Servicer Heterogeneity: Does Servicing Matter for Loan Cure Rates?

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Abstract

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1. Introduction

Until recently, the mortgage servicing industry - which collects loan payments on residential mortgages and remits those payments to either the originating lender or an investor - has operated largely in the background, receiving little public, regulatory, or academic attention. However, in the midst of the foreclosure crisis, mortgage servicing has garnered significant attention for its role in processing mortgage delinquencies. As the interface between borrowers and investors, servicers are often the ones that make the decision to grant either a loan modification or start foreclosure proceedings. To deal with the onslaught of delinquent loans, many servicers opened special "loss mitigation" offices in hard hit communities, held 'borrower outreach' fairs to reach delinquent mortgage holders, and developed relationships with foreclosure counselors to help shepherd paperwork through the loan modification process. Yet the industry has also been besieged by scandals related to "robo-signing" and "dual tracking," as well as recurrent stories of servicer mistakes and lack of capacity to undertake mortgage modifications. These complaints and illegal practices have led to significant legal actions, including the National Morgage Settlement among the five largest national loan servicers, the United States Department of Justice (DOJ), the United States Department of Housing and Urban Development (HUD), and the attorneys general of forty-nine states. On the regulatory front, the Bureau of Consumer Financial Protection (CFPB) enacted stricter servicing rules and exam procedures to ensure greater accountability and transparency in mortgage servicing.

Indeed, it has become increasingly apparent that mortgage servicing is a complicated but critical component to ensuring the sustainability of home mortgage lending, and that servicer practices matter in determining the likelihood that a delinquent borrower will be able to save his home from foreclosure. When a borrower receives his first notice of default, the path to cure or foreclosure can take months if not years, and there are multiple possible resolutions. Recent research has suggested that there is significant heterogeneity among servicers in terms of the types of resolutions they offer to borrowers, and that this heterogeneity has actually undermined the effectiveness of federal efforts to prevent foreclosures (Agarwal et al., 2013). Servicer heterogeneity is particularly problematic from the perspective of the borrower, since it means that similarly situated borrowers could experience very different outcomes. However, borrowers have very little control over their loan after it is originated; they cannot decide whether their loan will be securitized, who their servicer is (or will be, in case of a mortgage servicing right transfer), or what contractual provisions govern the servicing their loan (Levitin and Twomey, 2011).[1]

In this paper, we examine the impact of the pronounced variation in resolution practices among servicers on loan cure rates, focusing specifically on the experiences of low-income and minority borrowers. While differences in resolution practices among servicers are likely due to a set of complex and inter-related factors, understanding which loss mitigation practices are the most likely to contribute to loan cures, especially for historically underrepresented borrowers, can help to inform policies that seek to develop consistent and effective loss mitigation standards. Despite their importance, not much is known about whether and how specific servicer-related factors affect the likelihood of a delinquent loan being cured. Using a national level sample of subprime and Alt-A loans in private label securities, we address three key questions. First, what is the impact of servicer heterogeneity on loan cures and foreclosure sales, and do these impacts differ for African-American, Latino, and Asian borrowers? Second, how do servicers differ from one another in the extent to which they are

[1]Further, Levitin and Twomey (2011) point out that as a result of imperfect information, information asymmetries, and cognitive biases, homeowners do not correct the principal-agent problem in servicing by demanding a discount in mortgage rates to compensate for the servicing externality. Homeowners are unlikely to price in servicing risk in their borrowing.

willing to offer modifications, as well as the type of relief that they are willing to provide? Third, to what extent do these differences in loan modification rates help to explain borrower outcomes upon modification, such as redefault and eventual foreclosure?

We find that servicers - and servicing practices - matter significantly for borrower outcomes. There is vast heterogeneity across servicers; we find that the "Worst" 5 servicers have cure rates of close to 10 percent, whereas the "Best" 5 have cure rates near 38 percent. We also find that servicers vary greatly in their propensity to modify a loan. Servicers with higher cure rates perform permanent modifications on almost 48 percent of their delinquent loans, while servicers with the lowest cure rates only granted modifications to 2 percent of delinquent borrowers over the course of our study period. These differences across servicers are not explained by borrower, loan, or market characteristics, and underscore the importance of public policies that can help to increase both the uniformity and transparency of servicing practices. We also find that there is a strong correlation between the granting of a modification and loan cures; in particular, loan modifications that address borrowers' affordability constraints significantly reduce the likelihood of re-default one year after modification. With respect to borrowers of color, while we find significant cross-servicer heterogeneity in outcomes (as we do for the sample as a whole), it does not appear from this analysis that within their own servicing portfolio, individual servicers treat African American, Latino or Asian borrowers differently from their White counterparts.

The paper proceeds as follows. First, we provide some background on the development of the mortgage servicing industry, as well as federal policy efforts to increase the incentives and remove barriers for servicers to modify delinquent loans. Second, we review the existing literature on servicer practices, and discuss some of the reasons why there may be heterogeneity across servicers in their propensity to modify loans. In the third section, we present information about our data and variables. Fourth, we turn to our empirical analysis, providing a description of our model and findings to each of the three questions articulated above. We conclude with a discussion and the implications of this research for public policy.

2. Development of the Mortgage Servicing Industry

Historically, mortgage servicing was handled by originating lenders, who kept loans in their portfolios and who would work directly with borrowers who found themselves late on their payments. The rise of securitization, however, has led to the creation of a mortgage servicing industry. In this new regime, banks and investors, uninterested in managing the day-to-day responsibilities of collecting loan payments and undertaking loss mitigation, delegate the servicing of their loans to other institutions that specialize in loan servicing, or set up a separate servicing arm to manage loan processing. In addition, this specialization of mortgage lending has led to an asset class known as "mortgage servicing rights" (MSR); banks and other institutions invest and trade in MSRs, much as they would other investments. The credit rating agencies conduct periodic reviews of servicer quality, rating servicers against their peers. For example, Moody's assess servicers along five dimensions: collections, loss mitigation, foreclosure timeline management, administration, and servicer sustainability (Moody's Investor Service, 2013).[2]

The returns to the MSR and the servicing business come from three primary sources (Buttimer and Lin, 2005). First, servicers receive a fee for collecting, reporting and disbursing loan payments: approximately 25 to 50 basis points per year on the outstanding balance of the loan (Buttimer and Lin, 2005).[3] Second, servicers collect interest on payments they have collected from borrowers but not yet remitted to the investors in the mortgage backed security (MBS)this "float" is possible since borrowers pay their mortgages throughout the month, but servicers only need to make a single, monthly remittance to the MBS issuer. Third, servicers can charge fees to the borrowers, for example, for late payments or for providing detailed documentation (e.g. payment history or tax/escrow statements).

[2]However, as Levitin and Twomey (2011) argue, it is unclear whether the ratings system for mortgage servicing is effective at disciplining servicer behavior.

[3]Servicer fees are not explicitly negotiated; instead, the fees are related to the yield on the MBS, which is negotiated between the seller of the MBS and the investor. The required yield on MBSs at any given time is generally lower than the rates quoted for mortgages. The positive differential between the interest the originator/servicer receives from the borrower (at origination) and the yield required to be remitted to the investor (of the MBS) is the service fee. (Cochran et al., 2004)

Because the returns to any one loan are quite small, servicers' profits generally come from reducing costs and increasing the scale and efficiency of their operations (LaCour-Little, 2000). In addition to the fixed costs associated with building the computing and administrative infrastructure, monthly outlays include the administrative costs of collecting and disbursing payments and undertaking loss mitigation when a loan goes delinquent. Delinquent loans are particularly costly to the servicer. Typically, servicers must remit all payments to the investor each month by the remittance date, even if the borrower has not made the payment on their mortgage. As a result, if a borrower is delinquent, the servicer often must make the payment on their behalf; the servicer is not reimbursed for these advances until the loan has gone through foreclosure (Buttimer and Lin, 2005). During the recent crisis, the increase in administrative work load and the time consuming nature of collections activity, workouts, loan modifications, default and foreclosure processing, and real estate-owned (REO) management also increased servicer costs (Cochran and Shelnutt, 2014). As a result, the standard fees paid for loss mitigation on a nonperforming loan may be inadequate to cover the total costs associated with such an effort (Ding, 2013). Moreover, as Adam Levitin and Tara Twomey (2011) discuss in an excellent review article of the mortgage servicing industry, servicers' compensation structures create significant principal-agent conflicts between them and the MBS investors, to the detriment of delinquent borrowers who need a loan modification to prevent foreclosure.

Recognizing that voluntary efforts to expand loan modifications were unsuccessful at stemming the wave of foreclosures,[4] federal policy-makers have initiated a parade of programs designed to overcome servicer-related barriers to loan modification, with modest success. In February 2009, the Treasury Department rolled out the federal government's landmark foreclosure prevention initiative, the "Making Home Affordable" (MHA) program. As part of MHA, the "Home Affordable Modification Program" or HAMP, sought to overcome barriers to loan modification by encouraging servicers to bring loan payments in line with borrower incomes, with a goal of reaching 3 to 4 million distressed borrowers (GAO, 2014). Under

[4]Alan White, for example, showed that the majority of voluntary modifications at the start of the crisis typically increased a borrower's monthly payment, as well as the principal owed on the loan (White, 2009a,b).

the program, eligible borrowers work with the servicer to reduce their monthly payment to 38 percent of their income,[5] and then HAMP provides a government 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 that help keep borrowers in their homes.[6] To help servicers make a determination if a modification would help to protect the investors' interests in the loan, HAMP uses a standardized net present value (NPV) model to compare expected cash flows from a modified loan to the same loan with no modification, using certain assumptions.

The federal roll out of the HAMP program, while not reaching its potential, did help to increase the scale of loan modifications, and perhaps more importantly, provided clear guidelines for modifications and oversight of the servicing industry. As of November 2013, 1.3 million borrowers had received modifications under the HAMP program, well below Treasury's initial estimate of 3 million to 4 million (GAO, 2014). However, the program has led to significant reductions in payments–an average of $544 each month, or approximately 40 percent of their pre-modification payment–for borrowers who obtained relief (US Department of the Treasury, 2014). There is also emerging evidence that HAMP modifications have led to higher loan cure rates for deliquent borrowers; in a study of borrowers in New York City, Voicu and his colleagues (Voicu et al., 2012) find that HAMP loans are much more effective at preventing default than proprietary loan modifications, after controlling for a wide range of variables. While not conclusive, these results suggest that the incentives within the HAMP program as well as the modification guidelines have been successful at getting servicers to modify loans and to offer modifications that lead to real reductions in loan costs.

In addition to the HAMP program, there have been a number of legal actions taken against servicers that have also required that they undertake modifications and provide relief for delinquent and underwater homeowners. In February 2012, 49 state attorneys general and

[5]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.

[6]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.

the federal government announced a historic joint state-federal settlement with the country's five largest mortgage servicers,[7] requiring that these servicers provide $25 billion in relief in the forms of first and second lien principal reductions, refinance options for underwater borrowers, direct payments to borrowers, as well as financial support for state foreclosure prevention efforts. The settlment also implemented reforms to servicing standards, including requiring that servicers provide a single point of contact, adequate staffing levels and training, better communication with borrowers, and appropriate standards for executing documents in foreclosure cases. In 2013, 15 financial institutions settled with banking regulators, agreeing to make payments that totaled $3.9 billion to more than four million homeowners. However, concerns over abuses in mortgage servicing practices have continued, resulting in individual settlements between mortgage servicing companies and federal and state regulatory agencies.

Recently, there have also been concerns about the rapid growth of the non-bank servicer industry. The mortgage servicing industry has long been dominated by the large financial depository institutions. In 2013, the top 3 mortgage servicers were Wells Fargo, Chase, and Bank of America, together representing over a third of the market (37 percent). However, the most rapid growth in servicing has occurred among non-bank servicers such as Ocwen and Nationstar Mortgage. As of 2013, five of the top 10 mortgage servicing firms were non-banks (accounting for 15 percent of the total mortgage servicing market) (Goodman and Lee, March 31, 2014). This shift is in large part due to banks selling the servicing rights on their distressed mortgages, which are more costly to service and which present reputational risks for the banks. In addition, Basel IIIa set of banking reforms designed to strengthen the safety and soundness of the financial marketsestablishes new capital requirements for MSR and will likely increase the cost of holding MSR assets (Goodman and Lee, March 31, 2014). While many non-bank servicers specialize in working with distressed borrowers and have been more willing to undertake loan renegotiations, they have come under signfiicant regulatory scrutiny in recent years for growing too quickly and for increasing reports of poor

[7]The five banks signing onto the settlement are Ally/GMAC, Bank of America, Citi, JPMorgan Chase, and Wells Fargo. In addition, Bank of America, JP Morgan Chase, and Wells Fargo signed a separate settlement with the California Attorney General to provide an additional $12 billion in relief to California homeowners

servicing practices.

