

PRELIMINARY AND INCOMPLETE

Mortgage Modification and Strategic Default:

Evidence from a Legal Settlement with Countrywide

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This draft: September 7, 2010

We are especially grateful to Equifax, Black Box Logic, LLC, 1010Data, and Stan Humphries from Zillow for their data, research support, and infrastructure that were invaluable for the analysis in this paper. We thank seminar participants at Wharton, Chicago, UC Berkeley Haas, Columbia, and Ono Academic College (Israel), NBER Household Finance meeting, and NBER Law and Economics meeting for helpful suggestions. Alex Chinco, Ben Lockwood, and Ira Yeung provided incredible research support and substantive comments. The views expressed are those of the authors and do not necessarily reflect the views of the Federal Reserve Bank of New York or the Federal Reserve System. The Paul Milstein Center for Real Estate at Columbia Business School provided critical funding to support this research.

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ABSTRACT

More than 3.7 million homeowners lost their homes in 2008 and 2009, with forecasts that millions more will lose their homes in the coming years despite efforts by the federal government and private lenders to modify mortgages. In this paper we explore the possibility that strategic behavior by homeowners might explain some of the observed difficulty in achieving cost-effective mortgage modifications. Using information from a legal settlement involving Countrywide Financial Corporation, we compare Countrywide's modification efforts to those of unaffected but comparable mortgage servicers. Because the legal settlement was unexpected and induced by state government lawsuits targeting the largest surviving subprime mortgage originator, it potentially allows us to avoid the endogeneity associated with decisions to extend loan modifications to specific borrowers. After controlling for time-varying credit scores, loan-to-value ratios, interest rates, and other characteristics that do not vary substantially between loans serviced by Countrywide and comparable servicers, we find that Countrywide's relative delinquency rate substantially increased immediately after announcement of the legal settlement. We observe this among both subprime adjustable rate mortgages (ARMs) and subprime fixed rate mortgages (FRMs), but not non-subprime FRMs, which were not targeted by the legal settlement. Among ARMs, we find that the borrowers who were most likely to default after announcement of the legal settlement were the borrowers least likely to default otherwise, including borrowers with low CLTVs, those with substantial available utilization on their credit cards, and those who remained current on their credit card accounts for at least six months after defaulting on their mortgages. These results suggest the importance of taking account of strategic behavior in designing mortgage modification programs.

1. Introduction

More than 4.2 million homeowners lost their homes in 2008, 2009 and the first half of 2010. Additionally, fifteen million homeowners are at higher risk of future foreclosure because they owe more money to mortgage lenders and investors than their homes are worth. This figure represents more than one-in-three homeowners with at least one mortgage.¹

President Obama has made foreclosure prevention one of the key economic goals of his administration. Government officials have repeatedly called on private lenders to aid struggling homeowners by reducing principal owed and lowering interest rates to lessen the likelihood of foreclosure.² In addition they have subsidized mortgage modification efforts through various programs, including the Home Affordable Mortgage Program (HAMP). Yet government officials and private lenders alike admit that they struggle to decide which loans to modify and how, emphasizing the risk of distorting the incentives of otherwise able borrowers to pay back their debt.

Government mortgage modification efforts have centered on the HAMP, which has been focused primarily on reducing mortgage payments for borrowers with unaffordable mortgages.³ The federal government has committed \$75 billion and extensive human resources to HAMP, yet only 340,000 borrowers received permanent modifications in the first 15 months following the program's launch in March 2009.⁴ A report by the Treasury's Inspector General for the Troubled Asset

¹ "U.S. Loan Effort Is Seen as Adding to Housing Woes," *The New York Times*, 1/2/2010, P. A1.

² We note that in times of adverse economic conditions, debt forgiveness and loan modification can create value for both borrowers and lenders (see, Bolton and Rosenthal, 2002; Kroszner, 2003; and Piskorski and Tchisty, 2008). Moreover, because foreclosures may exert significant negative externalities, such as negative neighborhood effects (Campbell et al., 2009), it might be socially optimal to modify mortgage contracts to a greater extent than lenders would select independently.

³ A newer program based on encouraging banks to reduce principal balances was announced in Spring 2010, but it is too early to find evidence of its success.

⁴ Housingwire.com (<http://www.housingwire.com/2010/06/21/total-number-of-hamp-permanent-modifications-passes-340000-2>)

Relief Program (TARP) suggests that the HAMP “has been oversold by the Treasury Department and is likely to be a failure when it wraps up in 2012.”⁵

It is understandably difficult to develop a cost-effective mortgage modification program because of the difficulty in identifying precisely which borrowers might eventually default without modification. While more than 5.6 million borrowers are at least 60-days delinquent, many more are current on their mortgages, including the vast majority of borrowers whose mortgage balances exceed the values of their homes. Conditioning the availability of mortgage modifications on borrower delinquency has the risk of encouraging more borrowers to miss their payments in order to qualify for a modification. Recent reports suggest that about a quarter of those whose mortgages are seriously delinquent remain current on all other sources of credit, suggesting that strategic considerations rather than economic necessity are already driving many mortgage defaults.⁶

Lenders and policymakers are well aware of this strategic behavior problem, but nevertheless often target mortgage modifications to seriously delinquent borrowers because they perceive it to be costly to become delinquent. Seriously delinquent borrowers face more expensive current and future borrowing, including credit cards, auto loans, and any new mortgages or refinancings. As a result, the extent of strategic behavior generated by existing mortgage modification programs is an important empirical question in determining how to efficiently reduce potential foreclosures going forward.

In this paper we quantify the extent of strategic behavior generated by a recent modification program that extends benefits to borrowers who have missed at least two months of mortgage payments (at least “60 days past due”). We do this by studying a legal settlement between Countrywide Financial Company and 11 state

⁵ “Home Loan Modification Program Oversold: Watchdog,” *Reuters*, 3/23/2010.

⁶ Authors’ calculations based on borrowers who become at 60 days delinquent on their mortgage and do not miss any credit card payments for the following six months for our sample period, described below. Experian-Oliver Wyman Market Intelligence Reports provide similar estimates for 2006 to 2008. Using survey data, Guiso, Sapienza, and Zingales (2009) find that 17 percent of homeowners would default, even if they could afford to pay their mortgages, if their home values fell to levels where the homes were worth less than 50 percent of the homeowners’ mortgage debts.

attorneys general, who had filed lawsuits alleging deceptive lending practices. As part of the Settlement, Countrywide announced a new mortgage modification program for Countrywide-serviced, subprime mortgages in October 2008 (although Countrywide had recently been acquired by Bank of America, the Settlement applied only to Countrywide mortgages). A centerpiece of this Settlement was Countrywide's commitment to offer expedited, unsolicited loan modifications to borrowers who were at least 60 days delinquent.

The widespread scope of the Countrywide program, and its requirement that a borrower be delinquent in order to receive benefits, makes it a potentially useful experiment that could provide insight into borrowers' behavior under other modification programs. Several recent modification programs, such as the IndyMac/FDIC program, JP Chase Enhanced Program, Citi Homeownership Preservation Program, and GSE Streamlined Modification Program, have also primarily targeted seriously delinquent borrowers.⁷

We identify strategic responses to public announcement of the Countrywide Settlement using an extensive dataset that provides information on all privately securitized mortgages, including the name of the servicer, origination credit, house price, down payment information, and monthly payment history. We match data on these securitized mortgages to borrower data supplied by Equifax, one of the three major credit bureaus. The borrower data include credit scores as well as payment histories and utilization rates for credit cards, mortgages, second liens, and other sources of credit. These unique data allow us to follow borrowers credit behavior in the months following their initial default on their mortgage.

In this paper, we say that a borrower exhibits "strategic behavior" if he or she defaults as a result of the program announcement and would not have defaulted otherwise, at least in the near term. Of course, it is difficult to observe the counterfactual—what a borrower might have done absent the Settlement announcement. Below, we consider a variety of ways to identify strategic behavior.

⁷ See "A Brief (And Complete) History of Loan Modifications," Citigroup, 2009.

First, we estimate the number of additional defaults among Countrywide borrowers during the months immediately following the Settlement announcement relative to defaults among comparable borrowers who had similar mortgages but were unaffected by the Settlement because their loans were not serviced by Countrywide. This provides a potential estimate of the frequency with which a borrower might have missed payments *because* of the program announcement. To provide greater confidence that the Settlement announcement was the cause of these excess delinquencies, we provide several cuts of the data showing that the post-announcement rise in delinquencies for Countrywide relative to its peers took place only among mortgages that were targeted by the Settlement.

Second, we investigate the Settlement's effects in a cross-section of borrowers with lower credit utilization and lower combined loan-to-value ratios. These borrowers were arguably less likely to default in the near term (either because they had significant untapped liquidity through their credit cards or some positive equity in their homes). We also create a direct measure of "strategic default:" borrowers who remain current on their credit cards for at least 6 months after going delinquent on their mortgage. Such borrowers might have had financial resources available to make mortgage payments (possibly instead of making credit card payments), but chose not to do so.

Our initial analysis focuses on hybrid ARM mortgages (2/28s), a product largely aimed at subprime borrowers. The Countrywide settlement provided an automatic extension of the initial teaser rate to all subprime ARMs that were current before the teaser rate expired and became 60-days delinquent immediately afterward.⁸ We show that Countrywide's loans were comparable to loans of other servicers prior to announcement of the Settlement. Comparing the two groups, we study the likelihood that a mortgage rolls from current to 60 days delinquent before and after the Settlement announcement.

In difference-in-difference specifications that control for many borrower attributes, including current credit scores and indebtedness, we find a 7 to 10 percent

⁸ Section 2 describes the terms of the Settlement and the qualification requirements for automatic modifications.

increase in the probability that Countrywide Hybrid ARMs loans roll straight from current to 60 days delinquent during the three months immediately after the settlement announcement (relative to a control group of loans with non-Countrywide servicers). However, because these are 2/28 mortgages, interest rates will potentially reset after the first two years of maturity, and they will be resetting at different times for loans originated at different times. Subsequent regressions show that almost all of the increase in post-Settlement Countrywide defaults came from mortgages that reset around the time the Settlement was announced. For the cohort of Countrywide mortgages resetting around the program announcement, there was a 41 percent increase in defaults. There was no appreciable increase in defaults among Countrywide mortgages that reset before or after the settlement announcement. Furthermore, when we limit our analysis to strategic delinquencies—those in which borrowers remain current on credit cards during the 6 months after going delinquent on their mortgages, the entire statistical increase in Countrywide delinquencies appears to come from strategic borrowers. These borrowers only represent about 40 percent of Countrywide delinquencies in the months before the program announcement. The announcement of the Settlement resulted in nearly twice the number of strategic defaults as in previous months.

Next we subset on different levels of credit utilization and loan-to-value ratios. Our results show that the effect of the Settlement on Countrywide delinquencies (relative to the control group of loans with other servicers) was most pronounced among homeowners who had utilized only a small fraction of their available credit card balances and among borrowers with relatively low cumulative loan-to-value ratios (CLTV). Although these homeowners were the *least* vulnerable to economic shocks (either because they had significant untapped liquidity through their credit cards or some equity in their homes), these borrowers were the *most* likely to become delinquent immediately after the legal settlement. As above, these results point to significant strategic behavior among homeowners in response to the Settlement.

Next, we consider the possibility that these results might be driven by idiosyncratic characteristics of Countrywide loans resetting during the sample period.

