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# Who Receives a Mortgage Modification? Race and Income Differentials in Loan Workouts

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# Who Receives a Mortgage Modification? Race and Income Differentials in Loan Workouts[☆]

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**Abstract**

Loan modifications offer one strategy to prevent mortgage foreclosures by lowering interest rates, extending loan terms and/or reducing principal balance owed. Yet modifications are largely at the discretion of loan servicers and not as systematically transparent as loan application approvals and denials. Who is offered a modification and what form of modification they receive could result in disparate impacts for low-income and minority communities. This paper uses data on 105,769 non-agency securitized subprime loans made in 2005 to examine the incidence of defaults and modifications among loans managed by one large trustee of securitized loans covering 94 loan servicers in California, Oregon and Washington. Data from Home Mortgage Disclosure Act (HMDA) data is used to assess borrower characteristics. The results suggest although loan modifications remain a rarely used option among the servicers in these data, there is no evidence that minority borrowers are less likely to receive a modification or less aggressive modi-

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fication. These borrowers are more likely to be delinquent, but controlling for delinquencies we find no evidence of disparate impact. We also find that preliminary performance of loans post-modification is positive, particularly for minority borrowers. Generally modifications involve modest interest rate reductions and increasing loan balances.

*Keywords:* Mortgage Default and Foreclosure; Housing Policy; Loan Modifications

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## 1. Introduction

Between 2008 and the first half of 2010, an estimated 3.2 million mortgage loans in the United States have been modified in some form (Hope Now, 2010). While these numbers still pale in contrast to the number of defaults over the same time period, there is growing evidence that the scale of loan modifications has increased with the advent of the federal Making Home Affordable program and the Home Affordable Modification Program (or HAMP, see www.makinghomeaffordable.gov for details), and that these modifications have led to fewer re-defaults than earlier voluntary loan modifications that did little to change the payment terms on the loan. This is good news, since effective loan modifications have the potential to prevent foreclosures and their negative impacts on borrowers, communities, and the overall U.S. economy.

Yet, surprisingly, we know very little about these loan modifications and their effectiveness. Who received them? Are there any racial or ethnic differences in the types of loan modifications received? Were the modifications successful in preventing subsequent foreclosures? To date, data on loan modifications have only been released in the aggregate, with no information about the borrowers who have received modifications. For consumer advocates, this lack of transparency is troubling, since anecdotal evidence from foreclosure prevention counselors and legal aid groups suggests that the loan modification process is slow, confusing, and difficult to navigate. Their concern is that certain borrowers - for example, those with less financial knowledge or limited English - may be less likely to get a modification, and/or less likely to get a modification that effectively reduces monthly payment or the amount owed on the mortgage.

In this paper, we use a unique dataset that merges data on the loan performance of subprime home mortgages that are managed by Corporate Trust Services (CTS) of Wells Fargo Bank with data on borrowers reported as part of the Home Mortgage Disclosure Act (HMDA). With these merged data, we can provide some initial insights into who is receiving loan modifications, what types of loan modifications they are receiving, and whether or not those loan modifications are helping to prevent subsequent default. Specifically, we explore whether or not there are racial and/or ethnic differences in who receives a loan modification and what kind of modification they receive.

Our findings suggest that, conditional on being in default, there are no

significant racial and/or ethnic differences in who receives a loan modification, nor are there any significant differences in the types of modifications received. In fact, we find that controlling for a wide range of borrower, loan, and housing and labor market characteristics, minorities are slightly more likely to receive a loan modification, and are also more likely to see greater reductions in their interest rates. We also find that a loan modification significantly reduces the likelihood of subsequent default. These findings stand in stark contrast to the literature on mortgage originations, which has revealed persistent differences in loan outcomes by race and ethnicity in terms of loan pricing and terms. We also find a potentially important role of modifications in boosting subsequent loan performance.

The paper proceeds as follows. First, we provide some brief background on the evolution of loan modification efforts as well as a review of the literature on loan modifications to date. Second, we describe the data used in this paper as well as our modeling strategy. Third, we present our analytical findings. In the final section, we suggest avenues for additional research and discuss the policy implications of the paper.

## 2. Evolution of Loan Modification Efforts

Mortgage loan servicers[3] have a number of options open to them in response to a borrower in default: approve a loan modification, offer an alternative such as a short sale or other alternative to foreclosure, or pursue a foreclosure. Servicers may pursue these options simultaneously, or even encourage borrowers to submit modification applications and then fail to act on the application, request extensions and more data or require that the borrower initiate the whole process again sometime down the road.

In addition to significant variation in the loan modification process, loans can be modified in multiple ways, and not always in a way that is favorable to the borrower. One of the most common forms of loan modification occurs when a servicer adds payment arrears to the total loan balance, and then calculates a new monthly payment that will amortize the increased balance

[3]Although a mortgage loan may be serviced by a third party or by a lender directly, this paper will use the term "servicer" to indicate the party responsible for reporting to lenders and investors in a security about the status of each loan each month. Not all servicers have the discretion to decide loan outcomes and decisions may be made in collaboration with lenders and investors; for simplicity the term servicer will be used regardless.

over the life of the loan. This type of modification generally increases both the monthly payment amount as well as the overall amount of debt. A second type of modification - generally used on adjustable rate mortgages - is to freeze the interest rate and not allow it to reset at a higher rate. Third, a servicer can permanently reduce the interest rate on a loan in order to reduce the monthly payment, while leaving the balance of the mortgage the same. Finally, servicers can choose to reduce principal debt, which reduces the overall amount of the loan. A principal reduction is particularly beneficial to homeowners whose house values are significantly lower than the amount of their mortgage.

Federal policy-makers have focused on loan modifications as the primary tool for preventing foreclosure. Modifications of loan terms offer the possibility of addressing either of the two fundamental drivers of mortgage default: a borrower's inability to afford their monthly payments or their lack of incentive to make these payments given that the value of their home is less than the amount of mortgage debt owed. A successful loan modification also has the potential for larger financial returns for mortgage lenders and investors than a foreclosure. Surrounding homeowners and communities could also benefit by reducing the number of foreclosed homes which may result in depressed property values.

The federal Making Home Affordable program and the Home Affordable Modification Program (HAMP) allocated $75 billion to loan modification efforts, with a goal of reaching 9 million distressed borrowers by December 2012. Under the program, eligible borrowers work with the servicer to reduce their monthly payment to 38 percent of their income, and then HAMP provides a subsidy to further reduce the payment to 31 percent. Servicers also receive an up-front fee of $1,000 for each modification, plus "pay for success" fees on performing modified loans of $1,000 per year for up to 5 years, thus providing servicers a financial incentive to initiate modifications.[4] Borrowers are eligible for a HAMP modification on first-lien loans for owner-occupied properties with an unpaid principal balance of less than $729,750, originated on or before January 1, 2009. All borrowers must document their income, including a signed IRS 4506-T form to share tax data with the servicer, two

[4]HAMP also provides a bonus incentive of $1,500 to lender/investors and $500 to servicers for modifications made while a borrower is still current on mortgage payments but at imminent risk of default.

most recent pay stubs, a copy of a most recent tax return, and a signed affidavit of financial hardship. Homeowners who make their payments on time are eligible for up to $1,000 of principal reduction payments each year for up to five years.

Although in theory, both borrower and investor are better off if a foreclosure is avoided, in practice it has proven to be much more difficult to modify loans, and the number of modifications - both temporary and permanent - still falls significantly short of the number of distressed borrowers. In the first quarter of 2010, HAMP resulted in 164,000 permanent modifications. That same quarter, the Mortgage Bankers Association reported that nearly 2.1 million borrowers were in some stage of the foreclosure process, and another 4.5 million borrowers were at least 30+ days past due. Significant barriers exist to increasing the scale of loan modifications (Cordell et al., 2010). One of the biggest barriers has been the lack of incentives for servicers to modify loans. Loan modifications are costly: they are both labor and time intensive and cannot be easily automated. And unlike the costs associated with foreclosure, neither the labor nor the overhead costs associated with modifications are billable back to investors. As a result, servicers have very little financial incentive to undertake loan modifications. In addition, very few servicers have invested in either the staff or the technological capacity to respond to the current volume of distressed borrowers.

Mortgage securitization is also believed to create barriers to modification (Eggert, 2007; Gelpern and Levitin, 2009; Pikorski et al., 2009). The legal agreements governing mortgages held in private label securities require servicers to initiate foreclosures on defaulted loans, yet provide little or no guidance on how to do loan modifications. Servicers have expressed concerns that loan modifications could trigger investor lawsuits claiming that servicers are not fulfilling the contract nor meeting their obligation to maximize financial returns for investors. Junior liens can also complicate the loan renegotiation process; multiple investors with different interests may thwart servicers' efforts to provide the borrower with an effective modification. However, some researchers have suggested that securitization is a red herring when it comes to modifications, showing for example that loans held in portfolio are no more or less likely to be modified than loans that are held in mortgage backed securities (Adelino et al., 2009). Instead, they contend that servicers are reluctant to modify loans for two key reasons. First, they find that approximately 30 percent of borrowers "self-cure," meaning that they bring their loan current on their own. In this instance, servicers would

lose revenue unnecessarily by offering a modification. Second, servicers may also be concerned that if a borrower re-defaults after a modification, they will have simply postponed foreclosure, and, if the housing market continues to decline, the lender will recover even less in foreclosure in the future.

In addition to barriers on the servicing side, the loan modification process can also face complications on the borrower side. Although loan servicers are directed by the US Department of Treasury and Department of Housing and Urban Development to screen borrowers for eligibility for HAMP, in most cases borrowers must opt in to the program, especially those who are not yet in default but face a hardship and face imminent default (imminent default is not readily observable by the servicer). Borrowers must complete application forms much like those used in underwriting a loan, including an affidavit of hardship, proof of income and forms to release two years of federal income tax forms. The lender then rejects or accepts the application based on if the borrower meets the program guidelines regarding a documented hardship and stable income, as well as if the loan meets a standardized net present value test. Lenders may deny an application, fail to act on an application, or approve an application.