3. Literature Review: Servicer Heterogeneity in Loan Renegotiations

Until recently, the issue of mortgage servicing and modifications has received little attention in the scholarly literature. However, the role of mortgage servicing and loan modification practices have emerged as central to the debate about how to keep borrowers in their homes and prevent foreclosure and their negative impacts on borrowers, communities, and the overall U.S. economy. One critical finding is that there is significant heterogeneity across servicers in their propensity to modify loans. Agarwal et al. (2013), for example, document that following the rollout of HAMP, a few large servicers responded at half the rate of others, and argue that the effect of HAMP was muted by these nonresponsive servicers. In fact, they find that HAMP would have led to approximately 70 percent more permanent modifications if all the loans by less active servicers were renegotiated at the same rate as their more active counterparts. They also find that there is similar heterogeneity in the rate of private modifications offered across servicing entities.

Other studies examining loan modification patterns similarly point to the importance of servicer heterogeneity in predicting outcomes. In an earlier study examining servicer behavior pre-HAMP, Agarwal et al. (2010, 2011) find that lenders and servicers pursue their own individual loss mitigation practices, and that servicer fixed effects explain at least as much variation in modification terms as did borrower characteristics. In a study of loan modifications in five Mid-Atlantic states and Washington, DC, Collins and Herbert (Collins and Herbert, 2009) also find evidence for servicer heterogeneity. In their analysis, 5 servicers account for 58 percent of all the modifications in Maryland in their sample, despite only representing 28 percent of 60-day delinquencies.

The paper most relevant to our research was conducted by Lei Ding (2013), who explores servicer heterogeneity in loan modifications, using the CTS data, including merging those data with HMDA. Ding examines the loan modification activities during the period from January 2010 to May 2011 in two different types of markets: four Rustbelt states (Michigan, Indiana, Illinois, and Ohio) and four sand states (California, Arizona, Florida, and Nevada). He finds that servicers adopted significantly different loss mitigation approaches.

For example, four large servicers had a higher propensity to modify troubled loans than did smaller servicers, whereas three other large servicers were less likely than small servicers to do so, even after controlling for a variety of borrower and loan characteristics. He finds that compared with those served by small servicers (the reference group), the relative odds of receiving a loan modification conditional on 60-day delinquency vary significantly by servicer: to provide just one example, the relative odds of loan modification were 436% higher for troubled loans in the hands of the "best" servicer, whereas the odds of modification were 60% lower for those serviced by the worst.

This strongly suggests that servicer loss mitigation choices are driven by institutional factors, above and beyond underlying borrower and loan characteristics. The literature has identified several institutional factors that may influence servicer behavior, including servicer incentives and capacity, mortgage securitization and the associated "pooling and servicing agreements", information asymmetries, and lack of borrower contact (Adelino et al., 2009; Cordell et al., 2010; Eggert, 2007; Gelpern and Levitin, 2009; Levitin and Twomey, 2011; Pikorski et al., 2009).

The first question addressed in the literature is whether investor pooling and servicing agreements, or PSAs, limit a servicers' ability to undertake a loan modification. PSAs are heterogeneous contracts, typically varying by securitization sponsor, yet in general PSAs require servicers to manage the loans held by the trust as if for their own account and maximize the returns to the investor. A loan modification may be more difficult for a servicer to undertake if they need to consider all the different investor interests in a RMBS, especially when there are different tranches of investors with different interests. However, the extent to which securitization influences modification is still unclear. Adelino, Gerardi, and Willen (2009) found no differences in loan modifications between loans held in portfolio and loans in private label securities, while Piskorski, Seru, and Vig (2009) found just the opposite. Agarwal and coauthors (2011) and Been, Weselcouch, Voicu and Murff (2013) have subsequently confirmed Pikorski et al.'s (2009) findings that loans in private-label securities were the least likely to be securitized, though differences in data and methodology across the studies suggest that the debate over the role of securitization in loan renegotiations is

likely to be ongoing.[8]

In addition to potential barriers associated with their obligations under MBS pooling and servicing agreements, a second factor influencing servicer behavior is its compensation structure and source of liquidity. As mentioned earlier, 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.[9] The economics of the modification/foreclosure decision are thus highly dependent upon the cost of a modification and whether and when a modified loan redefaults. If the modified loan redefaults before the servicer has recouped the cost of the modification, then the modification is a money-loser for the servicer. Estimates for the cost of processing a loan modification range from $500 to over $1000 per modification. (Levitin and Twomey, 2011) Non-bank servicers may also face a different cost-benefit calculus than servicers affiliated with despository institutions. For example, Ocwen–the largest non-bank servicer–began aggressively modifying defaulted loans in 2008, including write-downs of principal, in part due to the liquidity squeeze placed on it by servicing advances combined with tightened credit markets (Levitin and Twomey, 2011). By modifying the loans and bringing them out of delinquency, Ocwen was able to reduce its obligation to make servicing advances, which reduced the strains on its liquidity.

A third explanation for servicer heterogeneity may lie in individual servicers institutional response to the foreclosure crisis and rising delinquencies. One option for a servicer is to implement a highly automated process of default management, which allows the servicer firm to keep the costs of managing delinquencies low but may not best serve the interests of the borrower. The practice of 'robo-signing in which servicers employed individuals to

[8]The 2009 amendments to the Truth in Lending Act provide a safe harbor for servicers that modify a distressed loan, as long as that modification maximizes the loan's net present value. In addition, it specifies that the duty to maximize the NPV of the mortgage is a duty owed to all investors, rather than to any one investor in particular, protecting servicers from competiting obligations to different tranches of RMBS investors (Levitin and Twomey, 2011).

[9]As Levitin and Twomey (2011) points out, the way servicers are paid can also create a moral hazard, since servicers may not have the same interests as the investors in the MBS.

sign foreclosure affidavits without reviewing the documents or following established notary practices and legal requirementsis emblematic of this push for automation and efficiency (Levitin and Twomey, 2011). In contrast, other servicers created special divisions to provide a more intensive, 'hands on approach to servicing delinquent loans. These loss mitigation units work with distressed borrowers, often in concert with housing counselors or foreclosure prevention specialists, to pursue a loan modification. Servicers often describe this process as more "art than science, since the outcome of the renegotiation is often in large part shaped by the borrowers ability and willingness to repay the loan; *ex ante*, it is difficult to know whether or not a modification will actually lead to a cure, or whether it merely postpones delinquency. In addition, a significant percentage of loans 'self-cure, meaning that the servicer must also make a judgment as to whether the modification is really necessary for any individual borrower. The extent to which the servicer is willing to invest in staff and time to perfect this "art" may lead to different determinations about the benefits of offering a borrower a modification. In addition, the "science" of the loss mitigation process also matters; differences in modification rates may arise if servicers use different assumptions in calculating the NPV of a loan. While the Treasury department released an NPV model as part of its efforts to streamline modifications, many servicers rely on internal models that may include different assumptions about the anticipated value of properties in six months time, the relative costs of renting versus owning in a particular market (which may influence the likelihood that a borrower decides to strategically default), and the servicers ability to manage and resell REO properties.

All of these factors have material effects for a borrower who is seeking to obtain a loan modification and stay in their home. However, borrowers have very little control over their loan after it is originated; they cannot decide whether their loan will be securitized, who their servicer is (or will be, in case of a mortgage servicing right transfer), or what contractual provisions govern the servicing their loan (Levitin and Twomey, 2011). Indeed, consumer rights regarding loss mitigation are fairly narrow, and the process by which loss mitigation decisions are made are often incredibly opaque not only to the consumer, but also to the housing counselors working with borrowers to resolve their delinquencies. A critical question is whether this servicer heterogeneity is leading to different outcomes for borrowers, and par-

ticularly, for delinquent low-income and minority homeowners. The lack of public data on individual loan modifications, coupled with the fact that most loan performance datasets do not include any information about the borrower with the exception of a FICO score, means that we still have a limited understanding of whether loan modifications help to prevent foreclosures, and for whom.[10] The handful of studies that do exist on loan modifications by borrower type have generally found no differences in the number or nature of loan modifications by race or ethnicity (Ambrose and Capone, 1996; Been et al., 2013; Chan et al., 2014; Collins and Reid, 2010; Mayer and Piven, 2012). A subsequent study conducted by the U.S. General Accounting Office using non-public HAMP data on four servicers did find some differences in the incidence of HAMP modifications across fair lending populations, but these differences were in large part due to differences in servicers' determination of borrower eligibility related to their debt-to-income ratio and the completeness of their modification request (GAO, 2014).

However, very few of these studies focus on loan cures, and more specifically, on the role that servicers play in determining borrower outcomes. In this paper, we seek to address this gap by extending Ding's (2013) analysis of the CTS data and examine whether or not differences in servicer practices lead to different rates of loan cures (not just modifications), as well as the servicing practices that might be able to explain differences in cure rates. In addition, we focus specifically on the experience of low-income and minority homebuyers. While differences in resolution practices among servicers are likely due to a set of complex and inter-related factors, understanding which loss mitigation practices are the most likely to contribute to loan cures, especially for historically underrepresented borrowers, can help to inform policies that seek to develop consistent and effective loss mitigation standards.

[10] In early 2011, Treasury released the first loan level data on the HAMP program. However, 79 percent of active permanent modification records and 82 percent of trial modification records in the data file lack information identifying the race or ethnicity of the borrower. A study by the Urban Institute, cited below, has nevertheless used these data to identify racial differences in modification outcomes.

4. Data Description

This paper uses data downloaded from Corporate Trust Services (CTS), a service of Wells Fargo Bank, N.A. that provides information on a variety of investment vehicles administered by the bank.[11] The CTS data cover privately securitized, subprime and Alt-A 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). 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.

In addition to detailed information on loan terms and performance, the CTS also includes two important fields that make it relevant to our research question. First, the CTS reports include a modification indicator, which represents all formal and permanent loan modifications and equals one for every period after the loan is modified. The reports also have 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. We create eight additional variables to capture the type of modification. First, we determine the percentage change in the interest rate (*Rate Change*), loan balance (*Balance Change*), and monthly payment (*Payment Change*) before and after modification. Second, we construct dummy variables, *Rate Decreased* and *Balance Decreased* that equal one if the rate decreased or the balance decreased, respectively. We further provide an interaction of the two variables to capture loans whose balance and interest rate fell after modification, *Balance and Rate Decreased*. Third, we construct a variable, *months to mod* that equals the number of months between the last 60-day delinquency and the modification. Finally, we determine if any of the loans have undergone a second modification over the period of observation.

Second, the CTS data include loans from over 100 servicers across the country, allowing

[11] These investor report files are available at www.ctslink.com.

us to identify servicer heterogeneity in loan modification practices. To minimize the effect of servicer size or regional variations in loan outcomes, we focus our analysis solely on the top 20 servicers in terms of the number of loans serviced in the data. Each of these servicers represent at least 3,000 loans in our sample, and geographically cover at least 20 states.[12]. We also drop all loans for which the servicer changed, though this is a small subset in the data.[13] The top 20 servicers in our data cover both bank and non-bank servicers, and include 7 out of the 10 largest servicers in terms of market share in 2013. The data also reflect a broad range of servicer quality as ranked by Moody's credit rating services.

The CTS dataset, 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. 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.

The sample for this paper consists of all first-lien mortgages for owner occupied, single family residences originated in 2004, 2005, and 2006 that were at least 60 days delinquent as of June 2009. We drop obsevations that went into bankruptcy during the panel, as well as loans which were prepaid in the first period of observation (June 2009). Loans with an original balance over $1 million are also removed, as they are arguably a different subset of loans.[14] The sample is thus a monthly panel of this set of delinquent loans; we observe monthly changes from June 2009 through December 2012. Data on modifications from the

[12] Collins and Urban (2014) found that state policies can influence servicer behavior; in Maryland, state level reporting requirements for state-chartered servicers led to both more modifications and foreclosure filings than those not subject to the state rules. For this reason, we were hesitant to include servicers operating only in one or two states

[13] However, as we discuss in the conclusion, some of the servicers in our sample were acquired or transferred to other institutions over the observed time period, suggesting that the consolidation of the servicer industry is an important area of future research.