We look at the behavior borrowers with fixed-rate mortgages (FRMs). The Settlement provided some relief for delinquent borrowers with subprime FRMs. Unlike 2-28s, which were predominantly a subprime product, many FRMs were extended to so-called prime borrowers with good credit and higher down payments. Since the program only applied to subprime mortgages, we would not expect any additional post-Settlement delinquencies for higher-quality borrowers with Countrywide FRMs relative to FRMs serviced by other institutions. This is exactly what the analysis shows. Countrywide FRMs with an initial FICO below 620 had a 22 percent relative increase in defaults immediately after the settlement announcement, while Countrywide FRMs with an initial FICO above 620 had no increase in delinquencies (the coefficient is negative, although not statistically different from zero).

Our results connect to several literatures. Previous studies of incentives, strategic behavior, and the financial crisis have examined a number of questions, including the impact of bailouts on banks' incentives to take risk⁹, the likelihood that some lenders originated mortgages with greater risk due to their ability to sell the loans in the securitized market¹⁰, and the impact of securitization on servicer decisions to foreclose delinquent loans.¹¹ Little attention has been given so far to strategic behavior among homeowners.¹² Our analysis is also related to the recent empirical literature examining household motives behind mortgage defaults (see, among others, Foote et al [2008], Guiso et al [2009], and Elul et al [2010]), and more broadly to the household finance literature (see Tufano [2009] for a recent survey).

⁹ See Farhi and Tirole (2009) and Poole (2009), for example.

¹⁰ Keys, et. al. (2010a, b), Mian and Sufi (2009), and Berndt and Gupta (2009) provide evidence suggesting that originators might have made riskier loans when they were able to securitize these loans.

¹¹ Piskorski, Seru, and Vig (2010) show that bank-held delinquent loans were foreclosed at a lower rate relative to comparable mortgages that were securitized.

¹² Moral hazard and strategic behavior has received sustained attention in other contexts, including health and unemployment insurance. In the context of unemployment insurance, Meyer (1990) and Moffitt (1985) show that a 10 percent increase in unemployment benefits leads to 4 to 8 percent longer duration of unemployment. Nonetheless, Chetty (2008) argues that liquidity constraints on the part of the unemployed contribute more than moral hazard in explaining the empirical evidence on the elasticity of unemployment duration relative to benefits.

Our paper is organized as follows. In Section 2 we describe the Countrywide Settlement and our hypotheses regarding the Settlement's effects on homeowner behavior. Section 3 presents our data and empirical methodology. Section 4 describes our results. We discuss the implications of these results for the design of mortgage modification policies in the concluding Section 5.

2. Countrywide Settlement and Hypotheses

2.1 The Settlement

In June 2008, attorneys general in California and Illinois brought suit against Countrywide, alleging deceptive lending practices.¹³ For example, the California complaint alleged that Countrywide

“implemented [a] deceptive scheme through misleading marketing practices designed to sell risky and costly loans to homeowners, the terms and dangers of which they did not understand, including by (a) advertising that it was the nation's largest lender and could be trusted by consumers; (b) encouraging borrowers to refinance or obtain purchase money financing with complicated mortgage instruments like hybrid adjustable rate mortgages or payment option adjustable rate mortgages that were difficult for consumers to understand; (c) marketing these complex loan products to consumers by emphasizing the very low initial “teaser” or “fixed” rates while obfuscating or misrepresenting the later steep monthly payments and interest rate increases or risk of negative amortization; and (d) routinely soliciting borrowers to refinance only a few months after Countywide or the loan brokers with whom it had ‘business partnerships’ had sold them loans.” (Page 5 of complaint)

Within days, similar suits were brought by attorneys general in nine other states.¹⁴ Countrywide entered a multi-state settlement on October 6, 2008.¹⁵ Though the

¹³ See <http://www.bloomberg.com/apps/news?pid=20601087&sid=aEsd2SRYtj7A>;
http://ag.ca.gov/cms_attachments/press/pdfs/n1582_draft_cwide_complaint2.pdf;
http://www.illinoisattorneygeneral.gov/pressroom/2008_06/countrywide_complaint.pdf.

¹⁴ See <http://www.law.com/jsp/PubArticle.jsp?id=1202426289950>.

settlement formally included only eleven states, other states were expected to join the settlement,¹⁶ and did.¹⁷ From the beginning, Countrywide applied the terms of the settlement nationally.¹⁸

Pursuant to the Settlement, Countrywide has agreed to modify subprime loans¹⁹ that it services and that are at risk of default. It is irrelevant whether the loan was originated by Countrywide, whether it is securitized or held in Countrywide's portfolio,²⁰ whether it previously received a modification, and whether the borrower's home is encumbered by a second mortgage or junior lien.

The Settlement targets three kinds of subprime mortgages currently serviced by Countrywide: Hybrid adjustable-rate mortgages (ARMs), Option ARMs, and fixed-rate mortgages (FRMs). To qualify for modification, the mortgage and borrower must satisfy four criteria, which are summarized in Table 1:

¹⁵ See <http://www.ct.gov/ag/lib/ag/consumers/finalmultistatefcsettlementtermsheet.pdf>; <http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aEasVHGtwC9A>. Copies of the formal settlements filed in California and Illinois are available here and here: http://ag.ca.gov/cms_attachments/press/pdfs/n1618_cw_judgment.pdf; http://illinoisattorneygeneral.gov/consumers/countrywide_final_judgement.pdf.

¹⁶ See <http://www.cbsnews.com/stories/2008/10/06/business/main4503045.shtml>.

¹⁷ See <http://www.housingwire.com/2009/01/14/virginia-joins-countrywide-settlement/>.

¹⁸ See this press release, which describes the Settlement as a nationwide program: http://www.nationalmortgagenetwork.org/pdfs/market_conditions/Countrywide_percent5B1_percent5D.Settlement.Facts.pdf.

¹⁹ The Settlement defined "Subprime Mortgage Loans" as "first-lien residential mortgage loans that (a) combine higher risk features (such as low or no documentation, low equity, adjustable interest rates, prepayment penalties, cash-out financing) with higher risk borrower profiles (lower FICO scores, recent bankruptcies/foreclosures, major derogatory credit), resulting in a loan that could not reasonably be underwritten and approved as a 'prime' loan. An existing [Countrywide] Residential Mortgage Loan would be a 'Subprime Mortgage Loan' if it is identified as such in connection with a securitization in which it is part of the pool of securitized assets or, in the case of a [Countrywide] Residential Mortgage Loan that is not included in a securitization, was classified as being 'subprime' on the systems of [Countrywide] and its subsidiaries on June 30, 2008. 'Subprime Mortgage Loans' do not include first-lien residential mortgage loans that are Federal Eligible." See, e.g., California Settlement, page 5 (http://ag.ca.gov/cms_attachments/press/pdfs/n1618_cw_judgment.pdf).

²⁰ Although securitization agreements often limit the servicer's authority to modify mortgages (Mayer, Morrison, and Piskorski 2009), Countrywide stated, "it currently has, or reasonably expects to obtain, discretion to pursue the foreclosure avoidance measures outlined in this agreement for the substantial majority of Qualifying Mortgages. Where [Countrywide] does not enjoy discretion to pursue these foreclosure avoidance measures, [Countrywide] will use its best effort to seek appropriate authorization from investors." See Multi-State Settlement, page 4, note 3

(<http://www.ct.gov/ag/lib/ag/consumers/finalmultistatefcsettlementtermsheet.pdf>).

- The loan must have originated before 2008 and have been within Countrywide’s servicing portfolio on June 30, 2008.
- The borrower’s loan-to-value ratio (LTV) must be at least 75.
- Payments of principal or interest are 60 or more days are delinquent or are likely to become delinquent as a result of an interest rate reset or negative amortization trigger.
- After modification, the borrower’s mortgage payments do not exceed 42 percent of income (or 34 percent among borrowers for whom taxes and insurance are not escrowed).

Countrywide’s obligations vary by mortgage and are summarized in Table 2.

Subprime Hybrid ARM borrowers are eligible for different types of modifications, depending on when they became delinquent. They should receive *unsolicited* restoration of the introductory interest rate for five years if they were current prior to their first rate reset and became 60 days delinquent immediately afterwards. Countrywide must offer this modification to a homeowner without requiring new loan documentation or verification of the borrower’s income. Additionally, all seriously delinquent Hybrid ARM borrowers—regardless of when they became delinquent—must be considered for some type of interest-rate modification. One type would reduce the initial interest rate for five years (to as low as 3.5 percent), after which the loan would be converted to an FRM at a low rate. Another type of modification would introduce a ten-year interest-only period and also reduce the (adjusting) interest rate over the life of the loan (to as low as 3.5 percent).

Subprime Option ARM borrowers must be considered for modifications that eliminate the negative amortization trigger, reduce LTV to as low as 95, reduce the interest rate (to as low as 2.5 percent) and prevent future adjustments from exceeding a lifetime interest rate cap of 7 percent, and possibly introduce a 10-year interest-only period.

Finally, *subprime FRM* borrowers must be considered for interest-rate reductions similar to those offered to Option ARM borrowers: a borrower could

receive either a permanent reduction in the interest rate or a 10-year interest-only period followed by a low rate for the life of the loan.

Countrywide agreed to proactively contact borrowers eligible for all of the foregoing modifications (although it agreed to this on October 6, 2008, Countrywide announced that it would not be ready to contact borrowers until December 1, 2008²¹). It also agreed to reach out to Hybrid and Option ARM borrowers whose mortgage payments were scheduled to change.²² These borrowers are encouraged to contact Countrywide if they think they will have trouble making the new payments. Finally, Countrywide agreed to suspend the foreclosure process for any borrower who may be eligible for a modification. The suspension should last as long as necessary to determine borrower eligibility.

2.2 Hypotheses

The Countrywide settlement was widely reported²³ beginning in October 2008 and was implemented nationwide beginning December 2008. This provides a unique opportunity to assess homeowner response to news of a typical modification policy. We view the Settlement as a largely exogenous shock, for reasons we give in the next section.

We use a differences-in-differences empirical approach, investigating whether, relative to mortgages serviced by comparable servicers, Countrywide mortgages were more likely to move from current to 60 days delinquent beginning in October 2008. By abruptly stopping payment, homeowners could make themselves eligible for

²¹ See, for example, this press release from the Attorney General for Washington State: <http://www.atg.wa.gov/countrywidePR100608.aspx> (“Countrywide said the loan modification program will be ready for implementation by December 1, 2008, and that the company would engage in proactive outreach to eligible customers at that point.”).

²² “Subprime or pay option ARM borrowers whose loans were originated on or before December 31, 2007, and whose payments are scheduled to change as a result of an interest-rate reset, recast, or expiration of an interest-only term shall be advised prior to the payment change to contact servicing personnel if they believe they will not be able to afford their new payments. In the event that borrowers respond to this solicitation, they shall be considered for loan modifications under the eligibility criteria in this agreement.” See Multi-State Settlement, page 7

(<http://www.ct.gov/ag/lib/ag/consumers/finalmultistatefcsettlementtermsheet.pdf>).

²³ For example, GoogleTrends (<http://www.google.com/trends>) shows a sudden increase in searches using the terms “countrywide mortgage” during October 2008.

the benefits of the Settlement. We also investigate the extent of such defaults among borrowers whose mortgages were resetting (or had just reset) to a higher interest rate when the Settlement was announced. These borrowers were an explicit target of the Settlement, receiving an unsolicited modification if they were current before reset and became 60 days delinquent immediately after.

