4	0.3	1,047	77.5	92	6.8	1,351

Source: Loan Performance ABS Database (April 2004) and authors' calculations

Table 4
Prepayment Penalty Term
Subprime Refinance 30-year 1st Lien Loans, 1999

	N	Percent
No Prepayment Penalty	34,484	28.2
Prepayment Penalty, <3 Years	17,892	14.6
Prepayment Penalty, 3+ Years	70,080	57.2
Total	122,456	100

Source: Loan Performance ABS Database (April 2004) and authors' calculations

Table 5
Loan Type
Subprime Refinance 30-year 1st Lien Loans, 1999

	N	Percent
Fixed Interest Rate	45,176	36.9
Adjustable Interest Rate	59,839	48.9
Balloon Loan	17,441	14.2
Total	122,456	100

Source: Loan Performance ABS Database (April 2004) and authors' calculations

Table 6
Prepayment Penalty Term by Loan Type
Subprime Refinance 30-year 1st Lien Loans, 1999

Prepayment Penalty Term	Loan Type						Total	
	Fixed		ARM		Balloon			
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
No Prepayment Penalty	19,769	43.8	12,233	20.4	2,482	14.2	34,484	28.2
Prepayment Penalty, <3 Years	2,363	5.2	14,774	24.7	755	4.3	17,892	14.6
Prepayment Penalty, 3+ Years	23,044	51.0	32,832	54.9	14,204	81.4	70,080	57.2
Total	45,176	100.0	59,839	100.0	17,441	100.0	122,456	100

Source: Loan Performance ABS Database (April 2004) and authors' calculations

Table 7
Prepayment Penalty Term by Ever-in-Foreclosure and Prepayment
Subprime Refinance 30-year 1st Lien Loans, 1999

Prepayment Penalty Term	Never In Foreclosure, Active		Never In Foreclosure, Prepaid		In Foreclosure at least Once		Total
	N	Percent	N	Percent	N	Percent	
No Prepayment Penalty	6,441	18.7	22,764	66.0	5,279	15.3	34,484
Prepayment Penalty, <3 Years	2,369	13.2	11,964	66.9	3,559	19.9	17,892
Prepayment Penalty, 3+ Years	14,362	20.5	39,178	55.9	16,540	23.6	70,080
Total	23,172	18.9	73,906	60.4	25,378	20.7	122,456

Source: Loan Performance ABS Database (April 2004) and authors' calculations

Table 8
Loan Type by Ever-in-Foreclosure and Prepayment
Subprime Refinance 30-year 1st Lien Loans, 1999

Loan Type	Never In Foreclosure, Active		Never In Foreclosure, Prepaid		In Foreclosure at least Once		Total
	N	Percent	N	Percent	N	Percent	
Fixed Interest Rate	10,558	23.4	26,902	59.6	7,716	17.1	45,176
Adjustable Interest Rate	9,339	15.6	37,491	62.7	13,009	21.7	59,839
Balloon Loan	3,275	18.8	9,513	54.5	4,653	26.7	17,441
Total	23,172	18.9	73,906	60.4	25,378	20.7	122,456

Source: Loan Performance ABS Database (April 2004) and authors' calculations

Table 9
Means and Standard Deviations of Model Variables
Subprime 30-Year Refinance Loans, Owner-occupied, 1999 Originations
(N = 3,763,713 Loan-Months)

	Mean	SD
Prepay 3+ Yrs	0.58	0.49
Prepay <3 Yrs	0.14	0.35
Adjustable Rate	0.46	0.50
Balloon	0.14	0.35
LTV	76.51	11.90
Missing FICO	0.09	0.28
FICO 300-579	0.38	0.48
FICO 580-619	0.21	0.40
FICO 620-659	0.17	0.38
Interest Rate at Origination	9.97	1.45
Current Interest Rate Difference [†]	0.02	0.35
Low/No Documentation	0.22	0.41
Cashout Refinance	0.73	0.44
Manufactured Housing	0.03	0.16
Multi-Family (2-4 Units)	0.07	0.25
Condo/Coop/Townhouse	0.03	0.16
Change in HPI since Origination (percent)	12.01	10.94
Unemployment (State-Level, percent)	4.62	1.12
Change in Prime Interest Rate	-0.22	1.06
Judicial Foreclosure State	0.43	0.50
Loan Age (months)	20.07	13.95

Source: Loan Performance ABS Database (April 2004) and authors' calculations

[†]Reported mean and standard deviation are for ARM loans only.

Table 10
 Monthly Probability of First Foreclosure Start and Prepayment
 Subprime 30-Year Refinance Loans, Owner-occupied, 1999 Originations
 Competing Risks Multinomial Logit Model

	Entering Foreclosure			Prepayment		
	Coefficient	SE	Odds Ratio	Coefficient	SE	Odds Ratio
Prepay 3+ Yrs	.185***	.017	1.20	-.240***	.009	.79
Prepay <3 Yrs	.152***	.023	1.16	-.078***	.013	.93
Adjustable Rate	.398***	.016	1.49	.335***	.009	1.40
Balloon	.377***	.020	1.46	.215***	.013	1.24
LTV	.007***	.001	1.01	-.006***	.000	.99
Missing FICO	.706***	.034	2.03	-.032	.017	.97
FICO 300-579	.668***	.030	1.95	-.210***	.013	.81
FICO 580-619	.442***	.031	1.56	-.094***	.013	.91
FICO 620-659	.307***	.032	1.36	-.046***	.013	.96
Interest Rate at Origination	.297***	.005	1.35	.056***	.003	1.06
Current Interest Rate Difference	-.051	.027	.95	.335***	.019	1.40
Low/No Documentation	.138***	.018	1.15	.001	.010	1.00
Cashout Refinance	-.012	.015	.99	.011	.009	1.01
Manufactured Housing	.106**	.038	1.11	-.565***	.032	.57
Multi-Family (2-4 Units)	.022	.027	1.02	.066***	.014	1.07
Condo/Coop/Townhouse	-.241***	.046	.79	.101***	.022	1.11
Change in HPI since Origination	-.013***	.001	.99	.025***	.000	1.03
Unemployment (State-Level)	.017*	.008	1.02	-.024***	.004	.98
Change in Prime Interest Rate	.125***	.009	1.13	.008	.006	.99
Judicial Foreclosure State	.212***	.013	1.24	-.121***	.008	.89
Loan Age (months)	.119***	.002	1.13	.100***	.001	1.11
Loan Age squared	-.002***	.000	.99	-.001***	.000	.99
Intercept	-10.997***	.086	--	-5.413***	.047	--
Chi-Square	45,418, 44 df, p<.001					
Sample Size (Loans)	122,456					
Sample Size (Loan-Months)	3,763,713					

Source: Loan Performance ABS Database (April 2004) and authors' calculations

* -- p<.05; ** -- p<.01; *** -- p<.001

The omitted categories are no prepayment penalty, fixed interest rate, FICO score of 660 or higher, income documented, no cash out, SFR, non-judicial foreclosure state.

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