[14] This is less than 0.5 percent of observations.

Office of the Comptroller of the Currency shows that the volume of modifications peaked in early 2010 and then declined throughout 2011 and 2012, meaning that our sample captures the period during which the vast majority of modifications were made/citepGAO2014.

Since loans enter the sample only if they are 60 or more days delinquent in the first period, our main dependent variable of interest is whether or not the given loan exits delinquency and "cures", as opposed to ending in a foreclosure sale. We rely on the CTS data for the measure of foreclosure sales. We create one additional measure, *Resolution* that captures the idea that either outcome–foreclosure or cure–may be better for the investor than a continuing, unresolved delinquency, since delinquent loans without action can also be costly.

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

4.1. Summary Statistics

In the first part of the analysis, we present a series of descriptive statistics that show the high degree of servicer heterogeneity in our data. In Table 1, we present summary statistics for servicers with the "Worst" 5 cure rates (meaning the lowest) and the "Best" 5 cure rates (meaning the highest). Differences in servicer outcomes are immediately apparent; the "Worst" 5 servicers have cure rates of close to 10 percent, whereas the "Best" 5 have cure rates near 38 percent. We also find that these two groups of servicers vary greatly in their propensity to modify a loan. Servicers with higher cure rates perform permanent modifications on almost 48 percent of their delinquent loans at some point in the time frame, while the group of 5 servicers with the lowest cure rates only granted modifications to 2 percent of delinquent borrowers. Conditional on granting a modification, high cure rate servicers are also much more likely to forgive interest and principal, decrease interest rates

by more, and are more likely to modify a loan a second time after the initial modification. However, for both groups of servicers, average principal balance changes are modest, and we do not observe any differences in the number of months between the first 60 day delinquency and the granting of a modification between the two groups.

Table 1 also demonstrates that borrower characteristics do not differ substantially across these two groups of servicers. For example, the "Best" and "Worst" servicers are equally likely to lend to Black, Hispanic, and Asian borrowers. The servicers with higher cure rates actually tend to service a slightly lower income sample (though the lower cure rate servicers just have a higher variance), as well as borrowers with lower credit scores, and slightly lower initial balances (though these are not statistically different from one another at the 10 percent level). Thus, there does not appear to be clear selection into different servicers by specific types of borrowers.

Figure 1 shows the ranking of servicer by cure rates. In the analysis that follows, we retain this cure rate ranking to identify each of the servicers in the data. Servicer_1 has the lowest cure rate, whereas Servicer_{20} has the highest cure rate. The differences in outcomes across servicers is dramatic. Servicer_1 had less than 10 percent of their delinquent loans cure by December 2012, compared to nearly 40 percent for Servicer_{20}.

Figure 2 shows that foreclosure sale rates are equally dispersed across servicers, although interestingly they do not directly correlate with the cure rate rankings. There is a loose, inverse relationship between cure rates and foreclosure sale rates. Servicer_8 forecloses on the highest percentage of delinquent loans, over 60 percent, even though it had a cure rate close to the average (approximately 15 percent). Similarly, Servicer_{13} has the lowest foreclosure sale rate, right around 10 percent, and its cure rate of delinquent loans was near the average of approximately 22 percent. Servicer_1 had the lowest cure rate, but only an average foreclosure sale rate (just over 30 percent), and Servicer_{20} had the highest cure rate and a slightly below average foreclosure sale rate (just under 20 percent). Thus, there is not a direct tradeoff between cure rates and foreclosure sale rates, and there appears to be additional variation in servicer behavior than what can be explained away by borrowers who cure.

However, in Figure 3, we see a direct correlation between servicer-level cure and modification rates. Servicers 1 through 8 have the lowest cure rates, and these servicers are also

the least likely to modify delinquent loans. Among the bottom 8 performing servicers, none modified more than 10 percent of their delinquent loans, and many only modified 1-2 percent. In contrast, servicers 9 through 20 were much more likely to modify delinquent loans in their portfolio. Specifically, Servicer_{20} has the highest cure rate as well as the highest modification rate, modifying nearly 50 percent of delinquent loans. However, this correlation is again not perfect, with a few servicers modifying a higher percentage of loans but not seeing quite as high rates of loan cures.

Figures 4 and 5 present data on the modified loans in the sample to see if there is heterogeneity across servicers in the types of modifications they implement. In Figure 4 Servicer_{20}, with the highest modification and cure rates, offers the most modifications including both interest and principal forgiveness. Figure 4 also shows that the majority of modifications entail interest rate forgiveness; while there is some heterogeneity in the likelihood to offer principal forgiveness, overall servicers seem reluctant to give borrowers this form of relief. However, there does seem to be a correlation between the extent of relief a servicer is willing to provide; in general, servicers with higher rates of interest rate forgiveness were also more likely to give prinicpal reductions, with Servicer_{18} being an exception to the pattern. Figure 5 further outlines Servicer_{18} as an outlier in the distribution, in that this servicer makes smaller changes in ther interest rates than other servicers post modification, yet still sees higher than average cure rates. Figure 5 further outlines that it is not uncommon for servicers to increase loan balances when they decrease the interest rates in a modification package. On average, modified loans experience an iincrease in their loan balance, suggesting that many servicers add unpaid payments onto the unpaid principal of the loan.

5. Empirical Analysis

In our empirical analysis, we explore three key questions. First, we examine the extent to which servicer heterogeneity exists in loan cures, foreclosure sales, or any resolution, after controlling for borrower, loan, and market characteristics. Second, we examine servicer heterogeneity in the likelihood of modifying a loan, and contingent upon modification, whether servicers differ in the amount of relief they are willing to provide. Third, we examine the effect of different kinds of modifcation on loan cures or foreclosure sales. Each of these ques-

tions is examined in a multivariate framework, with the specific models we employ described in more detail below.

5.1. Loan Cures and Foreclosure Sales

For the first question, we chose to use a duration model to assess the relationship between servicer effects and loan cure rates, which allows us to account for the speed of cures, foreclosures, and resolutions based on the servicer. Specifically, we estimate Equation 1, where $Y_{i,s,t,j}$ alternatively equals one if loan i in state s held by servicer j, cures, goes into foreclosure, or reaches a resolution (either cures or forecloses) in month by year combination t and zero otherwise. Servicer_j equals one if the loan is serviced by Servicer_j and zero otherwise. These servicer fixed effects allow us to pick up on any heterogeneity across servicers in cure rates, foreclosure rates, and resolution rates. We leave Servicer_{11} as the excluded servicer since it has the average cure rate demonstrated by Figure 1. This way, coefficients $\beta_1 - \beta 19$ represent the comparison of each servicer to the average servicer.

$$\begin{aligned} logit[\lambda(Y_{i,s,t,j})] = \alpha_0 + \sum_{j=1}^{10} \beta_j \text{ Servicer}_j + \sum_{j=12}^{20} \beta_j \text{ Servicer}_j \\ + \boldsymbol{\gamma X_i} + \delta \text{ HPI}_{i,t} + \eta_s + \kappa_t + \epsilon_{i,s,t,j} \end{aligned} \tag{1}$$

The vector $\boldsymbol{X_i}$ includes borrower and loan-level characteristics at the time of origination. These include: FICO score, number of months delinquent in the first period of observation, ln(original balance), race dummies, ln(income), a no documentation dummy, a refinance dummy (vs. new purchase), a prepayment penalty dummy, and an adjustable rate mortage (ARM) indicator. We also develop a measure of house price changes for each loan based on Zillow's monthly zip-code level HPI measures, where we use the change in prices between origination and the current period as a measure of local house price changes and their effect on the equity position of the borrower. This variable, $\text{HPI}_{i,t}$, has the advantage of not relying on a given average price measure at a particular time period but focuses instead on relative prices. We also include state-leve fixed effects, η_s, to control for any state-level variation in policies or legislative procedures, such as judicial vs. non-judicial states. Finally,

we include origination year dummies κ_t to control for any differences in the environment in which the loan was initiated, especially as it may be correlated with selection into servicers.

We run this model six times; first, we present results for the entire sample of loans, and include controls for race and ethnicity as well as income. We then stratify the sample into five separate buckets - four representing the major racial and ethnic groups in our data, and one focusing specifically on low-income households. We coded the race and ethnicity variables in the HMDA data as "Black\African American," "Hispanic\Latino," and "Asian\Hawaiian\Pacific Islander,"[15] and "Non-Hispanic White." Low-income households are designated as those borrowers with an income of less than 80 percent of their area median at origination. To test for robustness and to see if results would change with a different model specification, we also ran a series of linear probability models (LPM), and added month by year fixed effects to account for any differences in the probability of curing or foreclosing in a given time period. These results provide comparable findings to those of the duration model in Equation 1, so we present only the hazard in the paper for simplicity of exposition. However, the LPM models are included in the Appendix.

Table 2 presents the results from Equation 1, where we show the hazard rates on the likelihood that a loan cures for each of the servicers in our sample. Again, Sericer_{11}, the average cure rate, is the excluded group. Servicer_1- Servicer_{20} are ranked based on their cure rates, where 1 is the lowest (less than 10 percent of delinquent loans cured) and 20 is the highest (just under 40 percent of delinquent loans cured). Column (1) reports results for the full sample. Interestingly, once we control for a wide range of borrower, loan, and market characteristics, there is no longer a monotonic relationship between a servicers ranking and their loan cure rates. While in the descriptive statistics, Servicer_1- Servicer_{10} all had lower cure rates than Sericer_{11}, in the model, only Servicer_5 and Servicer_{17} have hazard rates under 1, meaning that these have lower probabilities of curing than Servicer_{11}. The remaining servicers, after controlling for other factors that may be correlated with servicer practices as well as cure rates, actually are more likely to cure than Servicer_{11}. In addition, the model highlights the degree of heterogeneity across servicers in their cure rates; some servicers are

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

more than 2.5 times as likely to cure than our excluded servicer. These results cannot be explained away by any observable controls or fixed effects.

In Columns (2)-(5) of Table 2, we replicate the analysis in Column (1) but we split the sample by the race of the borrower as identified in the HMDA data. Note that some servicers do not hold enough minority loans to identify servicer effects in cure rates for these subsamples (e.g. Servicer_{12} and Servicer_{16} for African Americans and Servicer_{6} for Asian borrowers), so the coefficients in the table are left blank. Again, the variation in cure rates across servicers is striking, and some servicers appear to perform much better for minorities than others. Servicer_{6}, for example, while falling below average in descriptive cure rates, appears to be very effective in providing relief to African American borrowers, while Servicer_{17} performs worse than average after adding in controls. With the exception of the Asian subsample in Column (4), only Servicer_{5} and Servicer_{17} have a lower propensity to cure than Servicer_{11}. However, consistent with studies that have examined the incidence of modification by race and ethnicity (Been et al., 2013; Chan et al., 2014; Collins and Reid, 2010), we do not find that cure rates within a servicer are significantly higher for white borrowers than for African American or Latino borrowers. In other words, while there are different outcomes for borrowers across servicers, for the most part, cure rates within servicers are consistent across racial and ethnic demographic groups. Column (6) of Table 2 shows the results for low income borrowers, finding heterogeneity across servicers in terms of cures, but to a lesser extent than in the racial and ethnic stratifications.

Table 3 replicates the analysis presented in Table 2, but this time we focus on foreclosure sales as our dependent variable. It should be noted that Servicer_{11} has the second lowest foreclosure sale rate (less than 10 percent of delinquent loans), represented in Figure 2. Thus, for these results, we compare other servicers to a low foreclosure sale rate. When compared with Servicer_{11}, only Servicer_{5} is less likely to undertake a foreclosure sale once we control for other borrower-level, loan-level, and state-level factors. This is consistent across subsamples, though there is some evidence that several servicers foreclose faster for some subgroups than others. For example, Servicer_{10} has a higher relative rate of foreclosure for African Americans than Whites, and Servicer_{13} has a higher relative rate of foreclosure for African Americans than Latinos. Similarly, Servicer_{17} has a higher relative rate of foreclosure

for Asian borrowers than African American borrowers, and Servicer_{18} has a higher relative rate of foreclosure for White borrowers than Latino borrowers. Similarly, Column (6) reports that some heterogeneity in foreclosure rates exists for servicers holding loans from low income borrowers, though again it appears that servicers are less statistically different from one another in this subsample. The wide variation in coefficients for low-income borrowers may in part be due to the fact that if a low-income family is delinquent because of job loss and insufficient income, it is very difficult to undertake a modification, thereby increasing the likelihood that delinquency will result in a foreclosure sale.