A substantial percentage of delinquent borrowers fail to contact their lender or servicer, which undercuts their ability to avoid foreclosure. Although servicers reach out to delinquent borrowers in a variety of ways, a significant proportion of borrowers never speak with their servicer when they find themselves unable to make their mortgage payments (Collins, 2007). Perhaps most alarmingly, Cutts and Merrill (2008) find that 52 percent of foreclosure sales lack reciprocal servicer contact, which undermines borrowers' ability to partner with their servicer to complete a workout. Because the likelihood of retaining one's home decreases the longer delinquent borrowers delay contacting their servicers, connecting borrowers and servicers as early as possible during the default period is critical to helping borrowers keep their homes (Cutts and Merrill, 2008).

Given these complications, as well as the fact that loan modifications and workouts are negotiated by private servicers on the telephone with individual borrowers, there is the potential for the modification process to present acute challenges for historically underserved borrowers - lower-income and minority borrowers in particular - who lack experience and knowledge of dealing with a lending institution. For example, borrowers who do not speak English or who may distrust banking institutions may fail to pursue a loan modification entirely, despite being eligible for a HAMP modification. Lack of knowl-

edge could also result in the increased likelihood of submitting incomplete paperwork. Race or perceived race could serve as a proxy servicers use for decision making on modifications, especially if these borrowers are deemed less sophisticated, more time consuming and therefore more costly to serve.

Indeed, housing counselors and other intermediaries working with distressed borrowers have reported that they have witnessed significant disparities in who receives a loan modification, and that the lengthy and complicated process can be particularly intimidating to those with limited English skills and/or lack of experiences with the financial services industry. Unfortunately, there are no publicly available data on loan modifications by race or income that allow us to analyze the hypothesis that there exist systemic inequalities in who receives a loan modification. This paper attempts to combine available data to begin to explore this fundamental research question.

## 3. Literature Review

The incidence of loan modifications and the effectiveness of different modification types are relatively new fields of research, and very little data have been available for academic study. A few studies before the current financial crisis have examined informational asymmetries associated with loan modification (Ambrose and Capone, 1996; Riddiough and Wyatt, 1994a,b) and the role that servicing and loss mitigation programs - primarily FHA loans and those serviced by Freddie Mac - can play in sustaining homeownership for lower-income households (Capone and Metz, 2003; Cutts and Green, 2005). Not surprisingly, interest in loan modifications has risen exponentially in recent years, and there are many research studies underway. The vast majority of these studies seek to inform loan modification policy, and examine whether contemporary loss mitigation efforts, including loan modifications, are helpful to borrowers.

A few consistent findings are emerging from these studies. First, despite the policy emphasis on loan modifications as a solution to the foreclosure crisis, very few loans are ever modified, and even fewer result in substantial contract amendments such as principal reduction (White, 2009a,b). Even with HAMP, the scale of modifications is still very small compared to the number of seriously delinquent loans, with estimates ranging between 3 - 8 percent depending on how modifications are defined (Adelino et al., 2009).

Second, research has shown that not all loan modifications are created equal. White, for example, showed early on that most voluntary modifica-

tions pre-HAMP typically increased a borrower's monthly payment, as well as the principal owed on the loan (White, 2009a,b). Not surprisingly, early studies analyzing the impacts of loan modifications found high rates of recidivism and redefault (Office of the Comptroller of the Currency, 2008). More recent research, however, has tried to tease out what matters when it comes to successful loan modification (Cordell et al., 2009; Cutts and Merrill, 2008; Haughwout et al., 2010; Quercia and Ding, 2009). In general, the research findings suggest that the most successful loan modifications are those that result in a significant decrease in either the monthly payments and/or the principal of the loan. Quercia and Ding (2009), for example, find that loans with greater payment reductions have lower redefault risks, and that there is an even lower level of redefault when payment reduction is accompanied by principal reduction. The authors suggest that among the different types of modifications, the principal forgiveness modification has the lowest redefault rate. They also find that the timing of the loan modification matters - early intervention yields better results. Borrowers who were current on their payments were much less likely to re-default than borrowers who received modifications after missing one or more payments. Cutts and Merrill (2008) show that the success rate of modified loans varies by the amount of arrearage capitalized into the loan modification; they find a direct relationship between a lower arrearage and a lower redefault rate.

What is missing from these studies, however, is an analysis of how these factors might differ for different types of borrowers. As noted above, some borrowers may systematically fail to seek out and receive loan modifications. Studies examining consumer behavior in the mortgage market have shown that there are significant differences in consumers' financial choices. Campbell (2006), for instance, finds that consumers with less education are the least likely to refinance when the terms of their loan could be most improved. Bucks and Pence (2008) show low-income mortgage borrowers are most likely to underestimate how much the interest rate on their loan could change relative to their actual contract. Minority borrowers are 30 percent more likely to not know their interest rate and low-income borrowers 28 percent more likely. Similar effects are shown for lesser educated borrowers. Low-income consumers with less than a college degree are among the least accurate or informed about the terms of their mortgage.

These studies suggest that some groups of consumers - lower income, lesser educated and minority races - may systematically exhibit differential behavior and may be less likely to seek out or receive a loan modification. To

study whether or not there are disparities in the incidence and type of loan modifications by race, researchers require a dataset that includes information not only on loan performance and changes to the loan terms, but also on borrower characteristics. To date, no such public dataset exists, greatly limiting the ability to paint a complete picture of what is happening with loan modifications. Collins (2009) provides an initial look at who receives loan modifications by matching cross-sectional loan modification data from CTS to the characteristics of borrowers based on the zip code of where the loan modification was made. He finds that borrowers in lower-income or higher share minority zip codes are not less likely to receive a modification or less aggressive modifications. In this paper, we extend this earlier work by taking advantage of the panel nature of the CTS data and by matching the individual loan records to loan originations in HMDA.

## 4. Data and Methods

For this analysis, we created a unique dataset that merges loan-level data on subprime home mortgages that are managed by Corporate Trust Services (CTS) of Wells Fargo Bank, N.A., also known as the Columbia Collateral File, with loan-level data on borrowers from the Home Mortgage Disclosure Act (HMDA). This merged dataset allows us to not only track the performance of loans and the incidence of loan modifications, but also analyze whether or not there are differences in loan modification rates and terms by race and ethnicity of the borrower.

CTS is a service of Wells Fargo Bank, N.A. that provides information on a variety of investment vehicles administered by the bank. The CTS data covers securitized mortgages for which Wells Fargo serves as the trustee, and includes mortgages with different interest rate structures, different purposes, different property types, and different lien statuses (Quercia and Ding, 2009; White, 2009b).[5] The database includes loans originated as early as the 1980s and tracks performance until the loan is paid off or foreclosed upon, and includes over 4 million individual loans. Each monthly loan record contains the borrower's FICO credit score, loan-to-value (LTV) ratio at origination, the last 12 month's delinquency history, the property zip code, the type of loan, and the original and current balance of the loan. The reports also have

[5]These investor report files are available at www.ctslink.com, administered by the Corporate Trust Services group of Wells Fargo Bank, N.A.

information about the loan balance, mortgage payment, and interest rate, both before and after modification, which enables us to identify whether total mortgage debt, interest rate, or mortgage payments are changed for individual homeowners.

The CTS data, however, does not include any information on the borrower other than their FICO score. For this reason, we merge the CTS data with loan level HMDA data. HMDA data provide information on the race and ethnicity of the borrower, their income, and the geographic location of the property securing the loan. Since 2004, the HMDA data also includes information on whether or not the loan was "higher-priced," defined as first lien mortgages with an annual percentage rate (APR) three percentage points over the comparable-maturity Treasury benchmark.

To match the data, we sorted CTS and HMDA loans into the census tracts of the purchased property using a geographic crosswalk file, and then matched loan originations on the following variables: origination date, loan amount, lien status, and loan purpose. We limited the matching to loans originated between 2004 and 2007, and garnered a 69.2 percent match rate. For this paper, we examine loans originated in three states: California, Oregon and Washington. By limiting our analysis to a few states, we are able to take full advantage of the panel data in the CTS, and minimize the likelihood that our findings are driven by differences in state laws regarding foreclosures- all three states are primarily non-judicial foreclosure states.

In addition, we limit our analysis to loans originated in 2005 for three reasons: it represents the peak of the subprime lending boom in these three states, the match rate for 2005 was over 75 percent, and it allows us to track loan performance and modifications for at least 3 years after origination. With these restrictions, we are left with a dataset of 105,769 observations. From this core set of loans, we created a panel dataset with one observation per loan per month until the loan is terminated through foreclosure, prepayment or right censoring. Loan performance is observed for 39 months, from December 2006 through May 2010. All loans were made in 2005 and are observed in December 2006, but not all loans are observed in every period. Loans may be paid off or lost to foreclosure.

One significant limitation of the CTS data is its coverage of the mortgage market, in particular, the lack of coverage of prime loans and loans held by banks in portfolio. Nevertheless, given that subprime mortgages account for more than half of all foreclosures, and that the vast majority of subprime loans that led to the crisis were securitized, this sample provides important

insights into the distribution of loan modifications to date. Also given potential that modifications are more challenging among non-agency securitized loans (meaning loans not managed by Fannie Mae, Freddie Mac or Ginnie Mae), this sample is particularly relevant for policy-makers.