We test for these effects beginning in October 2008, the month of Settlement announcement. There is, however, a potential confound beginning in early 2009. In February of that year the federal government announced plans to implement a widespread modification program, the Home Affordable Mortgage Plan (HAMP), which went on-line in March 2009.²⁴ This program may have affected homeowner behavior (across all servicers), possibly in much the same way as the Countrywide Settlement. To avoid confounding our inference by possible effects of the HAMP program announcement, we focus on measuring the behavior of borrowers in the first few months after Settlement announcement (from October 2008 to March 2009).

Countrywide was aware of the potential for strategic behavior. Its Settlement included a provision stating that, if it “detects material levels of intentional nonperformance by borrowers that appears to be attributable to the introduction of the loan modification program, it reserves the right to require objective prequalification of borrowers for loan modifications under the program and to take other reasonable steps.”²⁵ We suspect that this provision, which was not widely reported, did not deter homeowners from strategically defaulting on their mortgages in order to qualify for modifications.

To be sure, an increase in the delinquency rate among Countrywide borrowers does not necessarily show that they were acting strategically to become eligible for modification. Borrowers who stopped paying may be precisely those whom the Settlement targets: homeowners who are struggling to pay and likely to default in the near future. To determine whether economic distress is driving excess defaults in the post-announcement period among Countrywide loans (relative to loans with other

²⁴ <http://www.bloomberg.com/apps/news?pid=20601103&sid=a39GJA5.gTMc&refer=us>

²⁵ Multi-State Settlement, page 9 (<http://www.ct.gov/ag/lib/ag/consumers/finalmultistatefcsettlementtermsheet.pdf>).

servicers), we examine the delinquency rate among homeowners who are current on *non-mortgage* revolving debts (e.g., credit card accounts) and remain current for at least six months after going 60 days delinquent on their mortgage payments. Arguably, these homeowners were less likely to default absent the Settlement. But if their delinquency rate rises in response to the Countrywide Settlement, we have may have stronger evidence of strategic behavior.

Additionally, we examine the behavior of homeowners who were *least* likely to default when the Settlement was announced: those who had utilized a small fraction (less than thirty percent) of the available credit on their credit cards and those whose loans had lower combined loan-to-value ratios. These homeowners had access to significant amounts of additional liquidity or might have some positive equity left in the house and were therefore less likely to default in the absence of a modification program, at least in the near future. If we observe a rise in delinquency rates among these homeowners, we think it is suggestive of strategic behavior by those impacted by the Settlement, rather than changes in other economic factors that might be coincident with announcement of the Settlement.

Finally, we consider the behavior of borrowers with FRMs. While 2/28s are a risky mortgage product usually targeted at subprime borrowers, FRMs are a conventional mortgage product that is often taken out by prime borrowers who would not have qualified for modification under the Settlement. We therefore might observe a response to Settlement announcement among subprime FRM borrowers, but we do not expect to observe one among non-subprime FRMs. This comparison—subprime versus non-subprime FRMs—is particularly useful because it tests whether the Settlement announcement altered behavior only among the particular Countrywide loans that were eligible for relief.

3. Data and Methodology

3.1 Data

Our primary dataset combines loan-level observations from BlackBox Logic, LLC with credit report information from Equifax. BlackBox is a private company that provides a comprehensive, dynamic dataset of about 21 million privately securitized

Subprime, Alt-A, and Prime loans originated after 1999. These total about 90 percent of all privately securitized mortgages from that period. The data include static information taken at the time of origination, such as origination date, origination amount, FICO credit score, servicer name, interest rate, term, and interest rate type. BlackBox also records certain dynamic data, such as the monthly payment, mortgage balance, and delinquency status.

Equifax is a credit reporting agency that provides monthly data on the current credit score, payments and balances on mortgage and installment debt, and balances and credit utilization for revolving debt (such as credit cards and HELOCs). Equifax reports Vantage as the credit score. Intended to be comparable to FICO, the Vantage score was designed by the three credit reporting bureaus (Equifax, Experian, and TransUnion) to measure overall borrower credit health. Vantage scores range from 501 to 990.

Credit information from Equifax was linked to loan data from BlackBox. The linkage was performed by 1010Data, a provider of data warehousing and processing, using a proprietary match algorithm. 1010Data indicated varying degrees of “confidence” in the link between a loan in BlackBox and the associated credit report in Equifax. To deal with the possibility of mismatched loans between BlackBox and Equifax, we restrict our sample to loan-credit report matches in which BlackBox and Equifax report the same Zip Code. In addition, we require a close correspondence between other variables—loan balance and delinquency—that are included in both BlackBox and Equifax databases. This match provides a rich loan-level database that combines information about loan characteristics and credit histories. Because the Equifax data record balances on other mortgages held by the borrower, we are able to compute a CLTV for each property. We also have an indication of the dominant loan type of the mortgage pool into which the loan is packaged (e.g., prime or subprime).

Next, we link dynamic loan-balance information (provided by Equifax) to zip-level Home Price Indices (provided by Zillow) to calculate current CLTV for the property. We used the MAPLE/Geocorr2k engine provided by the Missouri Census to link property Zip Code to Metropolitan Statistical Areas.

We restrict our analysis to the types of mortgages that might have been eligible for the Countrywide Settlement: first-lien mortgages and properties that were not purchased as second homes or by investors. Requiring a common Zip Code between our two data sources provides additional verification that owner-occupants held loans in our analysis. We also exclude mortgages serviced by IndyMac because this servicer was taken over by the FDIC earlier in 2008 and announced a major modification program prior to Countrywide's settlement.

In most of our analysis, we focus on Hybrid ARMs that originated between 2005 and the first half of 2007. We include all Hybrid ARMs that reset after two years (2/28s) and had an initial LTV greater than 70. Hybrid ARMs are an appropriate focus because the Settlement targets loans that are scheduled for interest rate resets. In some specifications we also analyze subprime and non-subprime FRMs. In this analysis, we include all FRMs with initial LTV greater than 60.

The initial dataset included 1,034,765 loans observed between January 2005 and June 2010. After requiring a Zip Code match between BlackBox and Equifax, as well as other match quality and sampling criteria described above, we are left with 328,107 loans. In the analysis below, we will report results both for the initial dataset (all BlackBox securitized mortgages of a given type originated during sample time periods) as well as the smaller restricted matched sample. We have also confirmed that our analysis below does not vary when we restrict our data to include only loans for which 1010Data reported a very high "confidence" in the match.

3.2 Empirical Methodology

Our objective is to measure the effect of the Countrywide Settlement on borrower behavior immediately after it was announced in October 2008. One could simply study mortgage delinquency rates among Countrywide loans before and after the Settlement announcement in order to deduce its effect on homeowner behavior. But this would ignore other environmental conditions affecting homeowner behavior. We address this inference problem using a difference-in-difference (DD) approach that compares Countrywide mortgages (treatment group) to comparable mortgages (control group) before and after the Settlement announcement.

Identifying an appropriate control group is the key challenge here. The DD approach uses the control group to account for environmental conditions that may affect delinquency rates at the time of the policy announcement but are changing in the same way for the treatment and control groups. Ideally, we would like to identify a group of borrowers whose mortgages were not originated or serviced by Countrywide, but who would otherwise display the same behavior as Countrywide borrowers in the absence of the Settlement.

For our analysis of 2/28 ARMs, we select as a Control Group all 2/28s serviced by institutions other than Countrywide (except IndyMac). Over this time period, the market for subprime lending was extremely competitive, with mortgage brokers accessing databases that listed mortgage terms for many wholesale lenders. Indeed, as we will show below, Countrywide loans targeted by the Settlement exhibit small differences in observable attributes—both at origination and at the Settlement announcement date—from loans serviced by other institutions. Additionally, there is little change in these observable attributes around the time of Settlement announcement.

One might be concerned that, because Countrywide was sued while other lenders were not, Countrywide's loans are different from those of other lenders. While potentially troubling, we do not believe that this factor generates an appreciable bias in our results. State attorneys general appear to have selected Countrywide as a defendant because it was the largest originator and servicer of subprime mortgages and was still solvent at the time of the suits. Other originators such as New Century and IndyMac had already collapsed. Although Countrywide allegedly failed to disclose all features of its mortgage products, its lending practices might have not differed substantially from those of other institutions, who appear to have limited their disclosures to borrowers as well.²⁶ For these reasons, we view the

²⁶ See, e.g., Lacko and Pappalardo (2007). Moreover, it is not clear to what extent differences in disclosure of mortgage terms could affect borrowers' choices. Bucks and Pence (2008) report, based on Survey of Consumer Finances, that although most borrowers seem to know basic mortgage terms, borrowers with adjustable-rate mortgages appear likely to underestimate or to not know how much their interest rates could change.

Countrywide Settlement as an exogenous shock to Countrywide mortgages, which are closely similar to mortgages serviced by other institutions. Finally we also stress that we control for mortgage terms and allow for Countrywide specific fixed effect before and after the Settlement announcement. Even if similar borrowers were offered different terms by Countrywide relative to other services, our controls should capture this heterogeneity.

In sum, our identification assumption is that, in the absence of the Settlement, comparable Countrywide and Control Group loans would display similar payment patterns (up to a constant difference) during the period of study.

Tables 3 and 4 help justify our identifying assumption that Countrywide and Control Group servicers had a similar borrower base with comparable loan terms for 2/28 ARMs. Table 3 presents origination statistics. Measured at means, Countrywide loans have slightly higher CLTVs and interest rates. Credit scores are very similar too: measured at medians, origination FICO differs by only 3 points (means differ by about 6 points) between Countrywide and the Control Group; the difference in Vantage is slightly larger (20 to 30 points) but still a small difference relative to the standard deviation. Origination balance and credit card utilization are comparable across the two groups. Poor documentation tends to be more common in the Control Group, while second liens (closed end seconds (CES) and HELOCs) are found more often in the Control Group. There are also some differences in origination cohorts: Countrywide loans are more common in the latter half of 2006. Overall, however, the differences are small, suggesting that Countrywide and the Control Group serviced comparable loans.

Table 4 shows how these characteristics had evolved by September 2008, the month before Settlement announcement. This table summarizes the outstanding stock of 2/28 ARMs in September 2008, conditional on them being current two months earlier (this conditioning ensures that we are looking at a stock of loans that could have rolled straight to 60 days past due in the month before the program). We are particularly interested in the evolution of CLTV and borrower credit scores over time. Measured at medians, current CLTV is virtually identical between Countrywide and the Control Group; it is only slightly higher among Countrywide loans when

measured at means. Thus, while we observe small differences in CLTV at origination, those differences have disappeared by September 2008. The two groups also experienced small changes in credit scores over time. Among Countrywide loans, median Vantage scores increased by 4 points (mean scores increased by less than 1 point). In the Control Group, median Vantage score declined by 14 points, while the mean fell by about 17 points. These are tiny changes relative to the standard deviation (108.1 for Current Vantage). Across other dimensions—documentation, credit card utilization, second liens—differences between Countrywide and Control Group loans are smaller in September 2008 than they were at origination.

Table 5 compares modification rates between Countrywide and Control Group ARMs. Prior to October 2008, modification rates were consistently close to zero among Countrywide loans and equal to about .5 percent in the Control Group. After the Settlement announcement, however, we see a marked change in Countrywide modification rates. They remain approximately zero until February 2009, when the rate rises suddenly to 1.6 percent. This is consistent with public statements by Countrywide, indicating that it would implement the Settlement—including unsolicited interest rate modifications—beginning in December 2008.