Table 4 combines information from Tables 2 and 3, where the dependent variable of interest is now equal to one if any resolution is reached, whether this is a cure or a foreclosure. We continue to keep Servicer_{11} as our excluded servicer. In this model, only Servicer_5 is slower to reach a resolution, showing that Servicer_{11} has a "do nothing" type of approach. Again, heterogeneity exists across subsamples in Columns (2)-(6). This shows that servicers implement different strategies in dealing with delinquent borrowers. The analysis also shows that merely ranking servicers based on their outcomes, without considering the characteristics of the loans that they are servicing, may not be the best measure of performance when it comes to loan cures or resolutions.

5.2. Modifications

We next seek to understand how servicers vary in their choice to grant modifications to borrowers, and what types of modifications they are willing to undertake. We estimation Equation 2 (a modified version of Equation 1 using a linear probability model. In addition to all the control variables included in the previous model, in this specification we also include $\lambda_{m,y}$, month by year fixed effects.[16] The dependent variable is if the loan was modified at some point between June 2009 and December 2012.

$$\begin{aligned} Y_{i,s,t,j} = \alpha_0 + \sum_{j=1}^{10} \beta_j \text{ Servicer}_j + \sum_{j=12}^{20} \beta_j \text{ Servicer}_j \\ + \boldsymbol{\gamma X_i} + \delta \text{ HPI}_{i,t} + \eta_s + \kappa_t + \lambda_{m,y} + \epsilon_{i,s,t,j} \end{aligned} \tag{2}$$

[16] If we instead model this as a hazard similar to Equation 1 we obtain comparable results.

Table 5 represents the results from estimating Equation 2, where we continue to use Servicer_{11} (Servicer_{11} has the average modification rate, near 20 percent) as the excluded servicer. In comparison to the hazard model, the interpretation of these coefficients depend on the sign - a negative coefficient means that a servicer is less likely than Servicer_{11} to grant a modification, and a postive coefficient means that the servicer is more likely to do so. Again, we find that analyzing modification rates in a multivariate framework is important for tracking servicer behavior. We find that only Servicer_6 is less likely to perform modifications than the excluded servicer, further emphasizing Servicer_{11}'s "hands off" approach to delinquent loans. Further, consistent with previous studies (Agarwal et al., 2013; Collins and Herbert, 2009; Ding, 2013), we find that even after controlling for a wide range of factors, there is a substantial degree of variation in servicers' willingness to provide modifications.

This heterogeneity across servicers continues to exist for race-based subsamples. To provide just one example, for African American borrowers, working with Servicer_4 increases the likelihood of receiving a modification by 46 percent in comparison to those working with Servicer_{11}. In contrast, Latinos are more likely to receive a modification if their loan is being servied by Servicer_8 or Servicer_{12}. For Asian borrowers, the variation across servicers is less dramatic, though there are more servicers who are less likely to provide a modification. As with cures, we also do not find evidence that there are systemically different modification rates for African American, Latino or Asian borrowers within the same servicer. On average, if a servicer is more likely to grant a modification, they are more likely to do so for all borrowers. Servicer heterogeneity is also less pronounced with low-income borrowers, suggesting that there are perhaps more systematic ways to decide whether or not to provide modifications for these borrowers, such as the HAMP income guidelines.

In Table 6, we present the results from our analysis of the types of modification that different servicers are willing to grant. In this analysis, we restrict the analysis to loans that were modified, and observe the loan changes cross-sectionally at the time of modification. We use the eight variables discussed in the data section to determine if some servicers vary in the types of modifications they offer, conditional on observable characteristics. Specifically, we estimate a modified version of Equation 2, where we remove month by year fixed effects,

and revise $\text{HPI}_{i,t}$ to be the change in house prices from origination to the first period of modification. We remove Servicers 1, 8, and 17 since these did not perform enough modifications to evaluate the distribution of renegotiated terms.

Interestingly, even among servicers who are willing to extend relief, we find considerable heterogeneity in the types of relief that they provide. For example, in Column (1) of Table 6, we find that five servicers (2, 4, 6, 13, and 14) reduced borrowers' interest rates by less than Servicer_{11} as part of a modification, while five servicers (10, 12, 15, 16, and 18) provided borrowers with more relief. The remainder of servicers were not statistically different from one another in their reduction of interest rates pre- and post-modification. Column (2) reports that 6 servicers decreased the balance after modification by more than Servicer_{11}, while 2 increased the balance after modification by more. In Column (3) we next turn to changes in monthly payment before and after modification, where 10 servicers differed from Servicer_{11} (and each other), with eight decreasing payments by more than Servicer_{11}. The continued presence of strong heterogeneity across interest rate and payment changes is interesting given the presence of HAMP, which provides clear modification guidelines and should in theory be nudging all servicers, when they do a modification, to offer a modification aligned with the HAMP guidelines.

Columns (4) and (5) of Table 6 look at servicers' decisions to forgive principal and interest, respectively. Here there appears to be somewhat less degree of servicer heterogeneity but still significant differences across a handful of servicers in the likelihood that a modification entails either a interest rate or principal change. Interestingly, there seems to be some differences within servicers in terms of what kind of relief they provide. For example, while Servicer_{15} is more likely to do both interest rate and principal forgiveness than Servicer_{11}, Servicer_{18} is more likely to give an interest rate reduction (and by more), but less so when it comes to principal forgiveness. Thus, there is likely a divide between servicers in their inclination to provide interest versus principal forgiviness. Column (6) of Table 6 shows that most servicers take approximately the same amount of time to modify a loan. Servicer_{11} approximates the average of 10 months from delinquency to a permanent modification; at the extreme ends, Servicer_{2} and Servicer_{14} take on average seven months longer, and Servicer_{4} is about five months quicker on average. The final column of Table 6 shows that a handful of servicers

appear to be more willing to extend a second modification than Servicer_{11}. Interestingly, despite having the strongest cure rates in the descriptive statistics, Servicer_{20} does not appear to be more aggressive in terms of its willingness to work with borrowers after controlling for a wide range of characteristics. In contrast, Servicer_{18} and Servicer_{19} do seem to rise to the top in the extent of the relief they provide; however, interestingly, neither places as much emphasis on principal reductions.

5.3. The Impact of Modifications on Borrower Outcomes

Our final question is whether servicer heterogeneity in modifications leads to different outcomes for borrowers. Again, focusing on the universe of modified loans, we examine whether or not the terms of the modification influence (1) the likelihood of re-default 12 months after the modification and (2) the likelihood of a foreclosure sale, also a year after modification. We include all of the controls from Table 6 except for the servicer dummies.

Table 7 reports the results for re-default after modification. In Column (1) we find that a 10 percent decrease in the borrower's interest rate decreases re-default by 2.9 percent.[17] Similarly, Column (2) reports that a 10 percent increase in balance post modification results in a decrease in re-default by 0.5 percent. While this may seem counter-intuitive, the effect is small in magnitude, and it shows the relationship between interest rate and loan balance. Borrowers who see their balance increase by more likely received larger interest rate reductions, thereby increasing the affordability of the loan even if the amount owed is increased over the long-term. Indeed, the importance of affordability in predicting the success of a modification is shown in Column (3), where we find that a 10 percent decrease in a borrower's monthly payment decreases the probability of default by approximatley 3.7 percent.

Next, we look at rate changes and balance changes expressed as dummy variables, disregarding the amount of the relief. In Columns (4)-(5), we find that a modification that drops the interest rate increases the likelihood that a loan cures by approximately 10 percent.

[17]For example, reducing the interest rate by 10 percent (i.e. an interest rate moving from 10 percent before modification to 9 percent after modification) reduces the likelihood of re-default by approximately 2.9 percent.

While balance decreases appear to have no statistically significant effect on re-default rates in Column (4), we add an interaction term in Column (5) that captures loans where both balances and interest rates fell. In Column (5), we find that decreasing the current balance of the loan after modification actually increases the probability of re-default by 17 percent, when done in a vaccuum. However, when paired with an interest rate decrease, borrowers are 15 percent less likely to re-default. Thus, performing both a balance decrease and an interest rate decrease (the additive effect of the three coefficients reported) wipes out the effect of just reducing balances on their own and ends up having a comparable effect to just reducing the interest rate.

Column (6) reports that taking more time to modify the loan actually decreases the rate of re-default. This effect is very small in magnitude, where one additional month between initial 60-day delinquent status and modification reduces the probability of re-default by less than 2 percent. This could be because servicers spend more time crafting the proper modification package for the borrower. This could also give servicers time to collect information on the borrower. However, it may be the case that some of these started with temporary modifications, which we do not observe.

In Table 8 we look at the different types of modifications and see if they influence foreclosure sale rates. Across all specifications, the type of modification does not help determine the probability of foreclosure conditional on modifications. We posit two explanations for this. First, it is possible that the borrowers who would have foreclosed anyway would not have benefited from any type of modification. Second, we may have two short of a time frame to see many foreclosures, in that we look only one year post modification.

6. Conclusion

In an article published before the subrpime crisis, Michael LaCour-Little (2000) cites a quotation by Mozilo, then the Chief Executive Officer of Countrywide, as saying "There are really only two important people in the mortgage process: the borrower and the investor. Everyone else, including lenders, are just friction." In this paper, we have shown that the "friction" of mortgage servicing significantly shapes outcomes for delinquent borrowers. We find that the "Worst" 5 servicers have cure rates of close to 10 percent, whereas the "Best"

5 have cure rates near 38 percent. These differences across servicers are not explained away by borrower, loan, or market characteristics when we examine servicer practices in a multivariate framework; indeed, across the models, the recurring theme is that there are persistent differences across servicers in all forms of relief and borrower outcomes.

A second important finding in this paper is that despite federal efforts to streamline modifications, there remain significant differences in both the scale and depth of modification efforts undertaken by the servicers in our sample. We find that servicers vary greatly in their propensity to modify a loan. Servicers with higher cure rates perform permanent modifications on almost 48 percent of their delinquent loans, while servicers with the lowest cure rates only granted modifications to 2 percent of delinquent borrowers over the course of our study period. In addition, even with HAMP affordability guidelines, servicers vary significantly in both the likelihood that a modification entails either interest rate or principal forgiveness, as well as the depth of the relief.

We also find that there is a strong correlation between the granting of a modification and loan cures; in particular, loan modifications that address borrowers' affordability constraints significantly reduce the likelihood of re-default one year after modification. Contrary to some other studies, we try and tease out the interplay between interest rate and principal forgiveness. We find that interest rate forgiveness - which focuses on the affordability of monthly payments - reduces re-default one year after modification by about 10 percent, however, when coupled with with prinicpal forgiveness–which focuses on equity position–the effect is even stronger. We find less of an effect of principal forgiveness on its own, possibly due to the fact that a principal reduction that doesn't address short-term affordability constraints may not help the borrower keep their home.

With respect to borrowers of color, while we find significant cross-servicer heterogeneity in outcomes (as we do for the sample as a whole), it does not appear from this analysis that within their own servicing portfolio, individual servicers treat African American, Latino or Asian borrowers differently from their White counterparts.

Although it is still possible that these differences are due to undisclosed private information that servicers have about borrower credit worthiness, the wide range of controls in our models mean that servicer heterogeneity cannot be explained by observed differences in the

risk profile of borrowers, the mix of loans being served, or variations in the market. This has important implications for public policy, especially given the fact that borrowers have very little control over their loan after it is originated; they cannot decide whether their loan will be securitized, who their servicer is (or will be, in case of a mortgage servicing right transfer), or what contractual provisions govern the servicing their loan (Levitin and Twomey, 2011). Interestingly, we do not find that the "specialty" servicers in our sample are universally better or worse than the bank-owned servicing arms. Future research should attempt to tease out how and why servicing practices are so heterogenous even within a class of servicer, as well as the effect of policies and legal actions like the National Mortgage Settlement on borrower outcomes.

The findings in this paper suggest that programs such as HAMP are insufficient to ensure consistent practices across servicers. Recognizing the importance of the role of mortgage servicing, the CFPB recently issued rules which include improvements in borrower communication and disclosure, specific obligations to respond to borrower requests for information within specified timeframes, rules related to early intervention with delinquent borrowers and a single point of contact, and a prohibition on 'dual tracking.'[18] While these are a step in the right direction, the government needs to make sure that all similarly situated borrowers receive consistent treatment, regardless of who their servicer is. Additional transparency in the servicing world and how servicers make their loss mitigation decisions would help reveal which practices are the most effective at keeping borrowers in their homes.