## 5. Variable Definitions

Table 1 presents descriptive statistics for the loans in our sample. The average loan amount for the loans in our sample is $395,007, reflecting the high cost of housing in California, Oregon, and Washington. The mean income as reported in the loan application is also high, at nearly $127,000. Just under half (46 percent) of the loans were used for home purchase, and the majority of loans are adjustable rate mortgages (85 percent). The data also show the weakness of subprime mortgages that were bundled into mortgage backed securities. Thirty-two percent of the loans were high- cost, the mean FICO scores was 689, and 34.3 percent of the sample became 60+ delinquent at least once by May 2010. Only 6.8 percent of loans in the sample had received a permanent modification. As noted above, the modification process is not necessarily straightforward, and under HAMP, borrowers are first offered a trial modification before the contract changes are made permanent. In our analysis, we only consider permanent, not trial, modifications.

Because we have a panel dataset, we include both fixed and time varying explanatory variables in the models. Fixed covariates include the loan amount at origination, income at origination, the combined loan to value ratio at origination , loan purpose (purchase versus refinance), whether or not the loan was higher-priced, monthly payment to income, and the race and ethnicity of the borrower. Loan amount and income are both log transformed. Loan purpose is coded as a dummy variable, with "1" signifying that the loan was used to purchase the property. We code the race and ethnicity variables in the HMDA data as "Black\African American," "Hispanic\Latino," and "Asian\Hawaiian\Pacific Islander."[6] While the plurality of borrowers are white (49.5 percent), the sample also includes 31.5 percent Hispanic\Latino borrowers, 13.8 percent Asian borrowers, and 5.2 percent Black\African American borrowers.

Time-varying covariates, which are reported on a monthly basis, include the performance of the loan, current FICO score, whether the loan has an

[6] Also includes small percentage of Native American and other races.

adjustable interest rate, and the current interest rate on the loan.[7] In the models, we include two measures of FICO score to account for nonlinearities. In addition to information about the borrower and the loan, we include housing and labor market variables that could affect loan performance. For house prices, we use the Federal Housing Finance Agency House Price Index, measured in the current month as well as 6 months ago. Sample means show that MSA house prices have dropped dramatically between the origination of loans in 2005 and May 2010, with the FHFA HPI dropping from 308 to 244. Monthly data on the unemployment rate at the MSA level are obtained from the Bureau of Labor Statistics. We also include the prevailing contract interest rate on commitments for conventional fixed rate mortgages from Freddie Mac.

## 6. Model

Our empirical analysis focuses on four inter-related questions. First, controlling for borrower risk factors, loan characteristics, and labor and housing market conditions, who loses a home to foreclosure? Second, for borrowers who are in distress, who gets a modification? Third, for borrowers in distress, does a modification reduce the likelihood of a subsequent foreclosure? And fourth, does a modification result in a significant rewriting of the mortgage contract, such as a reduced interest rate and/or principal balance?

For the first question regarding the incidence of REO (real estate owned) by loan and borrower characteristics we use a competing risks specification. Mortgages are terminated not only when a borrower is foreclosed upon and the loan goes into REO, but also when the borrower pays off the loan (e.g., by selling or refinancing the house). We define the foreclosure as the point in time where the property becomes REO as the borrower has likely lost their home and this is a terminal state. Likewise "paid off" is also a terminal state. The Stata module, STCRREG, based upon Fine and Gray's (1999) method is used to estimate a maximum likelihood, competing risks regression model on a standard Cox regression.

Our second question regards the incidence of modifications. For this analysis the data is restricted to those loans being 60+ days delinquent. Making this conditional restriction focuses on loans most likely to receive

[7] Models were also testing using only FICO at origination, finding negligible differences. Time variance of FICO score is minimal in cross section.

a modification. This specification also relies on survival analysis but does not use a competing risk framework since a loan is either modified or not, and once it is modified it is always modified. Modifications as a function of various explanatory variables is a hazard function.

For the third question, regarding the effects of a modification on loan performance, we again use a competing risks framework as in the first analysis. However, here the data are again restricted to those loans which are at least 60+ days delinquent at some point in the study period and an indicator is added for a loan after receiving a modification.

For the fourth question, where we assess whether or not a loan modification results in significant contract changes, we adopt a difference in difference analysis which compares the a loan pre-modification to itself in the post-modification period. The model is a standard Ordinary Least Squares (OLS) regression on panel data. We assess two possible changes to the loan contract: whether or not there is a significant change in the interest rate on the loan (leading to changes in the monthly payments) and whether or not there is a change in principal owed on the loan. This model includes a covariate for a month in which a modification is in place. This therefore estimates the effects of modification relative to the prior pre-modification periods for each loan.

For all of these models the same reduced form specification is used:

$$
\begin{aligned}
Y_{i,t} = \\
&\alpha_{i,t} + \beta 1_i(\text{Ln Loan Amt}) + \beta 2_i(\text{Subprime}) + \beta 3_i(\text{CLTV}) + \beta 4_i(\text{Purchase}) \\
&+ \beta 5_i(\text{Race}) + \beta 6_i(\text{Ln Income}) + \beta 7_{i,t}(\text{ARM}) + \beta 8_{i,t}(\text{FICO}) \\
&+ \beta 9_{i,t}(\text{HPI}) + \beta 10_{i,t}(\text{Unemp Rate}) + \beta 11_{i,t}(\text{Delinquency}) \\
&+ \beta 12_t(\text{PMMS}) + \beta 13_t(\text{Post Mod}) + \gamma_i(\text{Servicer Fixed Effect}) + \varepsilon
\end{aligned}
\tag{1}
$$

where $\beta 1$ to $\beta 6$ are measured on loan i at origination and do not vary over time, while $\beta 7$ to $\beta 11$ vary over loan i and period t. $\beta 12$ varies over time but not loan i. Servicer fixed effect is measured using $\gamma_i$ for loan $i$ over all periods. $\beta 13$ is included only in models testing for the effects of modifications on loan terms. The models are run such that race and income, which are expected to correlated, are examined individually and jointly. Likewise, the subprime indicator, which is expected to be correlated with race, is also omitted from one version of each model.

## 7. Findings

Figure 1 presents a simple graph of the 60+ day delinquency rate for our different race and ethnicity categories by date. Overall, the CTS data reaffirms findings from other research projects that have shown that Hispanics/Latinos and Blacks/African Americans have experienced higher rates of delinquencies and foreclosures than whites and Asians. The figure also shows differences in the timing of delinquencies. For Hispanics and Blacks, the delinquency rate began to rise quite steeply after the 3rd quarter of 2007; for whites and Asians, the increase begins approximately a year later. This difference in timing has implications for racial differences in loan modifications. As Figure 2 shows, loan modifications were practically non-existent before the third quarter of 2008, and only began to rise significantly in 2009, after the HAMP program was announced.

In Figures 3 and 4, we present descriptive statistics on the characteristics of borrowers who received a loan modification, conditional on being 60+ days delinquent. Approximately 11 percent of Blacks and 9 percent of Hispanics received a loan modification, compared with 5 percent of Whites and 6 percent of Asians. This provides preliminary evidence that minorities are no less likely to receive a loan modification than other borrowers. In contrast, there is very little variation in the incidence of loan modifications by income, although low-income households are slightly less likely to receive a loan modification (5 percent) than are middle- and high-income households (7 percent).

In Table 2, we present the results of our first competing risks model which predicts the likelihood of a foreclosure (measured when the property reverts back to the bank as REO) versus prepayment. Column 1 presents the results without either the race or income of the borrower, column 2 presents the results with only race, column 3 presents the results with only income, and column 4 presents the results with both race and income included. Coefficients are reported as hazard ratios, with the standard errors in parenthesis.

The results of the model are consistent with expectations. We find that higher-priced loans increase the likelihood of foreclosure, as do loans with a higher combined loan to value ratio. A history of delinquency also significantly increases the likelihood of foreclosure. The effect of the downturn in the housing market post-2006 is also evident in the data. Higher MSA house prices in the current month decrease the likelihood of foreclosure, whereas areas that had higher house prices six months prior increase the likelihood

of foreclosure. This is consistent with other research which has shown that declining house values are a strong predictor of default (Doms et al., 2007).

Income at origination does not have a significant effect on foreclosure; two factors may explain this finding. First, income is measured at origination, so it is possible that a subsequent drop in income is what triggers foreclosure (which we would not pick up on). Second, the loan amount variable likely serves as a strong proxy for income; we find that as the loan amount goes up, the risk of foreclosure goes down. In terms of borrower race and ethnicity, we find that Hispanics and Asians/Hawaiian Pacific Islanders are more likely to lose their home to foreclosure than Whites, after controlling for the other variables in the model. We do not see the same effect for Blacks/African Americans. This is surprising, since other research has shown that Blacks are more likely to be in foreclosure, and even the descriptive statistics presented above show a higher 60+ delinquency rate for Blacks than for Whites. We believe this discrepancy is due to how we define "foreclosure." While Blacks are more likely to be in foreclosure, these properties do not reach the REO stage at the same rate as other borrowers. This leads us to hypothesize that there are neighborhood level differences in what properties convert to REOs: for example, in some neighborhoods a foreclosure may result in a short sale, which would still entail a loss of the home for the borrower but would not be recorded as an REO in the data. Similarly, we do not see a strong relationship between lower FICO scores and higher probabilities of REO. Other researchers studying the timing and paths of the foreclosure process have found the same (Chan et al., June 29, 2010). Omitting the subprime indicator has no material effects on race or other key variables. Servicer fixed effects, used as a means to proxy for unobserved mechanisms that could lead borrowers to certain servicers by location or market segment, also serves to affirm or amplify the results for key explanatory variables.