Figures 1 through 3 explore our identifying assumption further. They track the evolution of interest rates, Vantage Scores, and CLTV over time for quarterly loan vintages from the fourth quarter of 2005 through the first quarter of 2007. These vintages account for almost 90 percent of the outstanding current loans in our sample just prior to the program announcement. At each point in time in these figures, we compute the mean of variable among loans that were current two months prior.

Within each origination quarter, Countrywide and Control Group loans generally track each other closely. We do see a difference in interest rates around the reset date for some vintages: overall Countrywide loans tend to reset to a slightly higher average interest rate than Control Group loans. This suggests that Countrywide loans in this vintage may have been riskier than those in the Control

Group. We control for this difference—by, among other things, controlling for variation in interest rates over time—in the regressions reported below.²⁷

Figures 2 and 3 show that Vantage scores and CLTV evolved in similar patterns for Countrywide and Control Group loans. Overall, these patterns point to comparability between Countrywide and Control Group loans before the Settlement was announced in October 2008. Because variation between the two groups could be due to differences in the timing and mix of mortgages originated, we include a wide range of controls (for mortgage, loan pool, and individual borrower characteristics) in the regressions below.

We estimate two types of linear probability models. We begin with a panel model of the following form:

$$\Pr(Y_{it}=1|Current_{t-60})=\alpha+\beta\cdot CW_{it} + \mu\cdot Nov-Jan + \delta\cdot CW_{it}\cdot Nov-Jan + \gamma X_{it}+\varepsilon_{it} \quad (1)$$

The dependent variable is the probability that a mortgage becomes 60 days past due in month t ($Y_{it}=1$), conditional upon being current 60 days earlier ($Current_{t-60}$). We call this the “rollover rate” from current to 60 days delinquent. CW_{it} is a dummy variable that takes the value 1 if the loan is serviced by Countrywide. $Nov-Jan$ is another dummy, taking the value 1 if month t occurs the period November 2008 through January 2009. November 2008 is the first month during which we would observe a borrower response to announcement of the Settlement (because it was announced on October 6, 2008, our data would register a response no earlier than November). Because the federal government announced HAMP in February 2009, we view January 2009 as the last month of the “program period.” After that month, there is a potential confound. X_{it} is a vector of loan and borrower characteristics that includes variables such as initial and current Vantage score, initial and current CLTV, origination quarter, initial interest rate and loan balance, the magnitude of any interest rate reset, dummies for each quarter before and after the Settlement announcement, and interactions between these time dummies and the Countrywide indicator.

²⁷ FRM results later in the paper will avoid any differences in reset interest rates that might come from comparing Countrywide and Control Group 2/28 mortgages.

The coefficient of interest is δ , which measures the difference in rollover rates between Countrywide and Control Group loans relative to months just before the program period (September – October 2008). Standard errors are clustered by mortgage. The estimation period runs from January 2008 to March 2009.

We also estimate equation (1) separately for subsamples of loans with the same origination quarter. This is useful for two reasons. First, it allows us to control more carefully for heterogeneity across loans due to vintage-specific effects, such as the date of an interest rate reset. Loans with the same origination quarter reset at approximately the same time. Second, by analyzing origination cohorts separately, we can identify more precisely the particular borrowers who responded to the Settlement announcement.

4. Modification and Strategic Behavior

4.1 Strategic Defaults in Hybrid ARMs

We observe an increase in delinquency rates among Countrywide borrowers immediately after the Settlement announcement. Figure 4 follows the stock of Countrywide loans from December 2007 to March 2009. Around October 2008, we see a marked decline in the proportion of loans that are current and a large increase in the proportion that are delinquent. Figure 5 plots the stock of Control Group loans for the same period, but we observe no comparable changes in delinquency rates.

The patterns in these figures are largely confirmed by Table 6, which reports the monthly rollover rate for Countrywide and Control Group loans during the period July 2008 through March 2009. In the top panel, we report the proportion of mortgages that became 60 days past due in a particular month, conditional upon being current two months earlier. The bottom panel reports the proportion of mortgages that satisfy two conditions: (i) became 60 days past due during a particular month, conditional upon being current two months earlier, and (ii) the borrower was current on credit card balances at the time of default and remained current for the next six months. We view these conditions as characteristics of “strategic defaults:” borrowers are defaulting even though they have access to liquidity (as evidenced by their ability to remain current on credit card accounts).

Industry reports often use the same definition of strategic defaults when reporting mortgage delinquencies, drawing the same inferences that we do in our analysis.²⁸

Both panels of Table 6 show that rollover rates trended upwards among Countrywide and Control Group loans during the period July 2008 to March 2009. But there is a significant and temporary increase among Countrywide loans during the period immediately after Settlement announcement, November 2008 through January 2009. Control Group loans also experience a temporary increase in rollover rates around this time, but the increase begins a month later in December 2008. We will account for these trends in our analysis below, which compares defaults immediately before and after the Settlement announcement among Countrywide and Control Group loans.

Table 7 implements our specification in equation (1). Column (1) estimates the model using the full BlackBox sample; Column (2) uses the smaller BlackBox-Equifax merged sample. In both columns, the dependent variable is the probability that a loan rolls straight from current to 60 days delinquent. Column (3) changes the dependent variable to measure strategic defaults (rolling straight to 60 days delinquent while remaining current on credit card balances for the next 6 months).

All specifications include a wide range of loan- and borrower-level characteristics, including origination FICO, initial and current CLTV, initial interest rate and any change in the rate over time, a Countrywide dummy, whether the loan reset within the previous 3 or 6 months (and interactions between these reset variables and the Countrywide dummy), and quarterly cohort dummies. We also include a set of time dummies (Jan-Mar, Apr-Jun, Jul-Aug, Nov-Jan, Feb-Mar) that identify two- to three-month intervals before and after the Settlement was announced. The excluded category is September 2008 to October 2008, the two months immediately preceding the Settlement announcement (although the Settlement was announced in October 2008, data for October 2008 are measured as of October 1, which precedes the Settlement announcement on October 6). We interact each of these time dummies with the Countrywide dummy. Together, these

²⁸ See Experian-Oliver Wyman Market Intelligence Reports (2009-2010).

time and Countrywide*time dummies control for time-varying differences between Countrywide and Control Group loans. These variables also account for heterogeneity across loans and systematic differences between Countrywide and Control Group loans, including the possibility that Countrywide mortgages experience higher default rates at rate resets or during other time periods. Together, the variables allow us to test whether post-Settlement differences between Countrywide and the Control Group are significantly different from pre-Settlement differences.

The key covariate is the interaction Countrywide x Nov-Jan, which tests whether the difference in rollover rates between Countrywide and the Control Group is greater immediately after the Settlement announcement than immediately before (the omitted category is September – October 2008). Because we are using an OLS²⁹ specification, the coefficients in these tables are marginal effects and can be compared to the mean monthly rollover rate among Countrywide loans during the period September – October 2008, as reported at the bottom of the table (“Avg Delinquency”).

Across all columns in Table 7, the Countrywide x Nov-Jan interaction is positive, highly significant, and large relative to the rollover rate among Countrywide loans immediately before the Settlement announcement. We find this effect in both the BlackBox and matched samples. Column (2) reports that the rollover rate increased by 0.38 percent, a 6.4 percent increase relative to the mean rollover rate of 5.85 percent. The effect (0.42 percent) is larger for strategic defaults in Column (3), showing a 19.1 percent increase relative to the mean strategic default rate of 2.19 percent. Moreover, the Countrywide x Nov-Jan coefficients in column (2) and (3) are very similar in magnitude, suggesting that most, if not all, of the increase in delinquency among Countrywide loans is due to strategic defaults.

While strongly statistically significant, these effects are moderate in size and are derived from a model that implicitly constrains the effect of the Settlement

²⁹ We also estimate equation (1) using a logistic specification in order to account for the boundedness of the dependent variable. Such estimation is computationally intensive due to the inclusion of interaction variables that require additional estimation to correctly compute standard errors. The results we obtained so far indicate that the logistic specification yields results that are very similar to the OLS estimates reported here.

announcement to be the same for all loan vintages. The Settlement, however, likely impacted some loan vintages more than others. By its terms, it targeted loans that reset around or after the Settlement announcement. We therefore separately examine loans by vintage to determine whether the effect is larger for the targeted loans.

We rerun the specifications in Columns (2) and (3) separately for quarterly origination cohorts in Tables 8 and 9. Each column analyzes a separate sample, consisting only of loans originated during the quarter of interest. In Table 8, the Countrywide x Nov-Jan interaction is significant only for loans originating during the third quarter of 2006, which were undergoing interest rate resets just before the Settlement was announced. The effect here is quite large: the rollover rate increased by 2.29 percentage points, a 41.6 percent increase relative to the rollover rate among Countrywide loans in September-October 2008 (5.5 percent). We see a much larger relative effect for this origination vintage when we study the probability of strategic default in Table 9. Column (7) reports a 1.83 percentage point increase in strategic defaults, an 88.4 percent increase relative to the mean rate of strategic default in September 2008 (2.07 percent). Again we find that the Countrywide x Nov-Jan coefficients are very similar in magnitude for regular as well strategic delinquencies among loans originating during the third quarter of 2006. This suggests that most of the increase in delinquencies among Countrywide loans during this period (relative to the Control Group) is due to strategic defaults. We do not, however, observe an effect of the Settlement on strategic defaults in prior quarters.

These estimates suggest that the Countrywide Settlement increased the incentive of borrowers to become delinquent in order to benefit from the program. The effect is most pronounced among the borrowers targeted by the Settlement: those with loans that were resetting around the time of the Settlement. Almost the entire statistical increase in defaults after the Settlement was in strategic defaults by homeowners who were otherwise able to pay their credit card bills. The increase in defaults is very large: a 41 percent increase in defaults and a near doubling of strategic defaults.

To better understand who is defaulting and to consider alternative proxies for borrowers who might have been able to make their payments but chose not to, we

divide the sample by levels of credit-card utilization, measured at September 2008. Borrowers with low levels of utilization (e.g., those who have accessed less than 30 percent of their available balances) are likely to be less liquidity constrained and therefore less vulnerable to economic shocks than borrowers with high levels of utilization. Columns (1) through (3) of Table 10 show that the effect of the Settlement is strongest among borrowers with the lowest utilization levels. The effect is insignificant among borrowers with high utilization levels. These results are inconsistent with the possibility that idiosyncratic economic shocks to Countrywide borrowers explain the differences between Countrywide and Control Group loans after the Settlement announcement. This result may also support the hypothesis that the Settlement induced defaults among borrowers who were unlikely to default otherwise, at least in the near future.

We obtain further evidence on potential strategic behavior by splitting the sample by CLTV levels, as in Columns (4) through (6) of Table 10. Borrowers with low CLTV levels (below 90) are much less likely to default than those with very high levels (above 110). This is evident from the “Average Delinquency” row in Table 10, which shows that the rollover rate for Countrywide loans in September 2008 rises from 3.4 percent for borrowers with low CLTV to 7.9 percent for those with high CLTV. Although low CLTV borrowers were *less* likely to default prior to the Settlement, Table 10 shows that the Settlement had a *larger* effect among these borrowers than among those with high CLTV. The coefficient for Countrywide x Nov-Jan is equal to 0.78 percent among low CLTV borrowers, a 22.8 percent increase relative to the rollover rate in September-October 2008 (3.4 percent). Among high CLTV borrowers, the coefficient is 0.44 percent, a 5.6 percent increase. The coefficient for the low CLTV group is only marginally significant, but this most likely reflects the relatively small sample size.