[18]Effective January 2014, the CFPB's Mortgage Servicing Rules, 12 C.F.R. §§1026 & 1024, is a collection of nine separate rules, exceeding 1,100 pages.

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7. Tables and Figures

Table 1: Summary Statistics by Best 5 and Worst 5 Servicers in terms of Cure Rates

	Worst 5 Cure Rates		Best 5 Cure Rates		Total	
	mean	sd	mean	sd	mean	sd
Cure rate	.1040035	.305266	.3810868	.4856555	.2364666	.4249126
Loan Modified	.0219662	.1465736	.4751591	.4993843	.2386206	.426241
Forgave Principal	.0024329	.0492646	.0886764	.2842771	.0436627	.2043438
Forgave Interest	.0149095	.1211912	.4234746	.4941109	.2102291	.4074719
Rate Change	-.3643176	.2245239	-.4251008	.2629896	-.4208537	.2609022
Balance Change	-.0250217	.3590776	-.0074581	.3142426	-.0086859	.3175235
Months to Mod	9.471154	2.401516	10.17795	1.669014	10.11537	1.757163
Second Mod	.0186441	.1352788	.2543195	.4354805	.2423784	.4285243
Black	.1523595	.3593702	.1792192	.3835374	.164803	.3710034
Hispanic	.3101185	.4625436	.293847	.4555246	.3025803	.459376
Asian	.0518245	.2216733	.0371446	.1891168	.0450236	.2073564
Income	102390.1	116167.7	89337.83	73969.71	96151.79	98502
Fico Score	639.1247	65.08009	593.1428	82.06005	617.144	77.1835
Original Balance	276630.7	172429.1	247414.7	149763.1	262663.6	162645.3

Notes: Forgave Principal, Forgave Interest, Rate Change, Balance Change, and Months to Mod are all conditional on modification. Months to Mod is the time between first 60-day delinquency and modification.

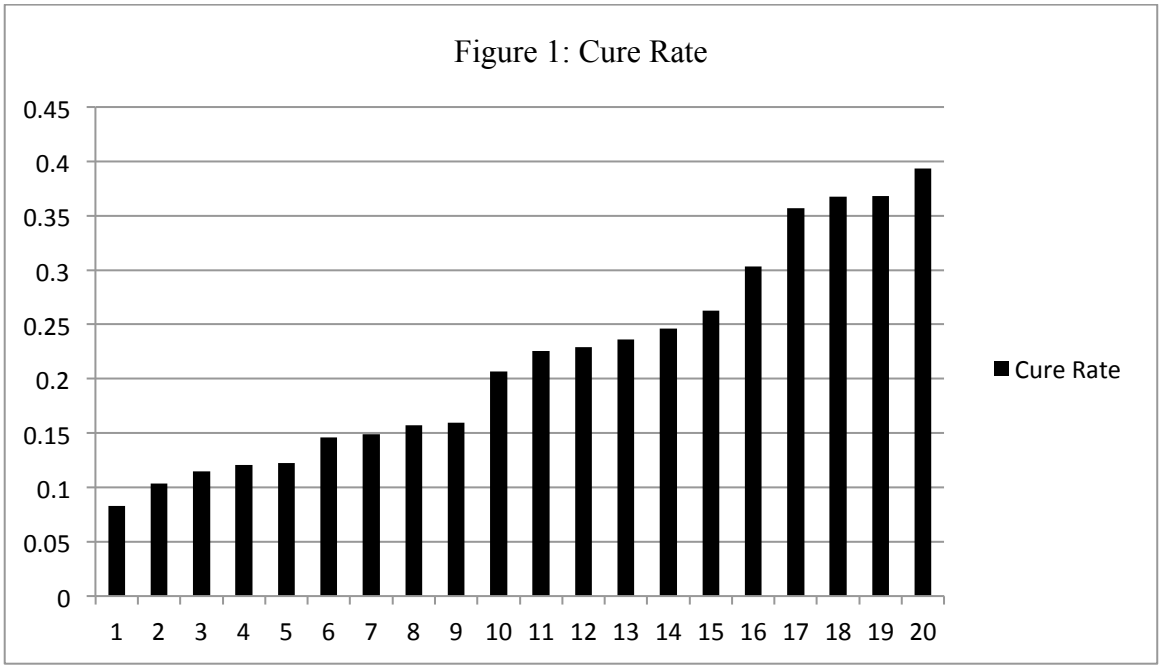
Figure 1: Cure Rate
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Cure Rate

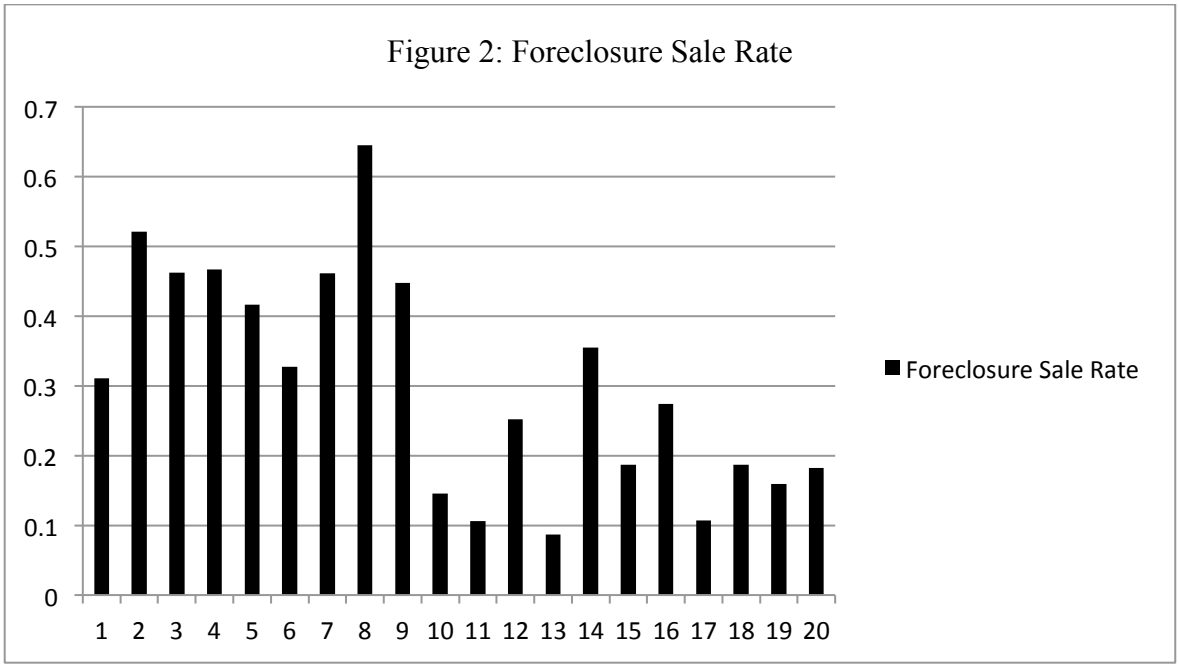
Figure 2: Foreclosure Sale Rate
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Foreclosure Sale Rate