Next we turn to the central question of this paper regarding which borrowers are more likely to receive a mortgage modification. In Table 3 we model the likelihood of getting a loan modification, conditional on being at least 60+ days delinquent. In this model, we do not find any racial or ethnic disparities in who receives a modification. In fact, Blacks/African Americans are slightly more likely to receive a loan modification than whites. Importantly, modifications are also more common among borrowers who initially received a high-cost loan. It also does not appear that servicers are basing their loan modifications on local housing and/or labor market conditions. Neither the current house price index nor the local unemployment rate has

any significant effect on the likelihood of receiving a loan modification. While these results suggest that loan modifications are relatively evenly distributed across borrowers - regardless of race and/or ethnicity - it does not entirely erase the possibility of disparities in who gets a loan modification. One thing we cannot assess is whether there are differences in who gets a loan modification among those who *applied* for one. In other words, we do not see loan modification denial or non-completion rates. However, there do not appear to be any systematic racial biases among existing loan modifications. When omitting the subprime indicator or adding servicer fixed effects it in fact appears that minorties are modestly more likely to receive a modification conditional on being delinquent.

Our second question was whether or not loan modifications help to prevent subsequent foreclosure. In other words, do loan modifications work? Table 4 presents this analysis. Like Table 2, we run a competing risks regression on the likelihood of losing one's home to foreclosure, but this time we include a parameter which indicates whether or not the loan received a permanent modification and restrict the analysis to loans with at least one delinquency. First, loans that received a modification are more than two-thirds less likely to end up in REO than are loans that do not receive a modification. The strength of this effect may be due in part to the fact that we only consider permanent modifications, which would select for borrowers with both the motivation and capacity to make their temporary modification payments and submit proper documentation. Second, while Hispanics and Asians/Hawaiian Pacific Islanders are still slightly more likely to lose their home to foreclosure, when we examine the interaction effects between race/ethnicity and loan modification, there is no significant difference. In other words, among Blacks/African Americans, Hispanics/Latinos and Asians who received a loan modification, there is no longer an elevated risk of foreclosure. These results suggest that loan modifications are an effective way of preventing foreclosure for this population.

For the next stage of the analysis, we consider whether or not loan modifications significantly changed the contract terms on the loan. We find that a loan modification significantly reduces the interest rate on the loan. On average, modified loans see a reduction in the interest rate of between 1.65 and 1.76 percentage points of interest depending on the specification (Table 5). We also do not find any racial disparities in who gets an interest rate reduction. While on average, Blacks/African Americans pay a slightly higher interest rate, approximately 11 basis points, than whites, Blacks who

received a loan modification pay a bit less - an additional drop of 17 basis points (although not statistically significant). Hispanics/Latinos and Asians who received a modification also see an added reduction in their interest rates.

In our final Table (6), we examine the effect of a loan modification on the outstanding balance of the loan. Research has shown that loans that include a reduction in the principal amount are less likely to redefault than loans with only payment changes. Especially given the dramatic house price declines in California, principal reductions as a result of a loan modification are likely to be an important part of foreclosure prevention. However, we find that most servicers are still adding missed payments onto the remaining principal of the loan. Modified loans see an increase in their loan balance ranging between $7,400 and $8,160, depending on the model specification. When we interact the loan modification indicator with race, we find that the loan balance of Hispanics and Asians goes up less than that for whites, but we do not see a significant effect for Blacks. Overall, few borrowers are receiving principal reductions, and are instead finding that their missed payments are being rolled into their loan balance.

## 8. Conclusions

Confronted with a rising number of foreclosures, the federal government launched HAMP in 2009 with a goal of greatly increasing the scale and impact of loan modifications. While the program has fallen far short of expectations, we find that HAMP has led to an increase in loan modifications, and that these modifications are successfully lowering the likelihood of redefault. Importantly, we also find no evidence of racial disparities among those who receive loan modifications. In fact, we find that Blacks/African Americans, Hispanics/Latinos and Asians are slightly more likely to receive a loan modification, and that these loan modifications have slightly larger reductions in their interest rate than those of similarly situated white borrowers. These findings stand in stark contrast to the literature on mortgage originations, which has revealed persistent differences in loan outcomes by race and ethnicity in terms of loan pricing and terms (Avery et al., 2006; Bocian et al., 2008; Nichols et al., 2004).

While this is good news, it is important to note that we cannot assess who applied for and did not receive a loan modification. In other words, in research on mortgage originations using HMDA data, we can assess both

differences in denial rates as well as differences in loan pricing. With the CTS data, we can only examine who receives a permanent modification, the nature of the modification and what subsequently happens to borrowers who receive a loan modification. If Black or Hispanic borrowers applied for a loan modification at higher rates than white borrowers, and were either denied a permanent modification or were thwarted by the lengthy and confusing application process, racial and ethnic disparities in the loan modification process could still exist. In addition, the CTS data represent only a slice of the overall mortgage market, and it may be that the sample of subprime loans in private-label securities does not represent what is happening with loan modifications in general. The paucity of publicly available data greatly limits the ability of researchers to answer the important questions surrounding mortgage transactions and the potential disparate impacts on different groups.

In addition, we believe our findings highlight the need for further research to help tease out what is responsible for these positive outcomes. Are there lessons from the loan modification process that could help us to design more sustainable paths to homeownership going forward? For example, one possible explanation for the lack of disparities along race or income is the role that housing counselors have played in the foreclosure prevention process. Does the presence of a trusted intermediary, who may be able to navigate the complicated world of loan modifications on the borrower's behalf, help to ensure more equitable loan modification outcomes? What aspects of foreclosure prevention campaigns led borrowers to apply for a loan modification or know where to seek out help? Recent studies examining the role of counseling for mortgage borrowers in default are suggestive that counseling and related interventions may in fact play a role for successfully avoiding foreclosure. Ding, Quercia, and Ratcliffe (2008) examine the association between telephone-based default counseling and the likelihood of curing a delinquency among loans made to low-income borrowers. Studies by Collins and Schmeiser (2010) and a preliminary evaluation of the National Foreclosure Mitigation Counseling Program (Mayer et al., 2009) also find positive impacts of default counseling on loan outcomes.

Alternatively, has the oversight and structure of the HAMP program itself helped to provide a protective frame around the loan modification process? Servicers and lenders have much less discretion due to the strong role of the public sector in overseeing the mortgage market since the crisis. It is notable that in 2009 HMDA data on loan denials shows a narrowing of racial gaps.

This may be due to the dominance of government sponsored enterprises and the FHA reducing lender discretion in the mortgage origination market. The highly structured processes may serve to level the field for traditionally underserved borrowers. The answers to these questions could help us to develop strategies to overcome information asymmetries and other vulnerabilities in the mortgage market, especially for underserved borrowers.

Finally, despite the positive findings, it is worth emphasizing that the scale of loan modifications is still falling well short of impending foreclosures. In addition, the continued reluctance of servicers to reduce principal balance may limit the effectiveness of modifications, especially in areas that have seen drastic declines in house prices (Quercia and Ding, 2009). More research is needed to understand the links between local market conditions, loan modification, and foreclosure prevention over the long term.

## References


Adelino, M., Gerardi, K.S., Willen, P., 2009. Why don't lenders renegotiate more home mortgages? redefaults, self-cures, and securitization. Federal Reserve Bank of Boston. Policy Discussion Paper No. 09-4.

Ambrose, B., Capone, C., 1996. Cost-benefit analysis of single-family foreclosure alternatives. Journal of Real Estate Finance and Economics 13, 105–120.

Avery, R.B., Brevoort, K.P., Canner, G.B., 2006. Higher priced home lending and the 2005 hmda data. Federal Reserve Bulletin 92, a123–a166.

Bocian, D.G., Li, W., Ernst, K.S., 2008. Race, ethnicity and subprime loan pricing. Journal of Economics and Business 60, 110–124.

Bucks, B., Pence, K., 2008. Do homeowners know their house values and mortgage terms? Journal of Urban Economics 64, 218–33. Federal Reserve Board of Governors.

Campbell, J.Y., 2006. Household finance. The Journal of Finance 61, 1553–1604.

Capone, C., Metz, A., 2003. Mortgage default and default resolutions: Their impact on communities. Federal Reserve Conference on Sustainable Community Development, March 27, 2003.

Chan, S., Gedal, M., Been, V., Haughwout, A.F., June 29, 2010. The role of neighborhood characteristics in mortgage default risk: Evidence from new york city. Available at SSRN: http://ssrn.com/abstract=1631944.

Collins, J.M., 2007. Exploring the design of financial counseling for mortgage borrowers in default. Journal of Family and Economic Issues 28, 207–226.

Collins, J.M., 2009. Who gets a bailout? characteristics of borrowers offered loan modifications. APPAM Annual Conference, Washington, D.C.

Collins, J.M., Schmeiser, M.D., 2010. Estimating the effects of foreclosure counseling for troubled borrowers. Available at SSRN: http://ssrn.com/abstract=1670859.

Cordell, L., Dynan, K., Lehnert, A., Liang, N., Mauskopf, E., 2009. Designing loan modifications to address the mortgage crisis and the making home affordable program. Finance and Economics Discussion Series 2009-43. Divisions of Research & Statistics and Monetary Affairs Federal Reserve Board.

Cordell, L., Dynan, K., Lehnert, A., Liang, N., Mauskopf, E., 2010. The Incentives of Mortgage Services and Designing Loan Modifications to Address the Mortgage Crisis. Lessons from the Financial Crisis: Causes, Consequences, and Our Economic Future, John Wiley & Sons, Inc., New Jersey.

Cutts, A.C., Green, R.K., 2005. Innovative Servicing Technology: Smart Enough to Keep People in their Houses? Building Assets, Building Credit: Creating Wealth in Low-income Communities, Brookings Institution Press, Washington, D.C.

Cutts, A.C., Merrill, W., 2008. Interventions in mortgage defaults: Problems and practices to prevent home loss and lower costs. Borrowing to live: Consumer and mortgage credit revisited., Brookings Institution Press., Washington, DC.

Ding, L., Quercia, R.G., Ratcliffe, J., 2008. Post-purchase counseling and default resolutions among low- and moderate- income borrowers. Journal of Real Estate Research 30, 315–344.