The foregoing patterns—strong effects of the Settlement on rollover rates among borrowers with relatively low credit card utilization and CLTV—are also evident when we estimate the probability of strategic default in Table 11. Even among borrowers who strategically defaulted in response to the Settlement announcement, the most responsive groups were those with low utilization.

Table 12 repeats these credit card utilization and CLTV comparisons in the subsample of loans originated in Q3 2006, the vintage where we find the most pronounced program effects. Here, the comparisons are stark. Among borrowers with the lowest utilization levels and CLTV levels, the delinquency rate among Countrywide borrowers increases in relative terms by 91.5 percent and 88.5 percent, respectively, immediately after the Settlement announcement. By contrast, delinquencies rise by 41.8 percent and 26.8 percent among borrowers with high utilization and CLTV. Taken together, these results are strongly consistent with a strategic default hypothesis.

4.2 Strategic Defaults in FRMs

Our results for ARMs could reflect idiosyncratic characteristics of Countrywide loans resetting during the sample period. To address this possibility, we examine the behavior of borrowers with fixed-rate mortgages (FRMs). The Settlement offered relief to subprime FRM borrowers, but a substantial fraction of securitized FRMs in our data are non-subprime loans offered to borrowers who had good credit. Non-subprime FRMs therefore provide a useful control group: although the Settlement could affect behavior among subprime FRM borrowers, we do not expect to observe a post-Settlement change in the behavior of non-subprime FRM borrowers (relative to those with FRMs serviced by Control Group institutions).

Subprime status is difficult to define, as there is no single agreed-upon definition. In order to be conservative, we define an FRM as “subprime” if origination FICO was less than 620, a common threshold for subprime status.³⁰ While some mortgages whose borrowers had an origination FICO above 620 might be also be considered subprime for a variety of reasons, including having a low down payment, mortgages with a FICO below 620 are quite likely to be viewed as subprime and thus qualify for modification under the Settlement if they were also delinquent.

The next set of tables and figures—Tables 13 through 18 and Figures 6 through 10—present summary statistics and delinquency rates separately for low and high FICO FRMs. Tables 13 and 14 present origination statistics. Among low-FICO

³⁰ See Keys, et. al. (2010a) for a discussion of the various definitions of subprime mortgages.

loans (Table 13), Countrywide loans tend to have slightly lower CLTV and interest rates, but higher Vantage and FICO, relative to loans in the Control Group. Similar to the summary statistics for 2/28 ARMs, Countrywide FRMs tend to have substantially lower rates of low or no documentation loans, lower credit card utilization, and second liens. Virtually the same differences characterize high-FICO FRMs (Table 14), except that there is no meaningful difference in the rate of low or no documentation loans.

Some of these differences attenuate when we examine summary statistics among FRMs in September 2008. This table examines the stock of loans in that month, conditional upon them being current two months earlier. Among both low-FICO and high-FICO loans (Tables 15 and 16), initial CLTV, origination FICO, current Vantage, credit card utilization, and the incidence of second liens are closely comparable across Countrywide and the Control Group. These patterns point to the comparability of Countrywide and Control Group FRMs during the period of our study.

Figures 6 through 8 plot the time variation in interest rates, Vantage, and CLTV for low-FICO loans. There is a consistent gap in the interest rate, with Countrywide FRMs having interest rates that are about .2 percent lower than those in the Control Group. Vantage scores, plotted in Figure 7, display a small gap over time, growing from a 5-point difference in early 2008 to 10 points in March 2009. The difference in CLTV is small too, and also grows slightly over time (Figure 8).

Tables 17 and 18 track rollover (top panel) and strategic default (bottom) rates by month for low- and high-FICO FRMs. Among low-FICO loans (Table 17), Countrywide rollover and strategic default rates are increasing until January 2009 and fall thereafter. Control Group loans, by contrast, display no obvious trend. This difference between Countrywide and the Control Group does not characterize high-FICO FRMs: across both groups, rollover and strategic defaults are increasing through January 2009 and falling somewhat thereafter.

Figures 9 and 10 explore the difference between Countrywide and the Control Group among low-FICO FRMs. We observe a sudden increase in Countrywide borrowers who are 90 days past due beginning in November 2008. No similar change

is apparent among Control Group borrowers in Figure 10, suggesting that the Settlement may have affected delinquency rates among low-FICO Countrywide FRMs.

This is confirmed in Tables 19 and 20, which estimate our baseline specification on FRMs. In Table 19, column (1) uses the full BlackBox sample, (2) subsets on the BlackBox-Equifax merged sample, and (3) and (4) separately analyze low- and high-FICO loans. We find a small and marginally significant effect of the Settlement on Countrywide mortgages in the BlackBox sample, but no effect in either the merged sample or the high-FICO subsample. A strong Countrywide Settlement effect is evident only when we restrict the sample to low-FICO loans as in Column (3). Here, the rollover rate increased 0.496 percent during the period November 2008 to January 2009, a 22.4 percent increase relative to the rollover rate in October 2008 (2.21 percent). Strategic defaults are also important in this sample, as Table 20 shows, even though they represent a relatively small proportion of all defaults. Strategic defaults increased by 24.5 percent, though the coefficient for low-FICO FRMs (0.15 percent) is only marginally significant. Taken together, Tables 19 and 20 imply that strategic defaults accounted for about 30 percent of excess delinquencies among Countrywide FRMs immediately after the Settlement announcement (calculated as 0.15 divided by 0.496). By contrast, strategic defaults accounted for nearly all such excess delinquencies among 2/28 ARMs.

Finally, Tables 21 and 22 make the same credit card utilization and CLTV comparisons that we performed for 2/28 ARMs. Both tables subset on low-FICO FRMs, the group of loans that exhibit a response to the Settlement announcement. An increase in rollover rates (Table 21) is evident among borrowers with both high and low credit card utilization, but the effect is slightly larger among those with low utilization (relative to the mean in September-October 2008, rollover rates increased 46.7 percent and 39.8 percent among low and high utilization borrowers, respectively). Across CLTV levels, however, we observe an effect only among borrowers with high CLTV. Table 22 repeats the analysis for strategic defaults. Here we observe an effect only among high utilization borrowers. High CLTV borrowers also exhibit an effect, but it is at best marginally significant.

Overall, these results parallel those we obtain for 2/28 ARMs: announcement of the Settlement induced a large increase in relative rollover rates and strategic defaults among Countrywide mortgages that were eligible for relief, but not among non-Countrywide mortgages and not among Countrywide mortgages that were ineligible for relief. Among both ARMs and low-FICO FRMs, we observe strong effects on rollover rates among borrowers with low credit card utilization and low CLTV, consistent with the strategic default hypothesis. But in one respect our results for low-FICO FRMs differ from those for ARMs: we do not find strong effects of the Settlement on strategic defaults among low-FICO FRM borrowers with low credit card utilization or low CLTV.

5. Conclusion³¹

The results in this paper provide evidence of strategic behavior by borrowers who were willing to suspend mortgage payments in order to qualify for a newly announced mortgage modification, even though they were less likely to become delinquent otherwise. In the months immediately following the announcement of the Countrywide Settlement, the number of Countrywide ARM borrowers rolling from current to 60 days delinquent rose by 6.4 percent relative to comparable servicers whose mortgages were not covered by the legal settlement. The effect of the Settlement announcement is much larger—19 percent—for strategic defaults, defined as rolling from current to 60 days delinquent while remaining current on credit cards during the full six months following the mortgage delinquency. We find that the post-announcement increase in delinquencies among Countrywide ARMs is driven entirely by the cohort of loans most likely to benefit from the Settlement: borrowers whose interest rates were resetting as the Settlement was announced. Among these borrowers, default rates increased about 41 percent, nearly doubling the number of strategic defaults as defined above. The estimated effects are strongest among those who appear least likely to have defaulted otherwise: borrowers who had

³¹ In a forthcoming draft we assess whether loan outcomes (foreclosure, returning to current, etc.) varied between loans that were eligible for relief under the Settlement and those that were ineligible.

utilized only a small percentage of their credit card limits and those with the lowest CLTVs were the most responsive to the announcement. These groups experienced the sharpest rise in both rollover rates and in strategic defaults, relative to comparable loans in the Control Group, immediately after the Settlement announcement. We confirm that these results are not due to idiosyncratic features of Countrywide ARMs by finding comparable effects among low-FICO FRMs (eligible for relief under the Settlement), but not among high-FICO FRMs (ineligible).

These results highlight the challenges associated with modifying mortgages in the presence of strategic behavior. Lenders can observe some of the same proxies for strategic behavior that we use in this paper, such as credit utilization and current credit scores. But other variables, such as ex-post payments on credit cards and the current cumulative loan-to-value (CLTV) ratio, may not be observable at the time of the modification decision.³² Recognizing this problem, mortgage modification programs often require costly reporting by borrowers, as well as trial periods, before permanent modification takes place. If borrowers behave strategically as our results seem to suggest, these expensive and time-consuming verification procedures may be more cost effective in the long run than offering modifications to all delinquent borrowers.

Our results may also explain why the federal HAMP program has had great difficulty in qualifying large numbers of borrowers for permanent mortgage modifications. Initial qualification requires only verbal information, while permanent modifications are time consuming and costly. In the presence of strategic behavior, it is important to find a tool that allows truly needy borrowers to separate themselves from other borrowers. Such a tool is not immediately apparent.

³² While lenders can obtain current mortgage balances, house price indexes used to compute CLTV are reported with a two-month lag after the sales took place.

References (Incomplete)

- Berndt, Antje, and Anurag Gupta, 2009, Moral Hazard and Adverse Selection in the Originate-to-Distribute Model of Bank Credit, *Journal of Monetary Economics* 56, 725-743.
- Bolton, Patrick, and Howard Rosenthal, 2002, Political Intervention in Debt Contracts, *Journal of Political Economy* 110, 1103-1134.
- Bucks, Brian K., and Karen Pence, 2008, Do Borrowers Know their Mortgage Terms?, *Journal of Urban Economics* 64, 218-33.
- Campbell, John, Stefano Giglio, and Parag Pathak, 2009, Forced Sales and House Prices, forthcoming in *American Economic Review*.
- Chetty, Raj, 2008, Moral Hazard vs. Liquidity and Optimal Unemployment Insurance. *Journal of Political Economy* 116, 173-234.
- Elul, Ronel, Nicholas S. Souleles, Souphala Chomsisengphet, Dennis Glennon, Robert Hunt, 2010, What “Triggers” Mortgage Defaults, *American Economic Review Papers & Proceedings* 100, 490-494.
- Farhi, Emmanuel, and Jean Tirole, 2009, Collective Moral Hazard, Maturity Mismatch and Systemic Bailouts, Harvard University working paper.
- Foote, Christopher, Kristopher S. Gerardi, and Paul Willen, 2008, Negative Equity and Foreclosure: Theory and Evidence, *Journal of Urban Economics* 64, 234-245.
- Guiso, Luigi, Paola Sapienza, and Luigi Zingales, 2009, Moral and Social Constraints to Strategic Defaults on Mortgages, Chicago Booth working paper.
- Keys, Benjamin, Tanmoy Mukherjee, Amit Seru, and Vikrant Vig, 2010a, Did Securitization Lead to Lax Screening? Evidence From Subprime Loans, *Quarterly Journal of Economics* 125, 307-362.
- Keys, Benjamin, Tanmoy Mukherjee, Amit Seru, and Vikrant Vig, 2010b, 620 FICO, Take II: Securitization and Screening in the Subprime Mortgage Market, Chicago Booth working paper.
- Kroszner, Randall, 2003, Is It Better to Forgive than to Receive? An Empirical Analysis of the Impact of Debt Repudiation, University of Chicago working paper.
- Lacko, James M., and Janis K. Pappalardo, 2007, Improving consumer mortgage disclosures: An empirical assessment of current and prototype disclosure forms, Staff Report, Federal Trade Commission Bureau of Economics.