Figure 3: Servicer Mod Rate

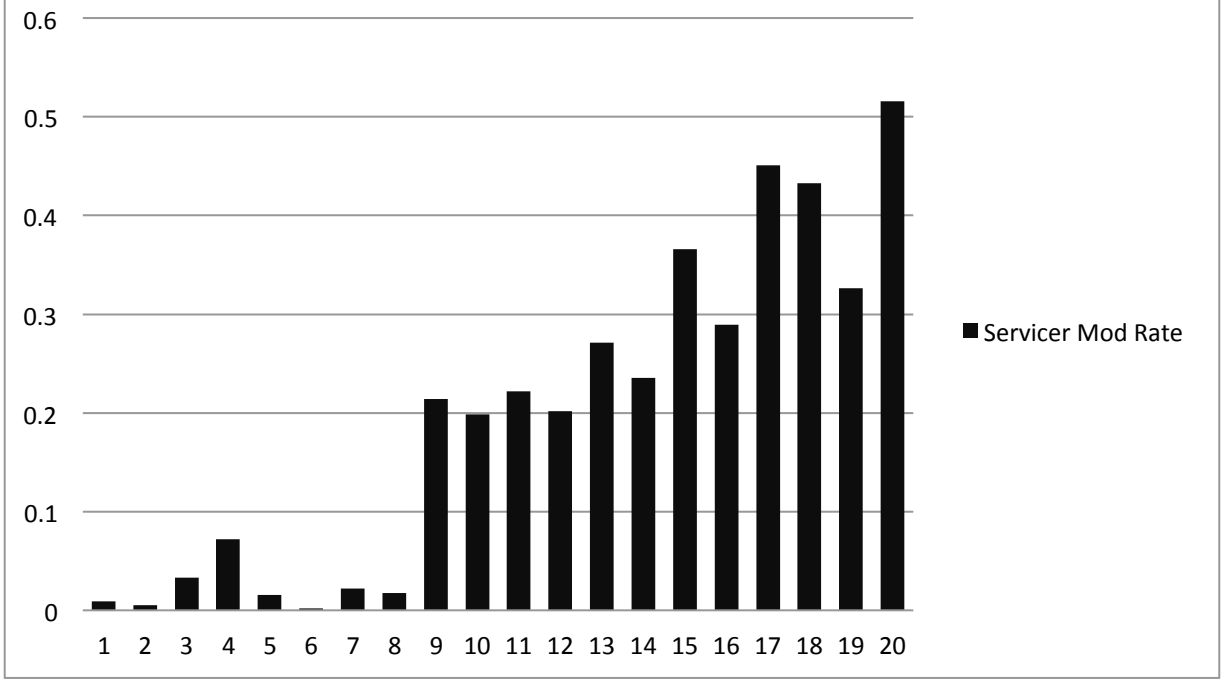

Figure 4: Principal and Interest Forgiveness

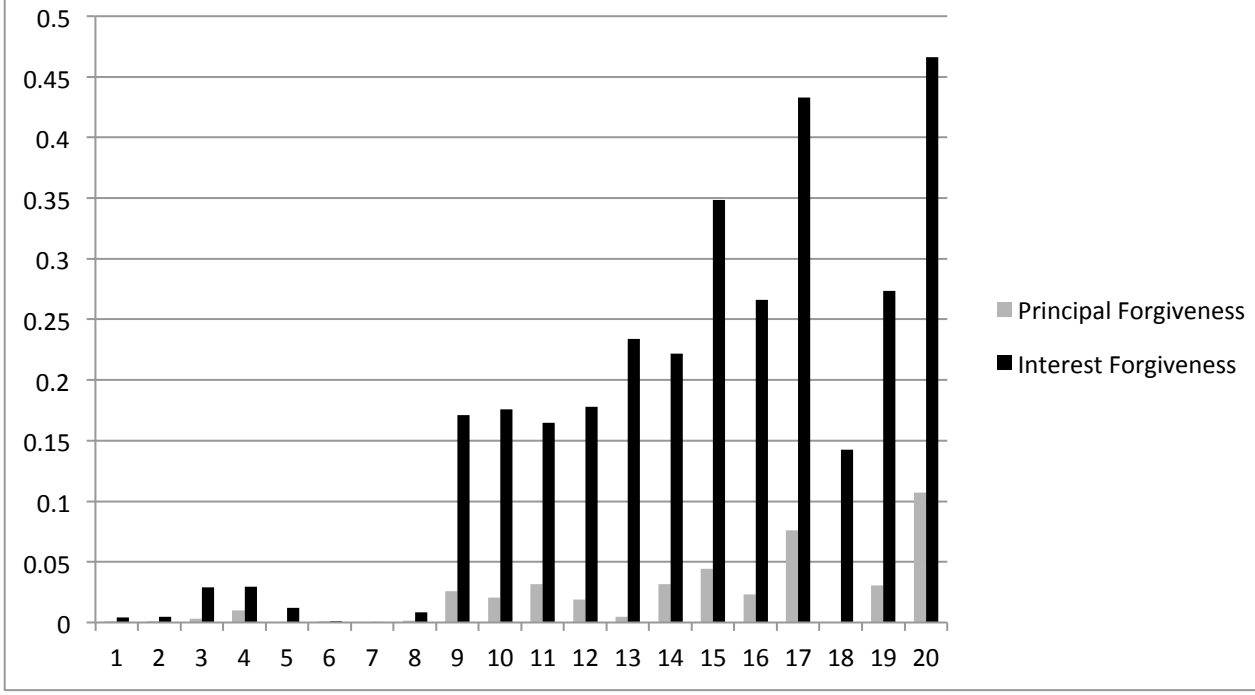

Figure 5: Balance and Rate Changes Post Mod

Table 2: Hazard: Servicer Heterogeneity Exists in Cure Rates

Dependent Variable =1 if loan was cured						
	Full Sample	Black	Hispanic	Asian	White	Low Income
	(1)	(2)	(3)	(4)	(5)	(6)
Servicer 1	1.207**	1.577*	0.934	1.669*	1.328**	0.519
	(0.101)	(0.398)	(0.152)	(0.471)	(0.153)	(0.256)
Servicer 2	1.185**	1.463	0.974	1.772*	1.320**	0.914
	(0.0942)	(0.372)	(0.150)	(0.528)	(0.148)	(0.442)
Servicer 3	1.959***	1.817**	1.991***	6.262***	1.840***	1.906
	(0.179)	(0.437)	(0.365)	(2.082)	(0.226)	(0.814)
Servicer 4	1.468***	1.422	1.518**	1.830*	1.512**	4.205***
	(0.145)	(0.563)	(0.264)	(0.621)	(0.249)	(1.289)
Servicer 5	0.800***	0.586**	0.740*	1.429	0.819*	0.658
	(0.0654)	(0.129)	(0.122)	(0.426)	(0.0935)	(0.195)
Servicer 6	1.009	4.815***	0.619		0.973	1.219
	(0.222)	(1.311)	(0.358)		(0.241)	(0.706)
Servicer 7	2.647***	2.182***	2.595***	6.185***	2.766***	1.982**
	(0.259)	(0.578)	(0.508)	(2.236)	(0.370)	(0.593)
Servicer 8	1.534***	1.211	1.789***	4.649***	1.388**	2.203*
	(0.168)	(0.330)	(0.340)	(1.641)	(0.225)	(1.015)
Servicer 9	1.728***	1.909***	1.633***	2.687***	1.722***	1.058
	(0.157)	(0.408)	(0.286)	(1.000)	(0.227)	(0.459)
Servicer 10	1.143	1.468	0.648	1.999	1.520**	0.422
	(0.159)	(0.480)	(0.178)	(0.922)	(0.274)	(0.323)
Servicer 12	1.077		1.988	0.991	1.188	1.116
	(0.218)		(0.931)	(0.600)	(0.268)	(0.385)
Servicer 13	1.790***	1.934***	1.809***	2.672***	1.720***	1.664**
	(0.135)	(0.361)	(0.275)	(0.802)	(0.180)	(0.416)
Servicer 14	1.267***	1.012	1.369*	2.402**	1.255*	0.882
	(0.106)	(0.197)	(0.230)	(0.915)	(0.149)	(0.234)
Servicer 15	1.306***	1.190	1.258	2.749***	1.311***	1.161
	(0.0936)	(0.213)	(0.183)	(0.781)	(0.129)	(0.267)
Servicer 16	1.248		2.294***	1.290	1.321*	
	(0.287)		(0.345)	(0.370)	(0.195)	
Servicer 17	0.621***	0.570***	0.543***	0.968	0.653***	0.420***
	(0.0488)	(0.115)	(0.0857)	(0.302)	(0.0713)	(0.131)
Servicer 18	1.640***	1.357	1.496**	3.334***	1.787***	1.326
	(0.141)	(0.311)	(0.250)	(1.120)	(0.213)	(0.370)
Servicer 19	2.732***	2.818***	2.516***	5.621***	2.624***	2.053**
	(0.237)	(0.569)	(0.461)	(1.986)	(0.314)	(0.623)
Servicer 20	1.658***	1.324	1.694***	2.527***	1.718***	1.392
	(0.130)	(0.251)	(0.264)	(0.870)	(0.189)	(0.368)
Observations	120523	20788	36708	6799	54756	6770

Hazard rates presented, Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Controls include: state dummies, origination year dummies, ARM indicator, change in HPI since origination, months delinquent as of June 2009, ficoscore, ln(original balance), a no documentation dummy, refinance (vs. initial purchase) dummy, prepayment penalty dummy. Excluded servicer is Servicer 11–the average cure rate (0.225). Models (1) and (6) also include race, Models (1)-(5) also include ln(income). Column (6) restricts the sample to those less than 80% of AMI at origination.

Table 3: Hazard: Servicer Heterogeneity Exists in Foreclosure Sale Rates

Dependent Variable =1 if foreclosed						
	Full Sample	Black	Hispanic	Asian	White	Low Income
	(1)	(2)	(3)	(4)	(5)	(6)
Servicer 1	1.557***	1.306	1.632**	1.747	1.509**	1.198
	(0.176)	(0.591)	(0.327)	(0.668)	(0.248)	(0.627)
Servicer 2	1.071	1.572	0.757	1.272	1.366**	3.088***
	(0.114)	(0.511)	(0.147)	(0.521)	(0.205)	(1.237)
Servicer 3	3.113***	3.828***	2.896***	3.863***	3.162***	6.601***
	(0.308)	(1.120)	(0.507)	(1.510)	(0.443)	(2.764)
Servicer 4	1.555***	1.859*	1.507**	1.643	1.652***	1.58e-19
	(0.179)	(0.655)	(0.289)	(0.698)	(0.306)	(.)
Servicer 5	0.654***	0.427***	0.618**	0.712	0.734**	0.646
	(0.0687)	(0.135)	(0.119)	(0.268)	(0.112)	(0.309)
Servicer 6	2.846***	1.11e-17***	2.613***		3.034***	12.66***
	(0.571)	(1.16e-17)	(0.919)		(0.813)	(9.321)
Servicer 7	2.712***	2.985***	1.902***	3.975***	3.196***	1.873
	(0.288)	(0.848)	(0.382)	(1.663)	(0.477)	(0.783)
Servicer 8	1.322**	1.444	1.213	2.023	1.413*	3.096**
	(0.188)	(0.544)	(0.310)	(1.129)	(0.295)	(1.470)
Servicer 9	2.637***	2.946***	2.348***	2.718***	2.853***	4.292***
	(0.264)	(0.720)	(0.408)	(1.022)	(0.470)	(1.574)
Servicer 10	2.100***	4.667***	1.428	2.015	2.355***	3.858*
	(0.375)	(1.452)	(0.471)	(2.203)	(0.539)	(3.135)
Servicer 12	1.367		1.787*	1.238	1.363	1.497
	(0.323)		(0.596)	(1.002)	(0.399)	(1.136)
Servicer 13	2.495***	3.074***	2.050***	2.816***	2.764***	2.823***
	(0.221)	(0.706)	(0.330)	(1.009)	(0.352)	(0.970)
Servicer 14	0.991	0.888	1.087	1.439	1.025	0.894
	(0.112)	(0.246)	(0.216)	(0.859)	(0.172)	(0.366)
Servicer 15	1.570***	1.740**	1.407**	1.751	1.652***	1.698
	(0.137)	(0.396)	(0.225)	(0.647)	(0.207)	(0.570)
Servicer 16	1.195		1.11e-19	2.175**	1.024	
	(0.515)		(.)	(0.799)	(0.570)	
Servicer 17	2.052***	2.237***	1.726***	2.952***	2.150***	1.916
	(0.195)	(0.547)	(0.298)	(1.084)	(0.299)	(0.795)
Servicer 18	1.955***	2.307***	1.530**	2.063*	2.365***	2.888***
	(0.184)	(0.554)	(0.260)	(0.852)	(0.322)	(0.964)
Servicer 19	3.717***	4.264***	3.212***	2.430*	4.098***	4.836***
	(0.349)	(1.018)	(0.545)	(1.195)	(0.564)	(1.634)
Servicer 20	1.458***	1.512	1.316	1.717	1.537***	1.712
	(0.142)	(0.387)	(0.232)	(0.703)	(0.218)	(0.641)
Observations	122272	22448	35127	6239	56800	7660

Hazard rates presented. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Controls include: state dummies, origination year dummies, ARM indicator, change in HPI since origination, months delinquent as of June 2009, ficoscore, ln(original balance), a no documentation dummy, refinance (vs. initial purchase) dummy, prepayment penalty dummy. Excluded servicer is Servicer 11–the average cure rate (0.225). Models (1) and (6) also include race, Models (1)-(5) also include ln(income). Column (6) restricts the sample to those less than 80% of AMI at origination.

Table 4: Hazard: Servicer Heterogeneity Exists in Time to Resolution

Dependent Variable =1 if foreclosed or cured						
	Full Sample	Black	Hispanic	Asian	White	Low Income
	(1)	(2)	(3)	(4)	(5)	(6)
Servicer 1	1.442***	1.493	1.365*	1.654*	1.523***	1.097
	(0.119)	(0.417)	(0.218)	(0.463)	(0.174)	(0.442)
Servicer 2	1.125	1.482*	0.953	1.211	1.326***	2.394***
	(0.0842)	(0.354)	(0.134)	(0.352)	(0.140)	(0.736)
Servicer 3	2.291***	2.521***	2.377***	4.121***	2.204***	3.131***
	(0.194)	(0.569)	(0.383)	(1.202)	(0.254)	(1.094)
Servicer 4	1.715***	1.710	1.707***	1.994**	1.976***	2.632***
	(0.156)	(0.587)	(0.279)	(0.679)	(0.275)	(0.764)
Servicer 5	0.750***	0.582***	0.739**	1.022	0.779**	0.745
	(0.0566)	(0.120)	(0.112)	(0.282)	(0.0825)	(0.221)
Servicer 6	1.623***	3.786***	1.355		1.601*	6.617***
	(0.282)	(1.019)	(0.288)		(0.397)	(3.566)
Servicer 7	2.427***	2.322***	2.334***	3.684***	2.527***	2.308***
	(0.198)	(0.557)	(0.355)	(1.160)	(0.295)	(0.636)
Servicer 8	1.549***	1.269	1.841***	3.112***	1.466***	2.076**
	(0.153)	(0.339)	(0.330)	(1.111)	(0.213)	(0.755)
Servicer 9	2.109***	2.320***	2.154***	2.355***	2.130***	2.983***
	(0.174)	(0.464)	(0.329)	(0.746)	(0.258)	(1.041)
Servicer 10	1.267*	2.097**	0.818	2.148	1.561***	0.662
	(0.174)	(0.679)	(0.218)	(1.266)	(0.251)	(0.423)
Servicer 12	1.094		2.648***	0.686	1.099	1.178
	(0.238)		(0.717)	(0.597)	(0.232)	(0.664)
Servicer 13	1.985***	2.444***	1.892***	2.441***	1.996***	2.469***
	(0.138)	(0.428)	(0.261)	(0.693)	(0.195)	(0.600)
Servicer 14	1.231***	1.055	1.412**	1.873*	1.227*	1.070
	(0.0969)	(0.199)	(0.215)	(0.637)	(0.140)	(0.277)
Servicer 15	1.402***	1.413**	1.396**	2.021**	1.409***	1.463*
	(0.0921)	(0.242)	(0.184)	(0.553)	(0.128)	(0.332)
Servicer 16	1.494**		1.821***	2.016**	1.309	
	(0.236)		(0.248)	(0.571)	(0.342)	
Servicer 17	1.628***	1.335	1.989***	3.626***	1.454***	0.932
	(0.135)	(0.297)	(0.300)	(0.999)	(0.174)	(0.386)
Servicer 18	1.699***	1.687***	1.592***	2.613***	1.861***	1.969***
	(0.128)	(0.335)	(0.227)	(0.826)	(0.199)	(0.506)
Servicer 19	3.569***	3.837***	3.383***	3.927***	3.716***	5.016***
	(0.259)	(0.690)	(0.486)	(1.285)	(0.394)	(1.158)
Servicer 20	1.803***	1.630***	1.927***	2.381***	1.796***	1.874***
	(0.128)	(0.296)	(0.270)	(0.732)	(0.178)	(0.446)
Observations	87146	15335	26047	4736	39974	4877

Hazard rates presented. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Controls include: state dummies, origination year dummies, ARM indicator, change in HPI since origination, months delinquent as of June 2009, ficoscore, ln(original balance), a no documentation dummy, refinance (vs. initial purchase) dummy, prepayment penalty dummy. Excluded servicer is Servicer 11–the average cure rate (0.225). Models (1) and (6) also include race, Models (1)-(5) also include ln(income). Column (6) restricts the sample to those less than 80% of AMI at origination.