Doms, M., Furlong, F., Krainer, J., 2007. Subprime mortgage delinquency rates. Working Paper 2007-33. Federal Reserve Bank of San Francisco.

Eggert, K., 2007. Comment on michael a. stegman et al's "preventive servicing is good business and affordable homeownership policy": What prevents loan modifications? Housing Policy Debate 18, 279–297.

Gelpern, A., Levitin, A.J., 2009. Rewriting frankenstein contracts: The workout prohibition in residential mortgage-backed securities. Southern California Law Review 82, 1077–1152.

Haughwout, A., Okah, E., Tracy, J., 2010. Second changes: Subprime mortgage modification and re-default. Staff Report No. 417. Federal Reserve Bank of New York.

Hope Now, 2010. Industry Extrapolations and Metrics: Life to Date Completed Modifications. Http://tinyurl.com/2absz8g.

Mayer, N., Tatian, P.A., Temkin, K., Calhoun, C..A., 2009. National foreclosure mitigation counseling program evaluation: Preliminary analysis of program effects. Washington, DC: The Urban Institute.

Nichols, J., Pennington-Cross, A., Yezer, A., 2004. Borrower self-selection, underwriting costs, and subprime mortgage credit supply. The Journal of Real Estate Finance and Economics 30, 197–219.

Office of the Comptroller of the Currency, 2008. Occ and ots mortgage metrics report: Disclosure of national bank and federal thrift mortgage loan data, third quarter 2008.

Pikorski, T., Seru, A., Vig, V., 2009. Securitization and distressed loan renegotiation: Evidence from the subprime mortgage crisis. Chicago, IL. Research Paper No. 09-02. Booth School of Business.

Quercia, R.G., Ding, L., 2009. Loan modifications and redefault risk: An examination of short-term impacts. Cityspace: A Journal of Policy Development and Research 11, 171–193.

Riddiough, T., Wyatt, S.B., 1994a. Strategic default, workout, and commercial mortgage valuation. The Journal of Real Estate Finance and Economics 9, 5–22.

Riddiough, T., Wyatt, S.B., 1994b. Wimp or tough guy: Sequential default risk and signaling with mortgages. The Journal of Real Estate Finance and Economics 9, 299–321.

White, A.M., 2009a. Deleveraging the american homeowner: The failure of 2008 voluntary mortgage contract modifications. Connecticut Law Review 41.

White, A.M., 2009b. Rewriting contracts, wholesale: Data on voluntary mortgage modifications from 2007 and 2008 remittance reports. Fordham Urban Law Journal 36.

Table 1: Descriptive Information

| Variable | All | CA | OR | WA | All, Conditional on 60+ Day Delinquency | All, Conditional on 60+ Day Delinquency & Modification |
|---|---|---|---|---|---|---|
| Total Number of Loans | 105,769 | 92,829 | 4,065 | 8,875 | 36,248 | 5,745 |
| Average Loan Amount (at origination) | $395,007 | $415,657 | $219,670 | $259,370 | $376,220 | $368,179 |
| Combined LTV (at origination) | 77.25 | 76.44 | 83.08 | 83.01 | 83.21 | 82.36 |
| Average Income (at origination) | $126,590 | $131,444 | $87,786 | $93,592 | $117,778 | $109,976 |
| Monthly Payment to Income (at origination) - (monthly PITI / (annual income/12)) | 5.55% | 5.47% | 6.16% | 5.96% | 5.24% | 4.94% |
| Average FICO Score (at origination) | 689 | 691 | 676 | 680 | 668 | 650 |
| Monthly Unemployment Rate (at origination) | 4.41% | 4.4% | 4.61% | 4.36% | 4.56% | 4.54% |
| Monthly Unemployment Rate (at final observation) | 9.4% | 9.72% | 8.32% | 6.56% | 10.83% | 12.73% |
| Average HPI at Origination | 308.11 | 318.32 | 233.52 | 235.46 | 311.73 | 312.29 |
| Average HPI at Final Observation | 244.34 | 247.13 | 220.42 | 226.16 | 222.54 | 211.6 |
| Percent Loans - Purchase | 45.95% | 44.78% | 52.94% | 54.93% | 55.39% | 45.24% |
| Percent Adjustable Rate Mortgages (at origination) | 84.56% | 85.03% | 77.76% | 82.79% | 90.92% | 90.27% |
| Percent Adjustable Rate Mortgages (at final observation) | 82.06% | 82.42% | 75.94% | 81.14% | 84.77% | 52.18% |
| Percent Subprime (300 BPS over Treasury) | 31.55% | 30.98% | 38.13% | 34.51% | 47.21% | 53.86 |
| Race of Homeowner | | | | | | |
| White | 49.45% | 45.3% | 84.16% | 76.95% | 36.68% | 36.08% |
| Black | 5.22% | 5.49% | 2.07% | 3.89% | 6.44% | 8.77% |
| Hispanic | 31.53% | 34.82% | 8.36% | 7.74% | 43.17% | 43.31% |
| Asian\Hawaiian\Pacific Islander Indicator | 13.8% | 14.39% | 5.41% | 11.43% | 13.71% | 11.84% |
| Percent of Loans - Paid Off (in final observation) | 40.39% | 37.89% | 56.97% | 58.99% | 14.31% | 5.99% |
| Percent of Loans - REO (in final observation) | 15.33% | 16.97% | 4.31% | 3.23% | 44.72% | 10.55% |
| Percent of Loans - Modified (in final observation) | 6.74% | 7.11% | 4.31% | 3.99% | 15.85% | – |