- Mayer, Christopher, Edward Morrison, and Tomasz Piskorski, 2009, A New Proposal for Loan Modifications, *Yale Journal on Regulation* 26, 417-429.
- Meyer, Bruce, 1990, Unemployment Insurance and Unemployment Spells, *Econometrica* 58, 757-82.
- Mian, Atif, and Amir Sufi, 2009, The Consequences of Mortgage Credit Expansion: Evidence from the 2007 Mortgage Default Crisis, *Quarterly Journal of Economics* 124, 1449-1496.
- Moffitt, Robert, 1985, Unemployment Insurance and the Distribution of Unemployment Spells, *Journal of Econometrics* 28, 85-101.
- Mulligan, Casey, 2010, Foreclosures, Enforcement, and Collections under the Federal Mortgage Modification Guideline, NBER Working Paper No. 15777.
- Piskorski, Tomasz, and Alexei Tchisty, 2008, Stochastic House Appreciation and Optimal Mortgage Lending, Columbia Business School working paper.
- Piskorski, Tomasz, Amit Seru, and Vikrant Vig, 2010, Securitization and Distressed Loan Renegotiation: Evidence from the Subprime Mortgage Crisis, *Journal of Financial Economics* 97, 369-397.
- Poole, William, 2009, Moral Hazard: The Long-Lasting Legacy of Bailouts, Cato Institute working paper.
- Tufano, Peter, 2009, Consumer Finance, *Annual Review of Financial Economics* 1, 227-247.

**Figure 1: 2/28 ARMs by Origination Vintage: Interest Rate
(Current 2 Months Before)**

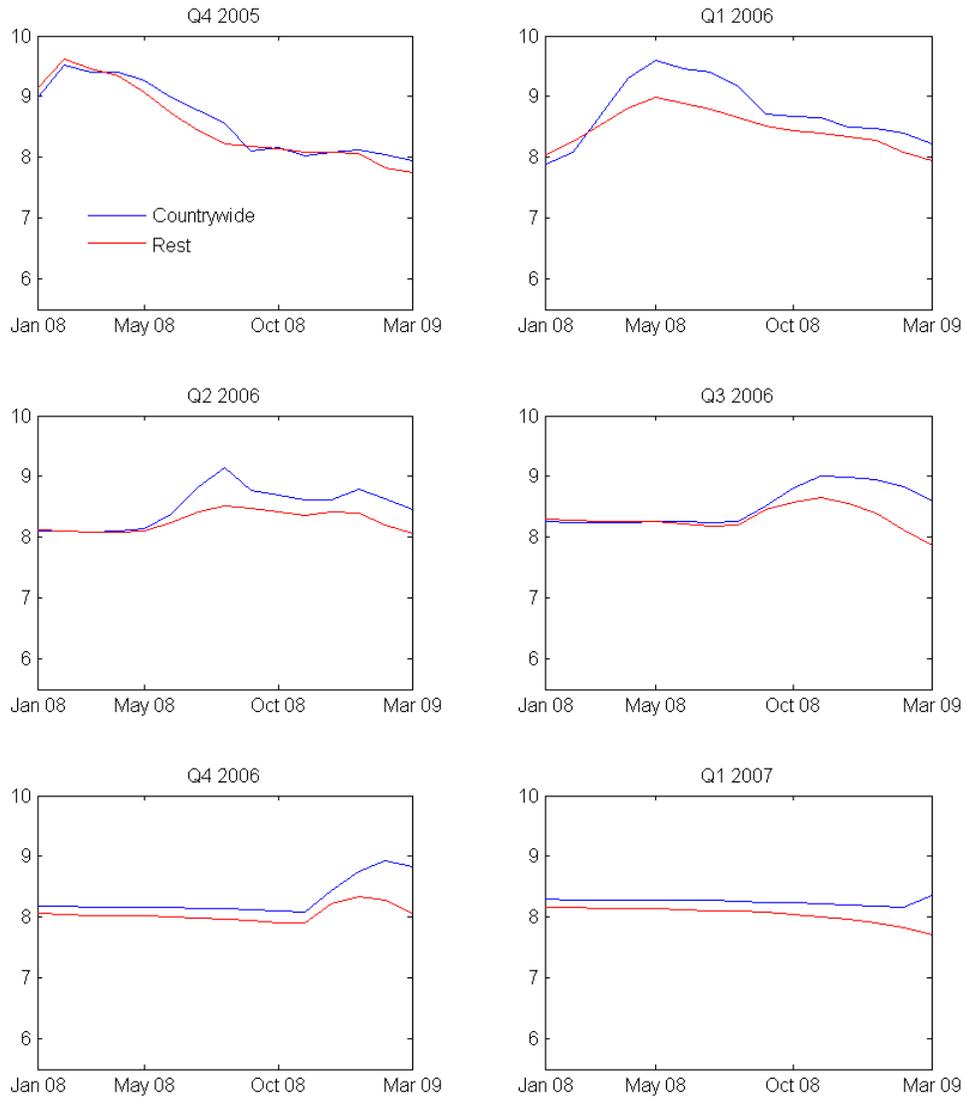


Figure 2: 2/28 ARMs by Origination Vintage: Vantage Score
 (Current 2 Months Before)

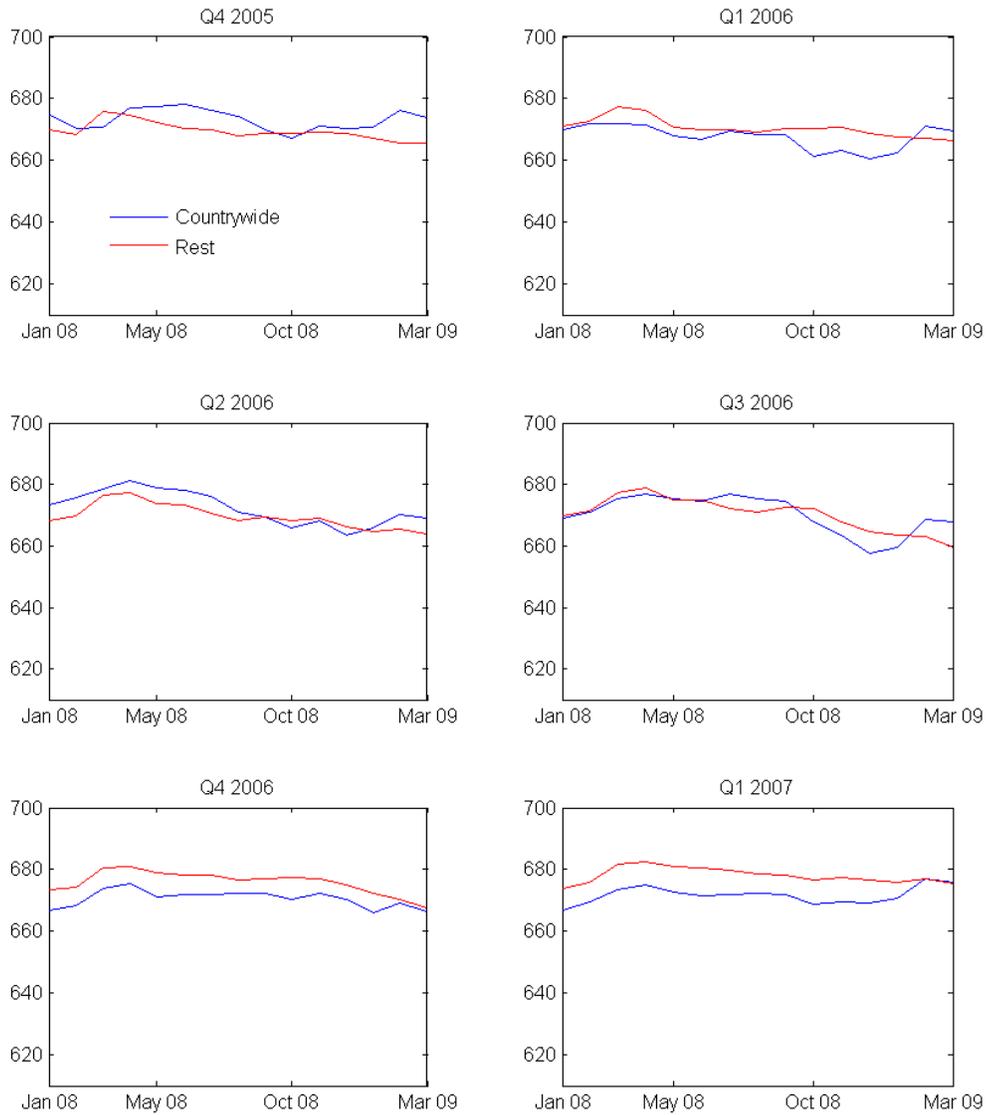


Figure 3: 2/28 ARMs by Origination Vintage: CLTV
 (Current 2 Months Before)