Table 5: LPM: Servicers Heterogeneity Exists in Probability of Modifying

Dependent Variable =1 if loan was modified						
	Full Sample	Black	Hispanic	Asian	White	Low Income
	(1)	(2)	(3)	(4)	(5)	(6)
Servicer 1	0.0511*	0.108**	-0.00694	-0.0835	0.0895***	0.0227
	(0.0285)	(0.0520)	(0.0218)	(0.0709)	(0.0245)	(0.0898)
Servicer 2	0.0483**	0.0861*	-0.00385	-0.109**	0.0846***	0.0279
	(0.0230)	(0.0439)	(0.0427)	(0.0475)	(0.0239)	(0.0635)
Servicer 3	0.0399	0.0610	0.00222	-0.0200	0.0469	0.0452
	(0.0260)	(0.0464)	(0.0515)	(0.0796)	(0.0321)	(0.0929)
Servicer 4	0.236***	0.459***	0.182***	-0.0631	0.307***	0.0806
	(0.0460)	(0.0674)	(0.0650)	(0.0709)	(0.0945)	(0.0668)
Servicer 5	0.150***	0.189***	0.113*	0.0650	0.166***	0.191**
	(0.0205)	(0.0562)	(0.0571)	(0.0521)	(0.0212)	(0.0700)
Servicer 6	-0.0757*	0.0145	-0.00352		-0.130***	-0.121
	(0.0396)	(0.0611)	(0.115)		(0.0370)	(0.131)
Servicer 7	0.0733***	0.163***	0.0558***	-0.103*	0.0711***	0.164***
	(0.0234)	(0.0490)	(0.0145)	(0.0569)	(0.0256)	(0.0376)
Servicer 8	0.190***	0.213***	0.304***	0.0431	0.147***	0.105
	(0.0377)	(0.0655)	(0.0500)	(0.0532)	(0.0485)	(0.0967)
Servicer 9	0.0230	0.0300	0.0217	-0.0944	0.0250	-0.126*
	(0.0149)	(0.0393)	(0.0317)	(0.120)	(0.0238)	(0.0651)
Servicer 10	-0.00744	-0.0836	0.0402	-0.157**	-0.0354	-0.166
	(0.0403)	(0.0795)	(0.0933)	(0.0579)	(0.0613)	(0.165)
Servicer 12	0.116*		0.493**	-0.129**	0.0917*	0.300***
	(0.0593)		(0.201)	(0.0510)	(0.0463)	(0.0639)
Servicer 13	0.0723***	0.118***	0.0624	-0.0547	0.0717***	0.119*
	(0.0203)	(0.0361)	(0.0370)	(0.0944)	(0.0219)	(0.0647)
Servicer 14	0.237***	0.232***	0.236***	0.230***	0.231***	0.226***
	(0.0310)	(0.0439)	(0.0824)	(0.0515)	(0.0222)	(0.0568)
Servicer 15	0.171***	0.219***	0.127**	0.130**	0.172***	0.139***
	(0.0306)	(0.0539)	(0.0554)	(0.0610)	(0.0241)	(0.0353)
Servicer 16	0.347**		0.0717	0.00612	0.509***	
	(0.143)		(0.0876)	(0.0468)	(0.0278)	
Servicer 17	0.0635***	0.0979***	0.0930*	-0.0719	0.0379*	-0.0503
	(0.0221)	(0.0323)	(0.0512)	(0.0799)	(0.0208)	(0.0306)
Servicer 18	0.0500***	0.0818*	0.0155	0.0411	0.0492***	0.0603
	(0.0183)	(0.0433)	(0.0456)	(0.0510)	(0.0158)	(0.0467)
Servicer 19	0.108***	0.144***	0.0903***	-0.0171	0.113***	0.136**
	(0.0207)	(0.0512)	(0.0322)	(0.0745)	(0.0203)	(0.0527)
Servicer 20	0.280***	0.304***	0.255***	0.102	0.289***	0.241***
	(0.0235)	(0.0417)	(0.0544)	(0.111)	(0.0292)	(0.0545)
Observations	156507	28078	46045	8372	71922	9594

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Controls include: state dummies, origination year dummies, month by year dummies, ARM indicator, change in HPI since origination, months delinquent as of June 2009, ficoscore, ln(original balance), a no documentation dummy, refinance (vs. initial purchase) dummy, prepayment penalty dummy. Excluded servicer is Servicer 11–the average cure rate (0.225). Models (1) and (6) also include race, Models (1)-(5) also include ln(income). Column (6) restricts the sample to those less than 80% of AMI at origination.

Table 6: Servicer Heterogeneity Exists in Type of Modification

	Rate Change	Balance Change	Payment Change	Forgave Principal	Forgave Interest	Months To Mod	Second Mod
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Servicer 2	0.156***	0.00218	0.0607	-0.226***	-0.0352**	0.672**	-0.123***
	(0.0427)	(0.00857)	(0.0364)	(0.0638)	(0.0148)	(0.309)	(0.0227)
Servicer 3	-0.0434	0.0378***	0.0162	0.0112	-0.0214	-0.179	-0.116***
	(0.0278)	(0.0113)	(0.0268)	(0.0331)	(0.0159)	(0.299)	(0.0132)
Servicer 4	0.137***	0.00745	-0.0552**	-0.00431	-0.0114	-0.468***	0.0946***
	(0.0144)	(0.00675)	(0.0249)	(0.00907)	(0.00759)	(0.105)	(0.0338)
Servicer 5	-0.0381	0.0165	-0.126***	-0.109***	0.000786	-0.192	0.00845
	(0.0244)	(0.0198)	(0.0150)	(0.0320)	(0.0354)	(0.143)	(0.0347)
Servicer 6	0.359***	-0.00991	0.278***	-0.627***	-0.0351**	0.376***	-0.0278**
	(0.0167)	(0.00848)	(0.0147)	(0.0451)	(0.0133)	(0.0691)	(0.0124)
Servicer 7	-0.0219	-0.0437***	-0.0761***	-0.0456	-0.0543***	0.0322	0.0308**
	(0.0304)	(0.0144)	(0.0189)	(0.0385)	(0.0173)	(0.0561)	(0.0130)
Servicer 9	-0.0216	0.0210*	-0.0739	-0.0659	-0.0244**	0.649	-0.125***
	(0.0612)	(0.0105)	(0.107)	(0.0755)	(0.0102)	(0.565)	(0.0344)
Servicer 10	-0.0831**	-0.0349***	0.0710***	0.0382**	-0.0318***	-0.369	-0.0803***
	(0.0391)	(0.0100)	(0.0205)	(0.0185)	(0.00894)	(0.581)	(0.0217)
Servicer 12	-0.104***	-0.0387***	-0.156***	-0.0107	0.0702***	-0.138**	0.0596***
	(0.0228)	(0.0114)	(0.0196)	(0.0120)	(0.0104)	(0.0616)	(0.0188)
Servicer 13	0.0512**	-0.0125	0.0331	-0.0666**	0.0311	-0.360	-0.135***
	(0.0223)	(0.0121)	(0.0229)	(0.0262)	(0.0259)	(0.230)	(0.0215)
Servicer 14	0.0542**	0.00708	-0.00802	-0.00542	-0.0194*	0.712***	-0.0228
	(0.0245)	(0.0106)	(0.0331)	(0.0385)	(0.0113)	(0.202)	(0.0898)
Servicer 15	-0.119***	-0.0314**	-0.169***	0.0293***	0.0740***	-0.000924	0.00465
	(0.0168)	(0.0137)	(0.0163)	(0.00804)	(0.0176)	(0.0688)	(0.0246)
Servicer 16	-0.197**	0.0326***	-0.225***	0.00746	-0.0144	-0.489	-0.168***
	(0.0739)	(0.00622)	(0.0415)	(0.0136)	(0.0120)	(0.470)	(0.0244)
Servicer 18	-0.0366***	-0.0573***	-0.0865***	-0.0361***	0.114***	-0.133***	0.190***
	(0.00981)	(0.0127)	(0.00612)	(0.0129)	(0.0187)	(0.0307)	(0.0396)
Servicer 19	0.0131	-0.0306***	-0.139***	-0.0461**	0.00115	-0.180*	0.0325**
	(0.0127)	(0.00798)	(0.0289)	(0.0173)	(0.0305)	(0.0916)	(0.0138)
Servicer 20	-0.0642	-0.00875	-0.0326	0.0352**	0.0521	0.343	-0.0640***
	(0.0561)	(0.0122)	(0.0544)	(0.0171)	(0.0662)	(0.386)	(0.0180)
Observations	4889	4888	4885	5287	5287	5287	5287

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Controls include: state dummies, origination year dummies, month by year dummies, ARM indicator, change in HPI since origination, months delinquent as of June 2009, ficoscore, ln(original balance), race, ln(income), a no documentation dummy, refinance (vs. initial purchase) dummy, prepayment penalty dummy. Excluded servicer is Servicer 11–the average cure rate (0.225). All Columns (1)-(7) are cross sections of modified loans in the period the loan was modified. Rate Change, Balance Change, and Payment Change are the percentage changes in interest rates, balances, and monthly payments before and after modification, respectively. Forgave Principal and Forgave Interest are dummy variables equal to one if principal or interest were reduced at all, respectively. Months To Mod is equal to the number of months between the loan's second delinquency and modification. Second Mod equals one if the servicer modified a second time in the sample. Servicers 1, 7, 9 did not have enough modifications to identify the type in these models, and are thus excluded.

Table 7: LPM: Types of Modification Influence Re-default Rates

	Dependent Variable =1 if loan re-defaulted after modification					
	(1)	(2)	(3)	(4)	(5)	(6)
Rate Change	0.288***					
	(0.0394)					
Balance Change		-0.0507*				
		(0.0283)				
Payment Change			0.365***			
			(0.0299)			
Rate Decreased				-0.105***	-0.0963***	
				(0.0259)	(0.0249)	
Balance Decreased				0.0370	0.175**	
				(0.0367)	(0.0774)	
Balance and Rate Decreased					-0.152*	
					(0.0768)	
Months to Mod						-0.0183***
						(0.00586)
Observations	29441	29417	29406	32311	32311	32311

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Controls include: state dummies, origination year dummies, ARM indicator, change in HPI since origination, months delinquent as of June 2009, ficoscore, ln(original balance), race, ln(income), a no documentation dummy, refinance (vs. initial purchase) dummy, prepayment penalty dummy.

Table 8: LPM: Types of Modification Do Not Influence Foreclosure Sale Rates

	Dependent Variable =1 if loan was foreclosed					
	(1)	(2)	(3)	(4)	(5)	(6)
Rate Change	-0.00222					
	(0.0113)					
Balance Change		0.00182				
		(0.00820)				
Payment Change			0.00532			
			(0.00961)			
Rate Decreased				0.00480	0.00564	
				(0.00509)	(0.00512)	
Balance Decreased				0.00466	0.0177	
				(0.00712)	(0.0223)	
Balance and Rate Decreased					-0.0144	
					(0.0270)	
Months to Mod						-0.000339
						(0.00169)
Observations	30977	30952	30940	33956	33956	33956

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$,*** $p < 0.01$ Controls include: state dummies, origination year dummies, ARM indicator, change in HPI since origination, months delinquent as of June 2009, ficoscore, ln(original balance), race, ln(income), a no documentation dummy, refinance (vs. initial purchase) dummy, prepayment penalty dummy.