Figure 1: 60+ Days Delinquent by Date and Race

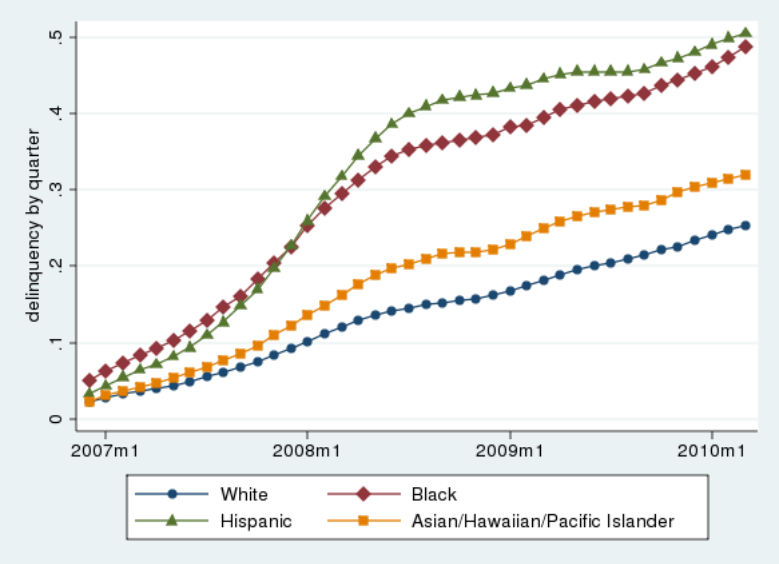


Figure 2: Modifications by Date and Race, Conditional on 60+ Days Delinquent

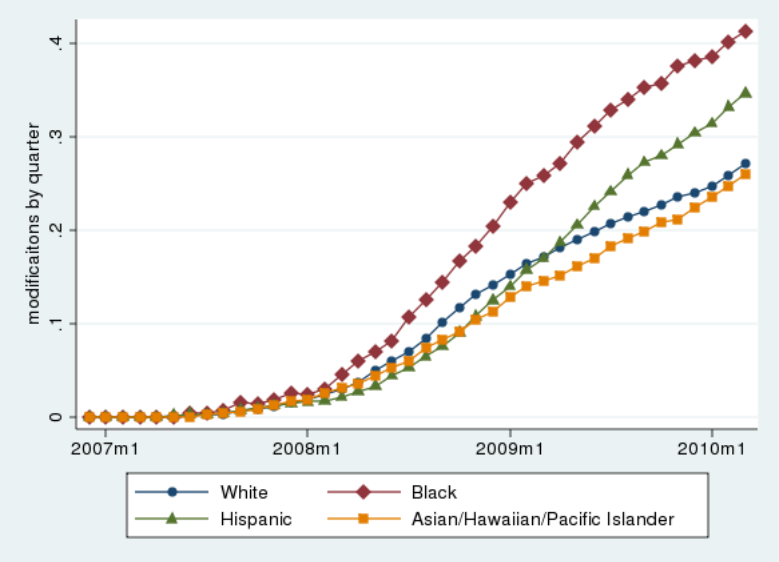

Figure 3: Modifications by Race

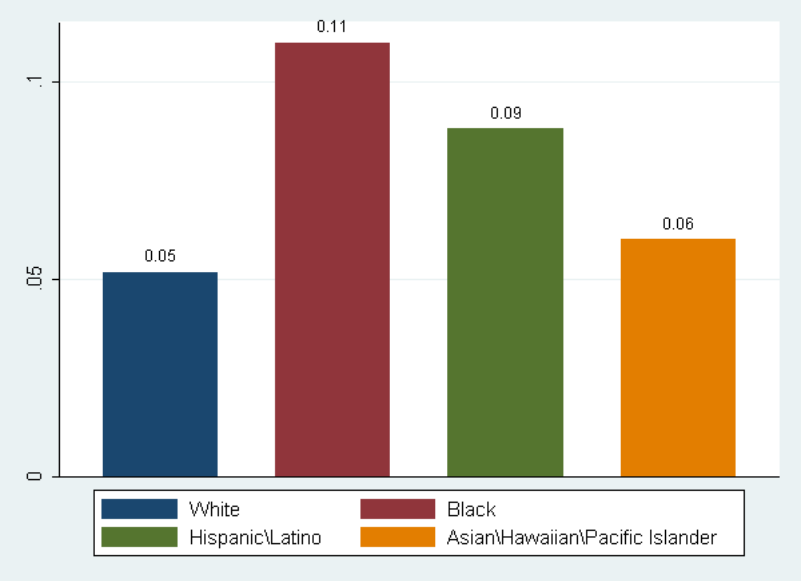


Figure 4: Modifications by Income

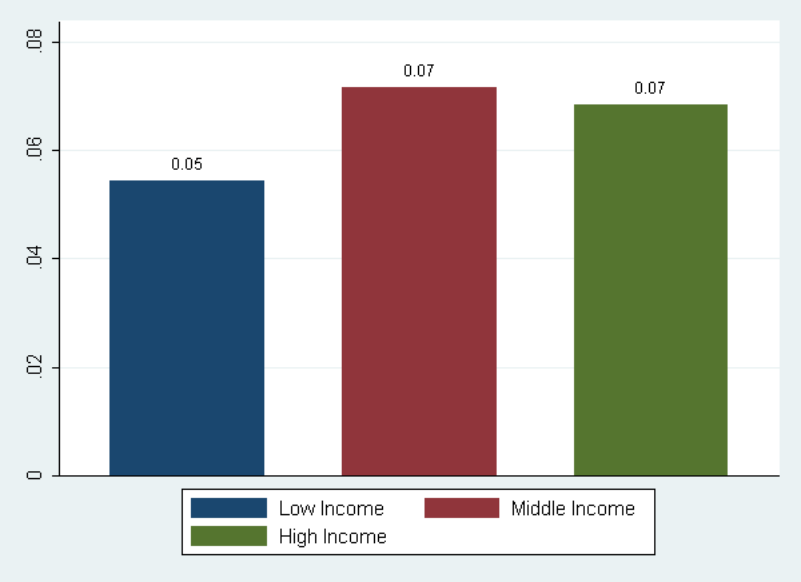

Table 2: Loss of Home to Foreclosure

| | (1) b/se | (2) b/se | (3) b/se | (4) b/se | (5) b/se | (6) b/se |
|---|---|---|---|---|---|---|
| Period 1 Loan Characteristics | | | | | | |
| High Cost Loan (>300 BPS Indicator) | 1.172*** | 1.154*** | 1.172*** | 1.153*** | | 1.184*** |
| | (0.023) | (0.023) | (0.023) | (0.023) | | (0.025) |
| Natural Log Loan Amount ($) | 0.850*** | 0.845*** | 0.851** | 0.832** | 0.814** | 0.73*** |
| | (0.022) | (0.022) | (0.053) | (0.051) | (0.051) | (0.041) |
| Combined Loan-to-Value Ratio | 1.020*** | 1.020*** | 1.020*** | 1.020*** | 1.020*** | 1.021*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) |
| Monthly Payment to Income Ratio x 100 | 1.001 | 1.002 | 1.001 | 1.001 | .997 | 0.994 |
| | (0.003) | (0.003) | (0.004) | (0.004) | (0.005) | (0.005) |
| Purchase Mortgage Indicator | 1.258*** | 1.234*** | 1.258*** | 1.232*** | 1.251*** | 1.229*** |
| | (0.026) | (0.026) | (0.028) | (0.028) | (0.028) | (0.026) |
| Black\African American Indicator | | 0.984 | | 0.985 | 1.014 | 0.945 |
| | | (0.036) | | (0.036) | (0.037) | (0.033) |
| Hispanic\Latino Indicator | | 1.159*** | | 1.160*** | 1.183*** | 1.09*** |
| | | (0.024) | | (0.024) | (0.025) | (0.022) |
| Asian\Hawaiian\Pacific Islander Indicator | | 1.210*** | | 1.210*** | 1.223*** | 1.172*** |
| | | (0.033) | | (0.033) | (0.033) | (0.031) |
| Natural Log Income ($) | | | 0.999 | 1.018 | 1.032 | 1.088 |
| | | | (0.056) | (0.057) | (0.059) | (0.058) |
| Time Varying Characteristics | | | | | | |
| Adjustable Rate Mortgage (ARM) Indicator | 1.000 | 1.000 | 1.000 | 1.000 | 1.001 | 0.999 |
| | (0.001) | (0.001) | (0.002) | (0.002) | (0.002) | (0.002) |
| Current FICO Score/100 | 1.019 | 1.019 | 1.019 | 1.019 | 1.023* | 1.041*** |
| | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.011) |
| Current FICO Score$^2$ | 0.998* | 0.998* | 0.998* | 0.998* | .998* | 0.997*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Log Quarterly Housing Price Index (HPI) | 0.921*** | 0.921*** | 0.921*** | 0.921*** | .922*** | 0.930*** |
| | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) |
| Log Quarterly Housing Price Index (HPI) 6 months lag | 1.044*** | 1.040*** | 1.044*** | 1.040*** | 1.039*** | 1.01 |
| | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) |
| Monthly Unemployment Rate (MSA) x 100 | 1.000 | 0.999* | 1.000 | 0.999* | .999* | 0.998*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Interest Rate x 100 | 1.000 | 1.000 | 1.000 | 1.000 | 1.001* | 1.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Months Delinquent as of Current Month | 1.145*** | 1.147*** | 1.145*** | 1.147*** | 1.147*** | 1.152*** |
| | (0.012) | (0.012) | (0.012) | (0.012) | (0.012) | (0.013) |
| Months Delinquent as of 3 Months Ago | 1.168*** | 1.168*** | 1.168*** | 1.168*** | 1.169*** | 1.166*** |
| | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.009) |
| Months Delinquent as of 6 Months Ago | 1.010*** | 1.010*** | 1.010*** | 1.010*** | 1.010*** | 1.012*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Freddie Mac PMMS - Current Month x 100 | 1.071*** | 1.072*** | 1.071*** | 1.071*** | 1.073*** | 1.077*** |
| | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.016) |
| Servicer Fixed Effects | No | No | No | No | No | Yes |
| Number of Observations | 2,622,318 | 2,622,318 | 2,622,318 | 2,622,318 | 2,622,318 | 2,622,318 |
| Number of Subjects | 105,769 | 105,769 | 105,769 | 105,769 | 105,769 | 105,769 |
| REO | 16,390 | 16,390 | 16,390 | 16,390 | 16,390 | 16,390 |
| Prepay | 42,636 | 42,636 | 42,636 | 42,636 | 42,636 | 42,636 |

Exponentiated coefficients

Source: Corporate Trust Services (CTS)

Performance period: December, 2006 - May, 2010

Loan Origination Year: 2005

Model: Competing Risks Model

Dependent Variable: Foreclosure (REO) is Event of Interest and Prepayment is Competing Event

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Probability of Mortgage Modification Conditional on Ever Becoming Delinquent

| | (1) b/se | (2) b/se | (3) b/se | (4) b/se | (5) b/se | (6) b/se |
|---|---|---|---|---|---|---|
| Period 1 Loan Characteristics | | | | | | |
| High Cost Loan (>300 BPS Indicator) | 2.589*** | 2.569*** | 2.570*** | 2.547*** | | 2.089*** |
| | (0.093) | (0.092) | (0.094) | (0.093) | | (0.084) |
| Natural Log Loan Amount ($) | 0.953 | 0.952 | 0.859 | 0.854 | 0.553*** | 0.822* |
| | (0.037) | (0.038) | (0.077) | (0.077) | (0.052) | (0.081) |
| Combined Loan-to-Value Ratio | 1.010*** | 1.010*** | 1.010*** | 1.010*** | 1.012*** | 1.003 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Monthly Payment to Income Ratio x 100 | 0.974*** | 0.974*** | 0.962** | 0.961** | 0.884*** | 0.948*** |
| | (0.007) | (0.007) | (0.013) | (0.013) | (0.015) | (0.015) |
| Purchase Mortgage Indicator | 0.881*** | 0.885*** | 0.872*** | 0.875*** | 0.920* | 0.942 |
| | (0.033) | (0.033) | (0.033) | (0.033) | (0.033) | (0.038) |
| Black\African American Indicator | | 1.142* | | 1.146* | 1.437*** | 1.175* |
| | | (0.077) | | (0.077) | (0.087) | (0.082) |
| Hispanic\Latino Indicator | | 0.996 | | 0.999 | 1.136*** | 0.970 |
| | | (0.036) | | (0.036) | (0.039) | (0.037) |
| Asian\Hawaiian\Pacific Islander Indicator | | 0.997 | | 0.999 | 1.056 | 1.011 |
| | | (0.048) | | (0.048) | (0.048) | (0.048) |
| Natural Log Income ($) | | | 1.121 | 1.126 | 1.644*** | 1.194 |
| | | | (0.097) | (0.097) | (0.153) | (0.115) |
| Time Varying Characteristics | | | | | | |
| Adjustable Rate Mortgage (ARM) Indicator | 0.977*** | 0.977*** | 0.977*** | 0.977*** | 0.983*** | 0.983*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Current FICO Score/100 | 0.990 | 0.991 | 0.990 | 0.991 | 1.013 | 0.966* |
| | (0.012) | (0.012) | (0.012) | (0.012) | (0.011) | (0.013) |
| Current FICO Score$^2$ | 0.999 | 0.999 | 0.999 | 0.999 | 0.997*** | 1.001 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Log Quarterly Housing Price Index (HPI) | 0.979 | 0.980 | 0.979 | 0.980 | 0.979 | 0.979 |
| | (0.017) | (0.017) | (0.017) | (0.017) | (0.016) | (0.017) |
| Log Quarterly Housing Price Index (HPI) 6 months lag | 1.044** | 1.043* | 1.044** | 1.043* | 1.044** | 1.043* |
| | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.018) |
| Monthly Unemployment Rate (MSA) x 100 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.001 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.000) | (0.001) |
| Interest Rate x 100 | 0.980*** | 0.980*** | 0.980*** | 0.980*** | 0.981*** | 0.979*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Months Delinquent as of Current Month | 0.947*** | 0.947*** | 0.947*** | 0.947*** | 0.947*** | 0.948*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Months Delinquent as of 3 Months Ago | 1.041*** | 1.041*** | 1.041*** | 1.041*** | 1.043*** | 1.038*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Months Delinquent as of 6 Months Ago | 0.987*** | 0.987*** | 0.987*** | 0.987*** | 0.987*** | 0.988*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Freddie Mac PMMS - Current Month x 100 | 0.858* | 0.858* | 0.858 | 0.858 | 0.898 | 0.778*** |
| | (0.066) | (0.066) | (0.068) | (0.068) | (0.110) | (0.034) |
| Servicer Fixed Effects | No | No | No | No | No | Yes |
| Total Observations | 1,025,532 | 1,025,532 | 1,025,532 | 1,025,532 | 1,025,532 | 1,025,532 |
| Unique Loans | 36,248 | 36,248 | 36,248 | 36,248 | 36,248 | 36,248 |