8. Appendix

Table 9: LPM: Servicer Heterogeneity Exists in Cure Rates

Dependent Variable =1 if loan was cured						
	Full Sample	Black	Hispanic	Asian	White	Low Income
	(1)	(2)	(3)	(4)	(5)	(6)
Servicer 1	0.00771	0.0974**	-0.00808	0.0283	0.0142	0.0253
	(0.0158)	(0.0415)	(0.0290)	(0.0426)	(0.0257)	(0.0869)
Servicer 2	-0.0339	0.000643	-0.0250	-0.0473	-0.0300	-0.0496
	(0.0202)	(0.0324)	(0.0283)	(0.0674)	(0.0309)	(0.0587)
Servicer 3	-0.00204	0.00365	0.0281	0.0962**	-0.0245	-0.0540
	(0.0255)	(0.0339)	(0.0327)	(0.0443)	(0.0371)	(0.0882)
Servicer 4	0.112***	0.131***	0.121**	0.0768	0.131***	0.135**
	(0.0183)	(0.0377)	(0.0465)	(0.0532)	(0.0350)	(0.0586)
Servicer 5	0.0174	0.0208	0.0464	0.0232	0.00531	-0.0314
	(0.0245)	(0.0507)	(0.0381)	(0.0522)	(0.0329)	(0.0582)
Servicer 6	0.00525	0.484***	0.000824		-0.0658	-0.0308
	(0.0619)	(0.0365)	(0.114)		(0.0437)	(0.0849)
Servicer 7	0.0716***	0.0623	0.115***	0.102	0.0545*	0.0582
	(0.0153)	(0.0374)	(0.0203)	(0.0828)	(0.0276)	(0.0511)
Servicer 8	0.111*	0.107	0.229***	0.127*	0.0493	-0.0716
	(0.0559)	(0.0644)	(0.0634)	(0.0660)	(0.0587)	(0.0742)
Servicer 9	-0.00263	-0.00686	0.0404	0.00173	-0.0237	-0.109
	(0.0229)	(0.0275)	(0.0288)	(0.113)	(0.0373)	(0.0905)
Servicer 10	0.0273	-0.0334	0.0474	-0.0596	0.0279	-0.210*
	(0.0416)	(0.0480)	(0.0827)	(0.101)	(0.0671)	(0.110)
Servicer 12	0.0448		0.424**	-0.0110	0.00362	-0.00697
	(0.0642)		(0.183)	(0.0716)	(0.0481)	(0.0647)
Servicer 13	0.0215	0.0641*	0.0682**	0.0390	-0.0168	-0.0292
	(0.0198)	(0.0325)	(0.0299)	(0.0628)	(0.0282)	(0.0631)
Servicer 14	0.112***	0.0864**	0.166***	0.201***	0.0803***	0.0111
	(0.0257)	(0.0384)	(0.0516)	(0.0466)	(0.0278)	(0.0546)
Servicer 15	0.0553**	0.0639*	0.0786*	0.106*	0.0405	0.0133
	(0.0246)	(0.0339)	(0.0425)	(0.0531)	(0.0302)	(0.0481)
Servicer 16	-0.0450*		0.0901	-0.00420	-0.0529	
	(0.0240)		(0.0621)	(0.0517)	(0.0318)	
Servicer 17	-0.0537**	-0.0787**	0.00172	-0.0783	-0.0739**	-0.187***
	(0.0234)	(0.0307)	(0.0304)	(0.0662)	(0.0321)	(0.0513)
Servicer 18	-0.00799	0.0156	0.0129	0.0361	-0.0176	-0.0873
	(0.0186)	(0.0312)	(0.0263)	(0.0723)	(0.0328)	(0.0638)
Servicer 19	0.0928***	0.0984*	0.132***	0.177**	0.0655**	0.0465
	(0.0245)	(0.0508)	(0.0274)	(0.0697)	(0.0305)	(0.0701)
Servicer 20	0.146***	0.125***	0.205***	0.125	0.126***	0.0239
	(0.0266)	(0.0354)	(0.0562)	(0.102)	(0.0345)	(0.0572)
Observations	156507	28078	46045	8372	71922	9594

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Controls include: state dummies, origination year dummies, month by year dummies, ARM indicator, change in HPI since origination, months delinquent as of June 2009, ficoscore, ln(original balance), a no documentation dummy, refinance (vs. initial purchase) dummy, prepayment penalty dummy. Excluded servicer is Servicer 11–the average cure rate (0.225). Models (1) and (6) also include race, Models (1)-(5) also include ln(income). Column (6) restricts the sample to those less than 80% of AMI at origination.

Table 10: LPM: Servicer Heterogeneity Exists in Foreclosure Sale Rates

Dependent Variable =1 if foreclosured						
	Full Sample	Black	Hispanic	Asian	White	Low Income
	(1)	(2)	(3)	(4)	(5)	(6)
Servicer 1	0.162***	0.158	0.243***	0.0377	0.147***	0.222
	(0.0329)	(0.162)	(0.0492)	(0.100)	(0.0308)	(0.142)
Servicer 2	0.0498	0.169	-0.0104	-0.0668	0.123**	0.497***
	(0.0432)	(0.124)	(0.0299)	(0.0753)	(0.0504)	(0.116)
Servicer 3	0.350***	0.369***	0.432***	0.248**	0.329***	0.584***
	(0.0368)	(0.0947)	(0.0565)	(0.102)	(0.0557)	(0.169)
Servicer 4	0.133***	0.136	0.182***	0.0729	0.140***	-0.166**
	(0.0257)	(0.0899)	(0.0382)	(0.0650)	(0.0453)	(0.0759)
Servicer 5	-0.0681***	-0.111**	-0.0435	-0.202***	-0.0449**	0.0128
	(0.0154)	(0.0495)	(0.0310)	(0.0552)	(0.0211)	(0.0582)
Servicer 6	0.295***	-0.00101	0.327**		0.329***	1.093***
	(0.0793)	(0.0444)	(0.123)		(0.107)	(0.105)
Servicer 7	0.291***	0.249***	0.231***	0.423***	0.331***	0.236**
	(0.0278)	(0.0535)	(0.0477)	(0.146)	(0.0404)	(0.101)
Servicer 8	0.0900**	0.0512	0.105	0.0816	0.113**	0.214*
	(0.0434)	(0.0853)	(0.0710)	(0.147)	(0.0456)	(0.106)
Servicer 9	0.343***	0.337***	0.372***	0.229***	0.338***	0.756***
	(0.0304)	(0.0843)	(0.0528)	(0.0554)	(0.0662)	(0.0666)
Servicer 10	0.177***	0.533***	0.155**	0.129	0.172***	0.144
	(0.0496)	(0.0759)	(0.0618)	(0.0899)	(0.0522)	(0.221)
Servicer 12	0.0522		0.163	0.0713	0.00632	0.0780
	(0.0603)		(0.173)	(0.264)	(0.0581)	(0.0627)
Servicer 13	0.301***	0.373***	0.263***	0.218***	0.319***	0.441***
	(0.0244)	(0.0563)	(0.0375)	(0.0603)	(0.0446)	(0.0835)
Servicer 14	0.0327*	0.0114	0.0675**	-0.0610	0.0413	0.0973
	(0.0190)	(0.0334)	(0.0302)	(0.0897)	(0.0253)	(0.0629)
Servicer 15	0.113***	0.0904**	0.141***	0.0301	0.119***	0.182***
	(0.0195)	(0.0384)	(0.0277)	(0.0680)	(0.0282)	(0.0551)
Servicer 16	0.153***		-0.159***	0.266***	0.0795**	
	(0.0486)		(0.0273)	(0.0618)	(0.0313)	
Servicer 17	0.388***	0.325***	0.428***	0.420***	0.381***	0.414***
	(0.0479)	(0.0459)	(0.0339)	(0.112)	(0.0584)	(0.111)
Servicer 18	0.189***	0.230***	0.169***	0.175**	0.222***	0.385***
	(0.0229)	(0.0642)	(0.0335)	(0.0637)	(0.0425)	(0.0708)
Servicer 19	0.549***	0.569***	0.575***	0.246**	0.567***	0.758***
	(0.0381)	(0.0748)	(0.0481)	(0.119)	(0.0604)	(0.0702)
Servicer 20	0.126***	0.103*	0.169***	0.0795	0.120***	0.221***
	(0.0131)	(0.0507)	(0.0307)	(0.102)	(0.0241)	(0.0659)
Observations	156507	28078	46045	8372	71922	9594

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Controls include: state dummies, origination year dummies, month by year dummies, ARM indicator, change in HPI since origination, months delinquent as of June 2009, ficoscore, ln(original balance), a no documentation dummy, refinance (vs. initial purchase) dummy, prepayment penalty dummy. Excluded servicer is Servicer 11–the average cure rate (0.225). Models (1) and (6) also include race, Models (1)-(5) also include ln(income). Column (6) restricts the sample to those less than 80% of AMI at origination.

Table 11: LPM: Servicer Heterogeneity Exists in Resolution Rates

Dependent Variable =1 if foreclosured or cured						
	Full Sample	Black	Hispanic	Asian	White	Low Income
	(1)	(2)	(3)	(4)	(5)	(6)
Servicer 1	0.158***	0.235	0.223***	0.0609	0.149***	0.263***
	(0.0330)	(0.146)	(0.0460)	(0.0910)	(0.0312)	(0.0929)
Servicer 2	0.00890	0.142	-0.0260	-0.138	0.0768	0.395***
	(0.0481)	(0.120)	(0.0211)	(0.118)	(0.0548)	(0.125)
Servicer 3	0.287***	0.317***	0.383***	0.235***	0.251***	0.417**
	(0.0363)	(0.0903)	(0.0467)	(0.0777)	(0.0419)	(0.166)
Servicer 4	0.231***	0.240***	0.283***	0.125**	0.261***	0.00244
	(0.0308)	(0.0677)	(0.0620)	(0.0520)	(0.0401)	(0.0909)
Servicer 5	-0.0410*	-0.0725	0.0175	-0.170***	-0.0350	-0.0164
	(0.0208)	(0.0568)	(0.0267)	(0.0564)	(0.0286)	(0.0713)
Servicer 6	0.279***	0.480***	0.323***		0.236**	0.973***
	(0.0921)	(0.0422)	(0.0901)		(0.102)	(0.0863)
Servicer 7	0.275***	0.243***	0.270***	0.364***	0.290***	0.247**
	(0.0278)	(0.0585)	(0.0445)	(0.101)	(0.0402)	(0.0984)
Servicer 8	0.184***	0.151*	0.327***	0.155	0.138**	0.105
	(0.0404)	(0.0821)	(0.0272)	(0.135)	(0.0590)	(0.112)
Servicer 9	0.290***	0.282***	0.364***	0.161	0.264***	0.552***
	(0.0290)	(0.0805)	(0.0462)	(0.100)	(0.0627)	(0.101)
Servicer 10	0.181***	0.418***	0.196**	0.0528	0.169**	-0.111
	(0.0433)	(0.0881)	(0.0899)	(0.0858)	(0.0664)	(0.123)
Servicer 12	0.0936		0.567***	0.0389	0.00517	0.0548
	(0.104)		(0.0408)	(0.186)	(0.0824)	(0.0812)
Servicer 13	0.259***	0.376***	0.260***	0.154*	0.246***	0.352***
	(0.0259)	(0.0603)	(0.0461)	(0.0761)	(0.0316)	(0.0842)
Servicer 14	0.141***	0.101**	0.226***	0.127	0.116***	0.106
	(0.0260)	(0.0492)	(0.0377)	(0.0865)	(0.0338)	(0.0834)
Servicer 15	0.151***	0.143**	0.202***	0.104**	0.141***	0.176**
	(0.0339)	(0.0531)	(0.0534)	(0.0501)	(0.0323)	(0.0791)
Servicer 16	0.115*		-0.0246	0.262***	0.0465*	
	(0.0632)		(0.0478)	(0.0621)	(0.0264)	
Servicer 17	0.334***	0.246***	0.442***	0.332***	0.302***	0.223**
	(0.0582)	(0.0541)	(0.0330)	(0.0639)	(0.0671)	(0.105)
Servicer 18	0.142***	0.210***	0.152***	0.153	0.158***	0.241**
	(0.0191)	(0.0643)	(0.0462)	(0.0986)	(0.0278)	(0.106)
Servicer 19	0.544***	0.562***	0.607***	0.343***	0.540***	0.708***
	(0.0306)	(0.0797)	(0.0401)	(0.119)	(0.0442)	(0.0723)
Servicer 20	0.258***	0.223***	0.355***	0.177***	0.229***	0.221***
	(0.0281)	(0.0504)	(0.0627)	(0.0540)	(0.0268)	(0.0761)
Observations	156507	28078	46045	8372	71922	9594

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Controls include: state dummies, origination year dummies, month by year dummies, ARM indicator, change in HPI since origination, months delinquent as of June 2009, ficoscore, ln(original balance), a no documentation dummy, refinance (vs. initial purchase) dummy, prepayment penalty dummy. Excluded servicer is Servicer 11–the average cure rate (0.225). Models (1) and (6) also include race, Models (1)-(5) also include ln(income). Column (6) restricts the sample to those less than 80% of AMI at origination.