Exponentiated coefficients

Source: Corporate Trust Services (CTS)

Performance period: December, 2006 - May, 2010

Loan Origination Year: 2005

Model: Cox Hazard Model

Dependent Variable: Modification

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Probability of Loss of Home to Foreclosure Conditional on Ever Becoming Delinquent

| | (1) b/se | (2) b/se | (3) b/se | (4) b/se | (5) b/se | (6) b/se |
|---|---|---|---|---|---|---|
| Period 1 Loan Characteristics | | | | | | |
| High Cost Loan (>300 BPS Indicator) | 1.087*** | 1.084*** | 1.087*** | 1.084*** | | 1.106*** |
| | (0.021) | (0.021) | (0.021) | (0.021) | | (0.022) |
| Natural Log Loan Amount ($) | 0.855*** | 0.850*** | 0.858*** | 0.848*** | 0.840*** | 0.763*** |
| | (0.019) | (0.019) | (0.034) | (0.033) | (0.033) | (0.031) |
| Combined Loan-to-Value Ratio | 1.009*** | 1.009*** | 1.009*** | 1.009*** | 1.009*** | 1.009*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Monthly Payment to Income Ratio x 100 | 1.001 | 1.001 | 1.002 | 1.001 | 1.000 | 0.996 |
| | (0.002) | (0.002) | (0.003) | (0.003) | (0.003) | (0.003) |
| Purchase Mortgage Indicator | 1.185*** | 1.173*** | 1.186*** | 1.173*** | 1.184*** | 1.165*** |
| | (0.021) | (0.021) | (0.022) | (0.022) | (0.022) | (0.022) |
| Modification Indicator | 0.274*** | 0.280*** | 0.274*** | 0.280*** | 0.282*** | 0.274*** |
| | (0.011) | (0.020) | (0.011) | (0.020) | (0.020) | (0.019) |
| Black\African American Indicator | | 0.932 | | 0.932 | 0.946 | 0.911** |
| | | (0.034) | | (0.034) | (0.035) | (0.031) |
| Hispanic\Latino Indicator | | 1.059** | | 1.059** | 1.071*** | 1.017 |
| | | (0.020) | | (0.020) | (0.020) | (0.019) |
| Asian\Hawaiian\Pacific Islander Indicator | | 1.108*** | | 1.108*** | 1.114*** | 1.091*** |
| | | (0.028) | | (0.028) | (0.028) | (0.027) |
| Modification Indicator x Black | | 1.003 | | 1.003 | 1.004 | 0.991 |
| | | (0.149) | | (0.149) | (0.149) | (0.147) |
| Modification Indicator x Hispanic | | 0.956 | | 0.956 | 0.953 | 0.929 |
| | | (0.091) | | (0.091) | (0.091) | (0.089) |
| Modification Indicator x Other | | 1.045 | | 1.045 | 1.049 | 1.053 |
| | | (0.147) | | (0.147) | (0.147) | (0.149) |
| Natural Log Income ($) | | | 0.997 | 1.002 | 1.008 | 1.072 |
| | | | (0.037) | (0.037) | (0.037) | (0.041) |
| Time Varying Characteristics | | | | | | |
| Adjustable Rate Mortgage (ARM) Indicator | 0.996** | 0.996** | 0.996** | 0.996** | 0.996* | 0.995** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) |
| Current FICO Score/100 | 0.968*** | 0.968*** | 0.968*** | 0.968*** | 0.970*** | 0.994 |
| | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) |
| Current FICO Score$^2$ | 1.003*** | 1.002*** | 1.003*** | 1.002*** | 1.002*** | 1.001 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Log Quarterly Housing Price Index (HPI) | 0.937*** | 0.937*** | 0.937*** | 0.937*** | 0.937*** | 0.942*** |
| | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) |
| Log Quarterly Housing Price Index (HPI) 6 months lag | 1.042*** | 1.041*** | 1.042*** | 1.041*** | 1.040*** | 1.019 |
| | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) |
| Monthly Unemployment Rate (MSA) x 100 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.999*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Interest Rate x 100 | 1.000 | 1.000 | 1.000 | 1.000 | 1.001* | 1.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Months Delinquent as of Current Month | 4.081*** | 4.094*** | 4.082*** | 4.093*** | 4.115*** | 4.077*** |
| | (0.861) | (0.864) | (0.861) | (0.864) | (0.869) | (0.860) |
| Months Delinquent as of 3 Months Ago | 1.182*** | 1.182*** | 1.182*** | 1.182*** | 1.182*** | 1.178*** |
| | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) |
| Months Delinquent as of 6 Months Ago | 1.011*** | 1.011*** | 1.011*** | 1.011*** | 1.011*** | 1.013*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Freddie Mac PMMS - Current Month x 100 | 0.797** | 0.801** | 0.797** | 0.801** | 0.803** | 0.835*** |
| | (0.058) | (0.056) | (0.058) | (0.056) | (0.056) | (0.045) |
| Servicer Fixed Effects | No | No | No | No | No | Yes |
| Number of Observations | 997,592 | 997,592 | 997,592 | 997,592 | 997,592 | 997,592 |
| Number of Subjects | 36,248 | 36,248 | 36,248 | 36,248 | 36,248 | 36,248 |
| REO | 16,388 | 16,388 | 16,388 | 16,388 | 16,388 | 16,388 |
| Prepay | 5,103 | 5,103 | 5,103 | 5,103 | 5,103 | 5,103 |

Exponentiated coefficients

Source: Corporate Trust Services (CTS)

Performance period: December, 2006 - May, 2010

Loan Origination Year: 2005

Model: Competing Risks Model

Dependent Variable: Foreclosure (REO) is Event of Interest and Prepayment is Competing Event

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Interest Rate on Loans Conditional on Receiving a Loan Modification

| | (1) b/se | (2) b/se | (3) b/se | (4) b/se | (5) b/se | (6) b/se |
|---|---|---|---|---|---|---|
| High Cost Loan (>300 BPS Indicator) | 0.786*** | 0.789*** | 0.728*** | 0.727*** | | 0.592*** |
| | (0.030) | (0.030) | (0.032) | (0.033) | | (0.031) |
| Natural Log Loan Amount ($) | -0.337*** | -0.336*** | -1.062*** | -1.060*** | -1.350*** | -0.992*** |
| | (0.034) | (0.034) | (0.086) | (0.087) | (0.106) | (0.103) |
| Combined Loan-to-Value Ratio | 0.000 | 0.000 | -0.000 | -0.000 | 0.003* | -0.002 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Purchase Mortgage Indicator | -0.012 | -0.007 | -0.085** | -0.081** | 0.000 | -0.075** |
| | (0.028) | (0.028) | (0.029) | (0.029) | (0.031) | (0.028) |
| Monthly Payment to Income Ratio x 100 | -0.018** | -0.018*** | -0.095*** | -0.095*** | -0.142*** | -0.094*** |
| | (0.005) | (0.005) | (0.015) | (0.015) | (0.023) | (0.019) |
| Adjustable Rate Mortgage (ARM) Indicator | 0.078* | 0.078* | 0.090* | 0.089* | 0.106** | 0.090* |
| | (0.037) | (0.037) | (0.037) | (0.037) | (0.037) | (0.037) |
| Current FICO Score/100 | -1.154*** | -1.147*** | -1.254*** | -1.245*** | -0.817** | -1.466*** |
| | (0.257) | (0.258) | (0.255) | (0.256) | (0.264) | (0.251) |
| Current FICO Score$^2$ | 0.058** | 0.058** | 0.068** | 0.067** | 0.029 | 0.087*** |
| | (0.021) | (0.021) | (0.021) | (0.021) | (0.022) | (0.021) |
| Log Quarterly Housing Price Index (HPI) | -4.890*** | -4.881*** | -4.889*** | -4.880*** | -4.861*** | -4.881*** |
| | (0.114) | (0.114) | (0.114) | (0.114) | (0.114) | (0.114) |
| Log Quarterly Housing Price Index (HPI) 6 months lag | 3.804*** | 3.782*** | 3.807*** | 3.781*** | 3.760*** | 3.780*** |
| | (0.189) | (0.189) | (0.188) | (0.189) | (0.189) | (0.191) |
| Monthly Unemployment Rate (MSA) x 100 | -0.158*** | -0.158*** | -0.157*** | -0.158*** | -0.159*** | -0.157*** |
| | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) |
| Months Delinquent as of Current Month | 0.222*** | 0.223*** | 0.222*** | 0.223*** | 0.224*** | 0.222*** |
| | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) |
| Months Delinquent as of 3 Months Ago | -0.019*** | -0.019*** | -0.019*** | -0.019*** | -0.020*** | -0.019*** |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) |
| Months Delinquent as of 6 Months Ago | -0.028*** | -0.027*** | -0.028*** | -0.028*** | -0.028*** | -0.027*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) |
| Freddie Mac PMMS - Current Month x 100 | -0.073*** | -0.071*** | -0.074*** | -0.071*** | -0.069*** | -0.073*** |
| | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) | (0.014) |
| Post Modification Indicator | -1.759*** | -1.665*** | -1.754*** | -1.660*** | -1.649*** | -1.667*** |
| | (0.031) | (0.044) | (0.031) | (0.044) | (0.044) | (0.044) |
| Black\African American Indicator | | 0.050 | | 0.093 | 0.228*** | 0.112* |
| | | (0.050) | | (0.050) | (0.052) | (0.049) |
| Hispanic\Latino Indicator | | 0.002 | | 0.030 | 0.106*** | 0.033 |
| | | (0.031) | | (0.031) | (0.032) | (0.030) |
| Asian\Hawaiian\Pacific Islander Indicator | | 0.050 | | 0.065 | 0.087 | 0.095* |
| | | (0.045) | | (0.045) | (0.046) | (0.044) |
| Modification Indicator x Black | | -0.173 | | -0.174 | -0.174 | -0.173 |
| | | (0.093) | | (0.093) | (0.093) | (0.093) |
| Modification Indicator x Hispanic | | -0.133* | | -0.133* | -0.134* | -0.131* |
| | | (0.055) | | (0.055) | (0.055) | (0.055) |
| Modification Indicator x Other | | -0.173* | | -0.173* | -0.174* | -0.174* |
| | | (0.086) | | (0.086) | (0.086) | (0.086) |
| Natural Log Income ($) | | | 0.840*** | 0.839*** | 1.076*** | 0.797*** |
| | | | (0.089) | (0.089) | (0.115) | (0.105) |
| Constant | 23.535*** | 23.566*** | 23.792*** | 23.808*** | 23.929*** | 25.028*** |
| | (1.140) | (1.136) | (1.129) | (1.126) | (1.167) | (1.146) |
| Servicer Fixed Effects | No | No | No | No | No | Yes |
| Total Observations | 223,352 | 223,352 | 223,352 | 223,352 | 223,352 | 223,352 |
| Unique Loans | 5,745 | 5,745 | 5,745 | 5,745 | 5,745 | 5,745 |
| $R^2$ within | 0.460 | 0.460 | 0.460 | 0.460 | 0.460 | 0.460 |
| $R^2$ between | 0.274 | 0.275 | 0.302 | 0.303 | 0.222 | 0.398 |
| $R^2$ overall | 0.398 | 0.398 | 0.407 | 0.407 | 0.379 | 0.439 |

Source: Corporate Trust Services (CTS)
Performance period: December, 2006 - May, 2010
Loan Origination Year: 2005
Model: Random Effects Linear Regression
Dependent Variable: Interest Rate
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

# Table 6: Current Balance on Loans Conditional on Receiving a Loan Modification

| | (1) b/se | (2) b/se | (3) b/se | (4) b/se | (5) b/se | (6) b/se |
|---|---|---|---|---|---|---|
| High Cost Loan (>300 BPS Indicator) | -5380.333** | -4209.989** | -6103.414*** | -4812.295** | | 459.369 |
| | (1641.003) | (1600.981) | (1698.104) | (1669.274) | | (1634.198) |
| Natural Log Loan Amount ($) | 357635.493*** | 357275.542*** | 349441.680*** | 350827.003*** | 353033.859*** | 342232.735*** |
| | (5574.955) | (5550.877) | (6559.253) | (6645.564) | (6739.726) | (7122.377) |
| Combined Loan-to-Value Ratio | -888.857*** | -909.249*** | -890.309*** | -910.060*** | -930.345*** | -1070.930*** |
| | (129.091) | (129.232) | (128.930) | (129.091) | (129.231) | (137.181) |
| Purchase Mortgage Indicator | -416.320 | 754.422 | -1175.342 | 139.626 | -297.310 | 2268.437 |
| | (1783.927) | (1823.201) | (1821.053) | (1874.947) | (1853.167) | (1783.402) |
| Monthly Payment to Income Ratio x 100 | 3441.360*** | 3259.839*** | 2566.984** | 2574.925** | 2918.574** | -284.812 |
| | (656.430) | (645.192) | (912.080) | (906.812) | (897.500) | (637.701) |
| Adjustable Rate Mortgage (ARM) Indicator | 2809.899*** | 2810.707*** | 2824.371*** | 2821.947*** | 2804.637*** | 2778.075*** |
| | (618.221) | (617.885) | (618.246) | (617.873) | (617.467) | (617.711) |
| Current FICO Score/100 | -5667.500 | -5638.069 | -6023.212 | -5913.084 | -6628.191 | -4228.130 |
| | (8611.260) | (8614.766) | (8634.703) | (8638.126) | (8589.480) | (8664.730) |
| Current FICO Score$^2$ | 542.796 | 540.360 | 575.684 | 565.796 | 630.021 | 418.600 |
| | (740.028) | (740.175) | (742.305) | (742.439) | (738.004) | (745.022) |
| Log Quarterly Housing Price Index (HPI) | -11742.149*** | -11637.025*** | -11755.667*** | -11647.580*** | -11689.870*** | -11842.296*** |
| | (1294.411) | (1301.494) | (1294.268) | (1301.344) | (1300.977) | (1301.853) |
| Log Quarterly Housing Price Index (HPI) 6 months lag | 20571.680*** | 20433.054*** | 20583.473*** | 20438.104*** | 20477.183*** | 21290.201*** |
| | (2698.643) | (2734.808) | (2698.411) | (2734.684) | (2734.493) | (2737.676) |
| Monthly Unemployment Rate (MSA) x 100 | -771.968*** | -768.160*** | -772.154*** | -768.551*** | -768.162*** | -716.738*** |
| | (114.600) | (115.130) | (114.596) | (115.131) | (115.137) | (115.233) |
| Interest Rate x 100 | -2784.584*** | -2790.576*** | -2786.324*** | -2791.938*** | -2795.467*** | -2795.246*** |
| | (104.266) | (104.296) | (104.248) | (104.280) | (104.250) | (104.258) |
| Months Delinquent as of Current Month | 3014.335*** | 3018.037*** | 3014.701*** | 3018.319*** | 3018.070*** | 3010.613*** |
| | (183.825) | (184.168) | (183.826) | (184.169) | (184.165) | (184.237) |
| Months Delinquent as of 3 Months Ago | -3029.152*** | -3027.307*** | -3029.122*** | -3027.287*** | -3027.002*** | -3028.776*** |
| | (135.488) | (135.335) | (135.488) | (135.335) | (135.335) | (135.346) |
| Months Delinquent as of 6 Months Ago | 508.868*** | 514.087*** | 508.687*** | 513.931*** | 514.241*** | 509.101*** |
| | (97.818) | (97.878) | (97.815) | (97.874) | (97.874) | (97.867) |
| Freddie Mac PMMS - Current Month x 100 | -161.809 | -131.713 | -163.641 | -133.229 | -135.946 | -90.947 |
| | (214.058) | (215.205) | (214.020) | (215.162) | (215.154) | (214.994) |
| Post Modification Indicator | 7431.860*** | 8158.775*** | 7433.804*** | 8160.202*** | 8142.282*** | 8097.003*** |
| | (399.244) | (614.447) | (399.291) | (614.469) | (614.085) | (613.797) |
| Black\African American Indicator | | -9119.070*** | | -8737.122*** | -9679.912*** | -6588.600** |
| | | (2376.566) | | (2371.281) | (2417.822) | (2289.256) |
| Hispanic\Latino Indicator | | -12752.092*** | | -12482.697*** | -12968.622*** | -9415.359*** |
| | | (1710.775) | | (1720.442) | (1737.305) | (1643.384) |
| Asian\Hawaiian\Pacific Islander Indicator | | -4841.686 | | -4691.107 | -4795.733 | -5890.081* |
| | | (3000.983) | | (3028.325) | (3031.288) | (2961.130) |
| Modification Indicator x Black | | -167.976 | | -168.828 | -169.703 | -157.892 |
| | | (1296.313) | | (1296.346) | (1296.401) | (1295.647) |
| Modification Indicator x Hispanic | | -1355.592 | | -1354.928 | -1353.485 | -1343.973 |
| | | (817.786) | | (817.780) | (817.734) | (817.487) |
| Modification Indicator x Other | | -1199.860 | | -1200.471 | -1200.622 | -1203.534 |
| | | (1229.639) | | (1229.692) | (1229.720) | (1229.057) |
| Natural Log Income ($) | | | 9582.537 | 7546.214 | 5777.947 | 22254.273*** |
| | | | (5789.877) | (5774.527) | (5722.897) | (5324.763) |
| Constant | -4138312.542*** | -4125483.643*** | -4137911.897*** | -4125395.571*** | -4133314.183*** | -4188159.614*** |
| | (73861.055) | (73299.505) | (73643.037) | (73152.863) | (74028.891) | (76843.473) |
| Servicer Fixed Effects | No | No | No | No | No | Yes |
| Total Observations | 223,352 | 223,352 | 223,352 | 223,352 | 223,352 | 223,352 |
| Unique Loans | 5,745 | 5,745 | 5,745 | 5,745 | 5,745 | 5,745 |
| $R^2$ within | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 |
| $R^2$ between | 0.877 | 0.879 | 0.877 | 0.879 | 0.878 | 0.888 |
| $R^2$ overall | 0.857 | 0.859 | 0.857 | 0.859 | 0.858 | 0.868 |

Source: Corporate Trust Services (CTS)
Performance period: December, 2006 - May, 2010
Loan Origination Year: 2005
Model: Random Effects Linear Regression
Dependent Variable: Current Balance
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$