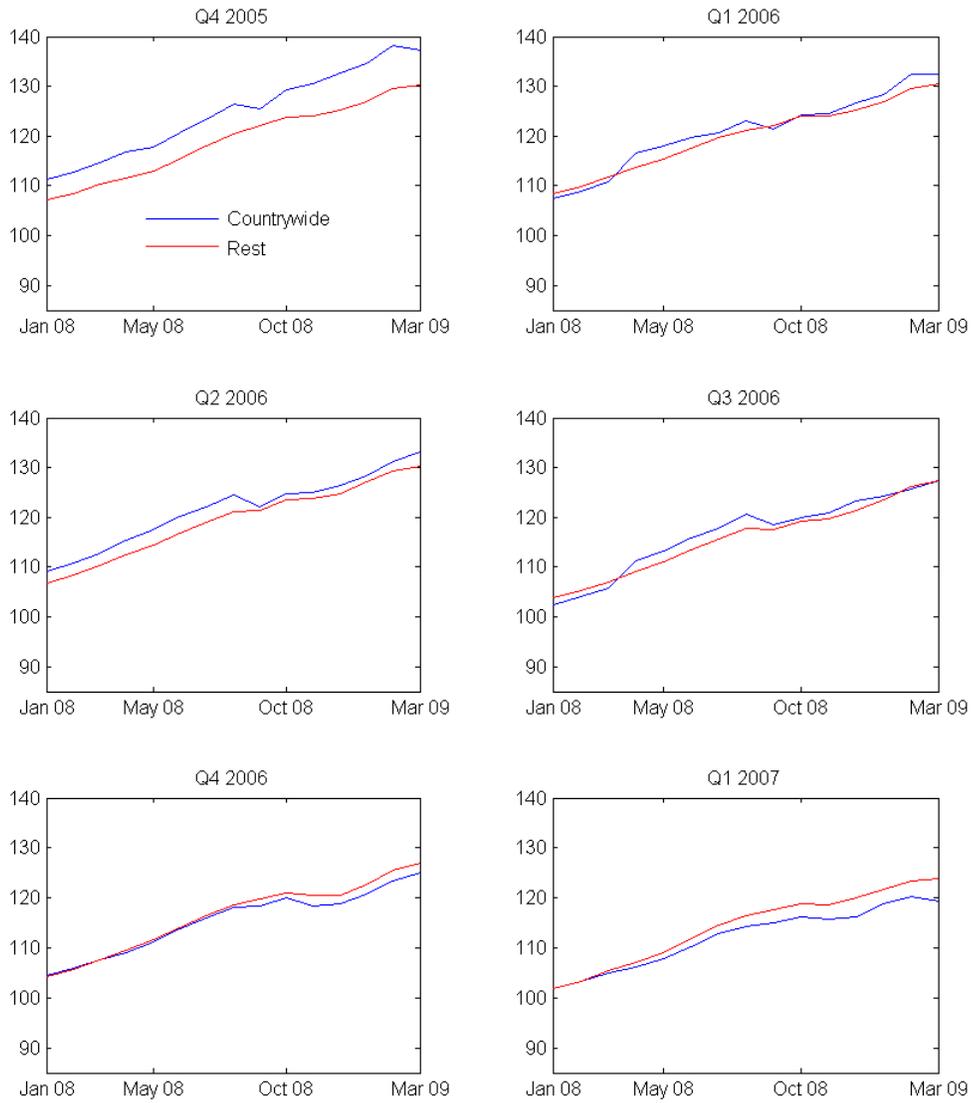


Figure 4: 2/28 ARM by Status--Countrywide

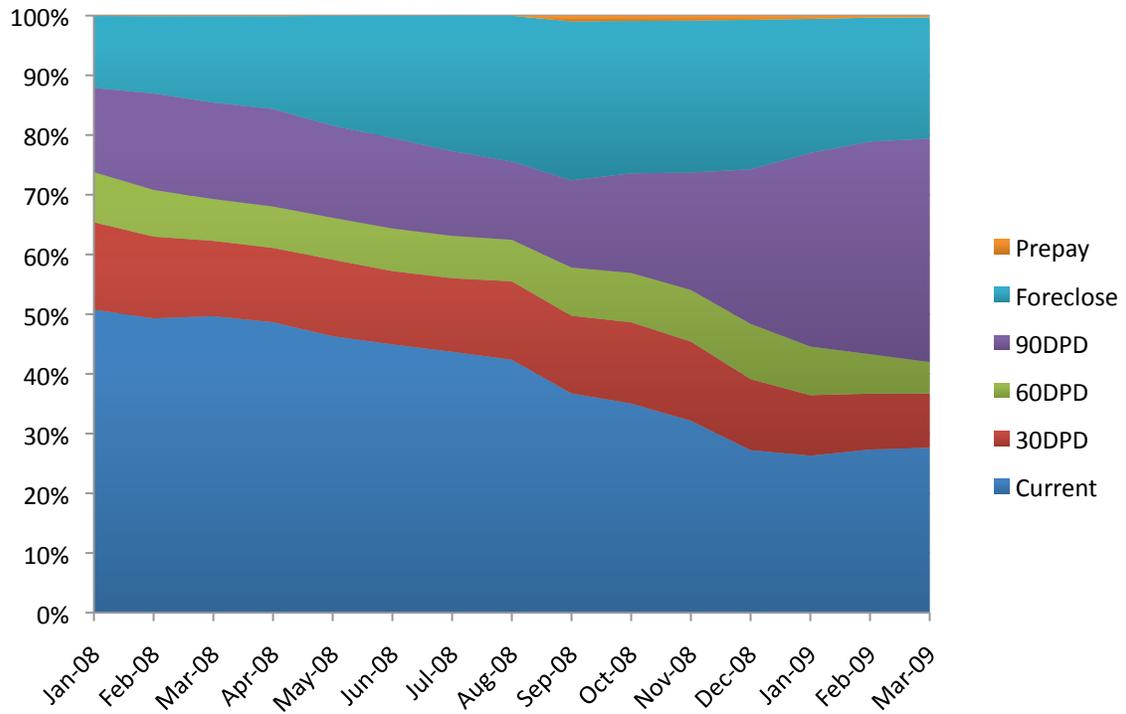


Figure 5: 2/28 ARM by Status--Rest

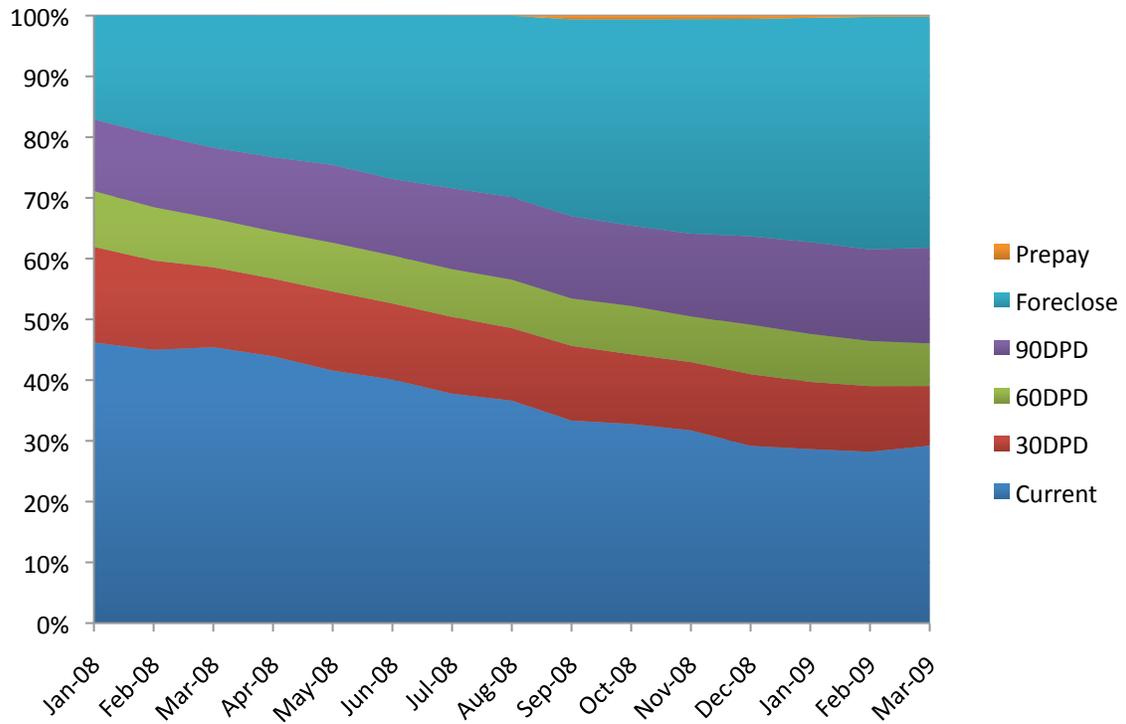


Figure 6: FRM Interest Rate by Servicer

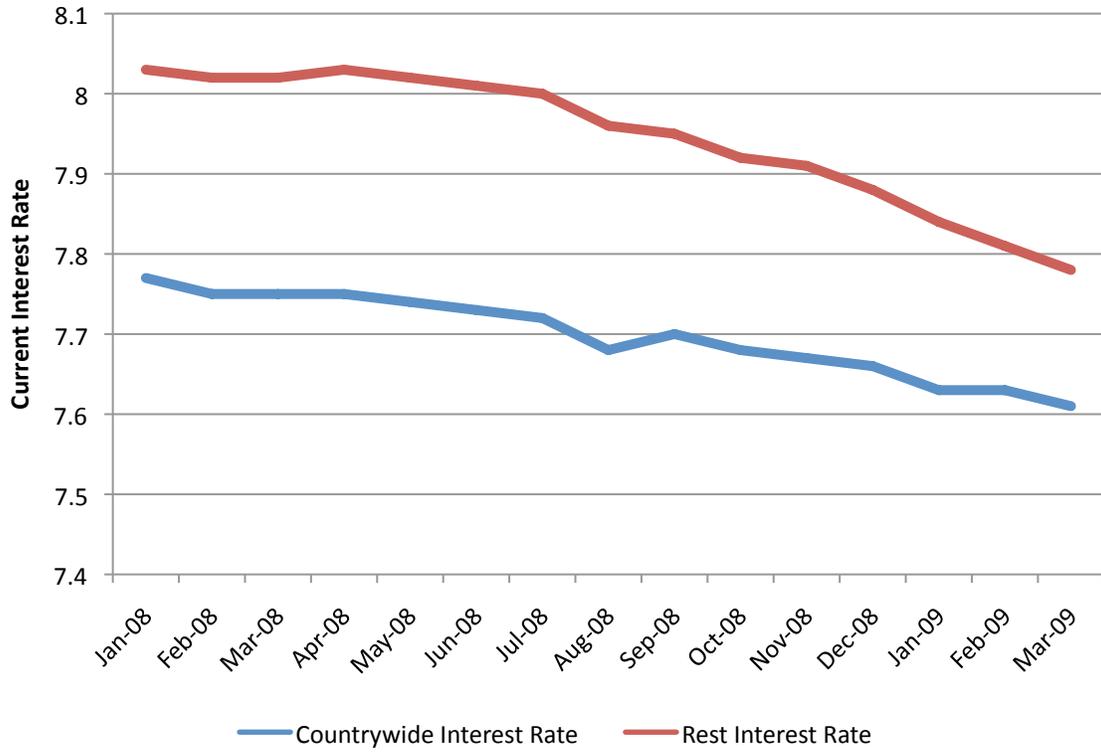


Figure 7: FRM Vantage by Servicer

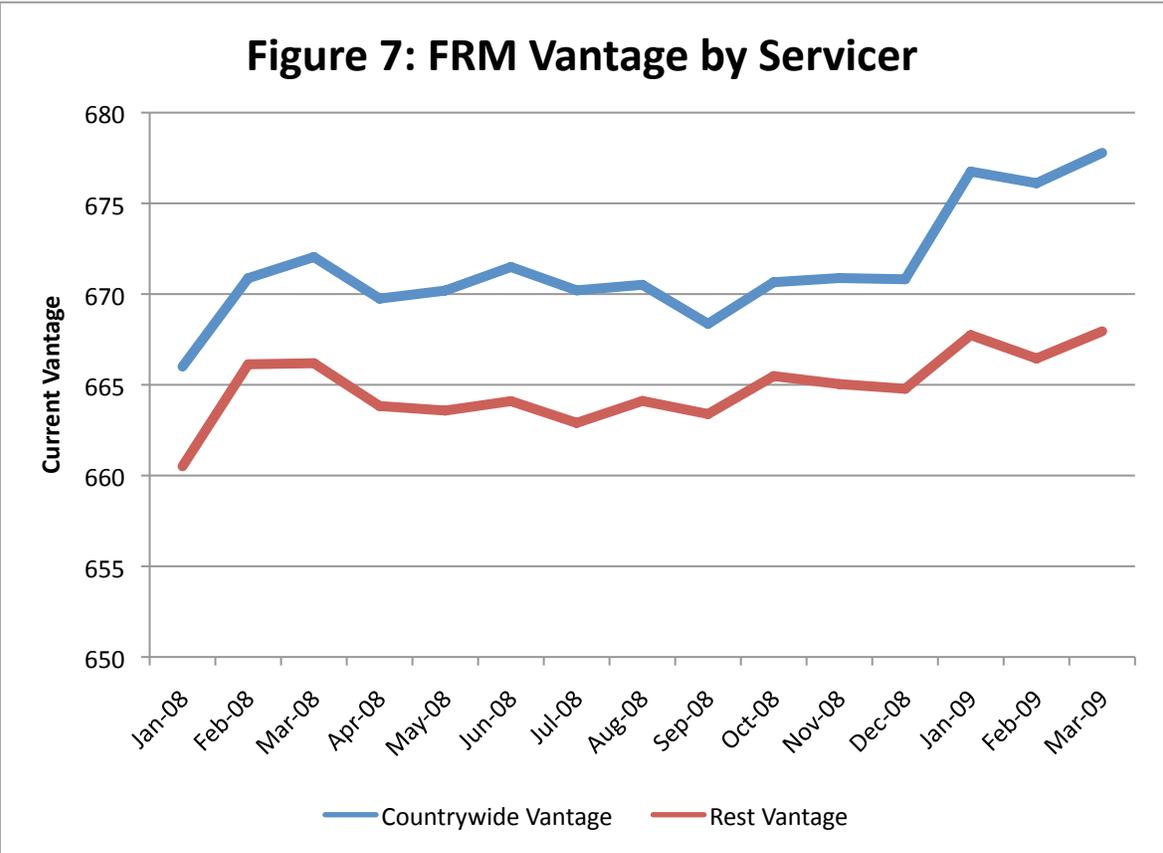


Figure 8: FRM CLTV by Servicer

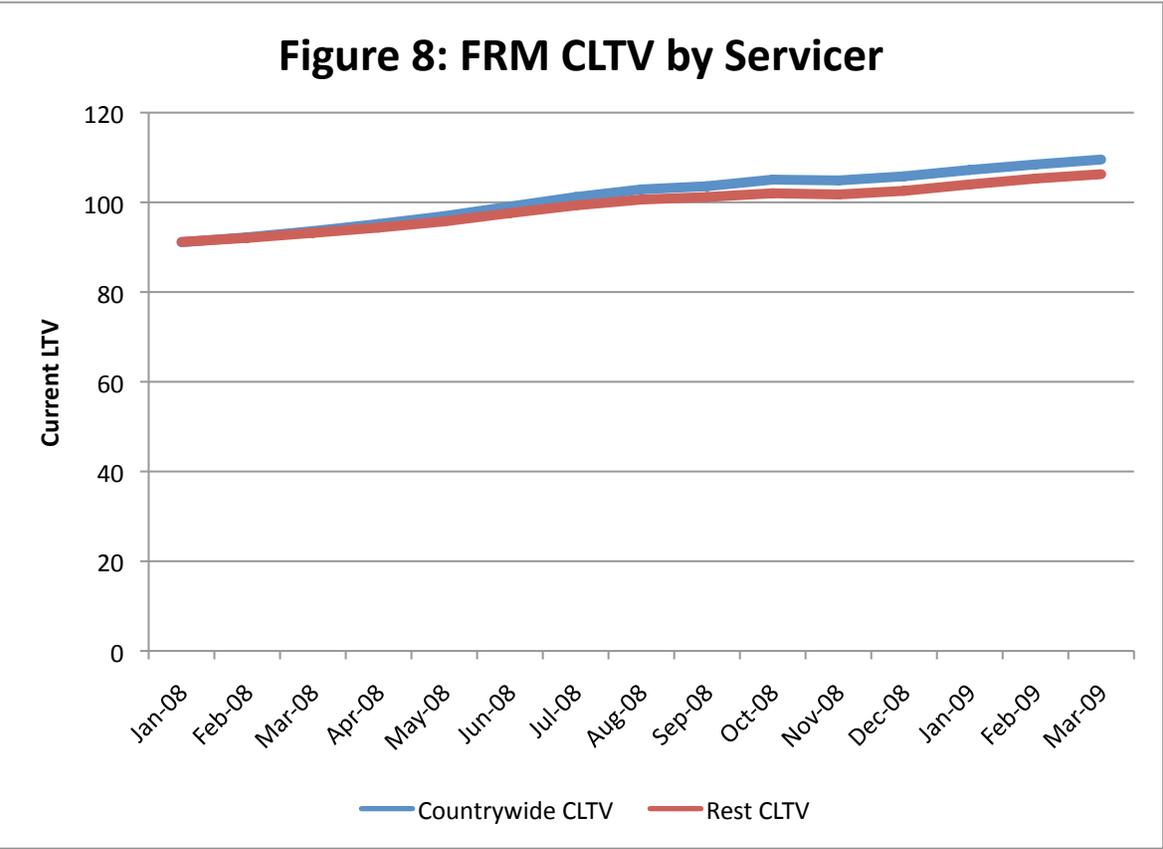


Figure 9: FRM Status--Countrywide

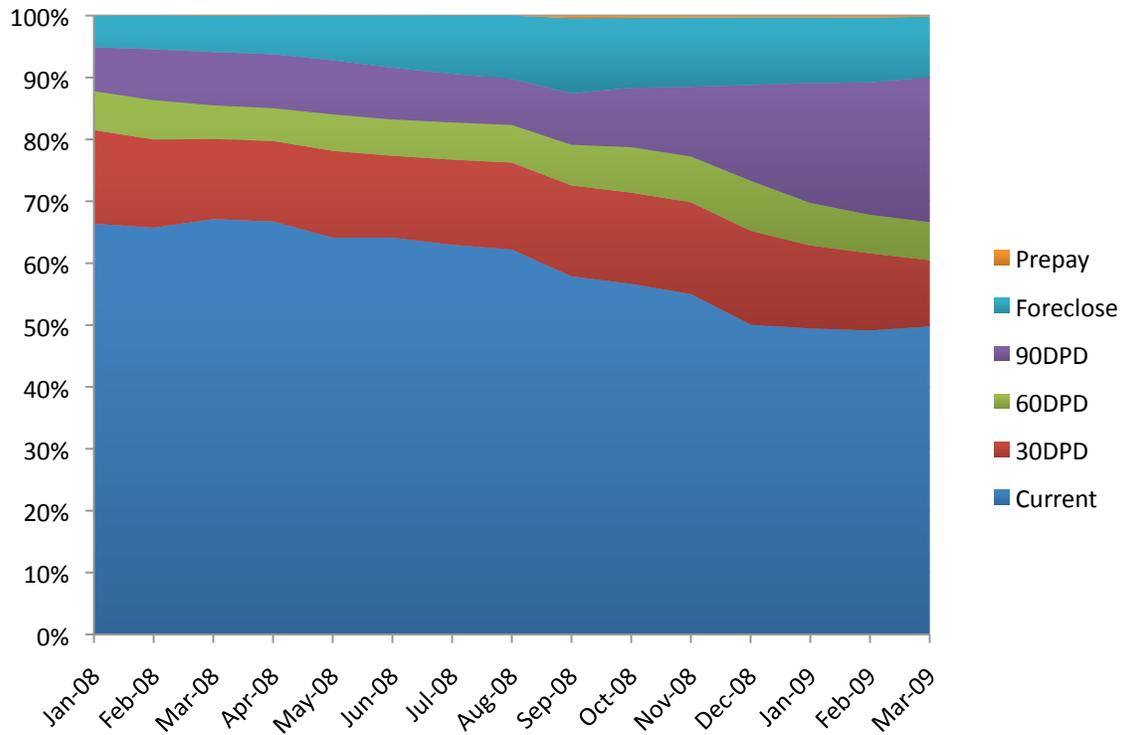


Figure 10: FRM Status--Rest

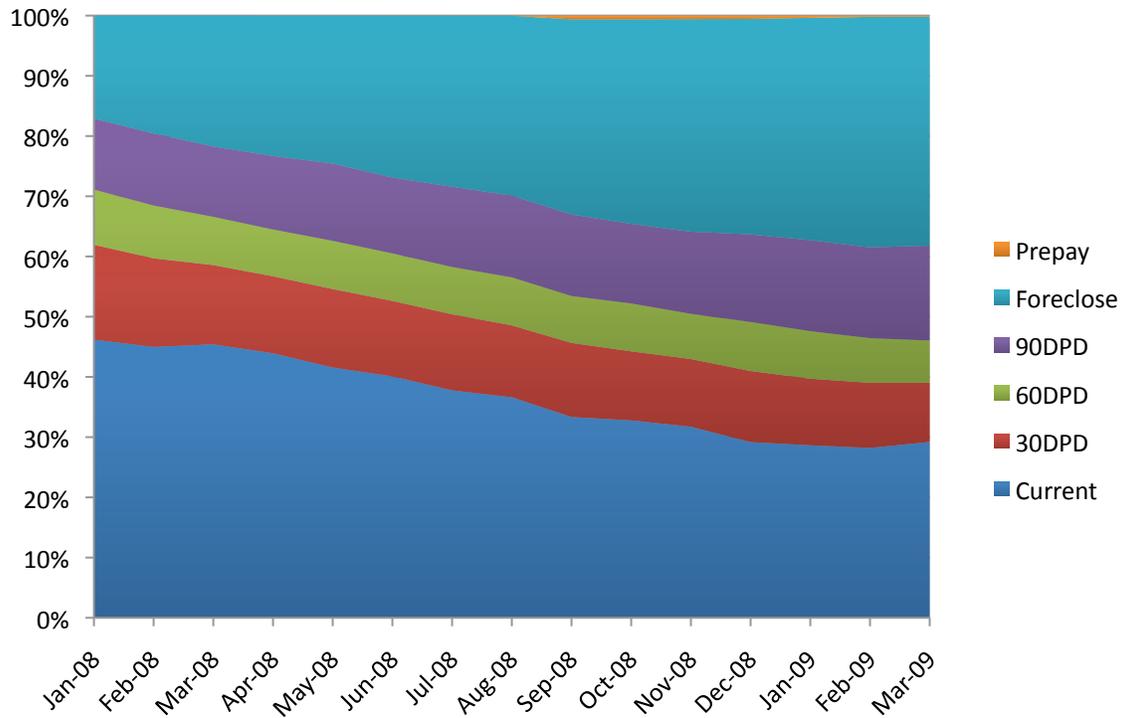


Table 1: Summary of Countrywide Settlement: Borrower Eligibility

Mortgage Type	Subprime Hybrid ARM, Option ARM, Subprime FRM
Origination Date	Before 2008
LTV	At least 75
Delinquency	Currently 60 or more days past due (dpd), or likely to become 60 dpd after rate reset or negative amortization trigger
Income	Post-modification payments (including tax/insurance escrow) do not exceed 42 percent of income

Table 2: Summary of Countrywide Settlement: Modification Options			
	Hybrid ARMs	Option ARMs	FRMs (and other subprime loans)
Option 1: Unsolicited extension of introductory interest rate period for 5 years	Yes		
Option 2: Extension of introductory rate for 5 years; conversion to FRM at low rate	Yes		
Option 3: 10-year interest-only period, followed by reduced interest rate for life of loan	Yes		Yes
Option 4: Reduced interest rate for life of loan			Yes
Option 5: Eliminate negative amortization, reduce principal to as low as 95 LTV, and either Option 3 or 4 .		Yes	

Table 3: Summary Statistics for 2/28 Mortgages At Origination–Matched Sample

	Countrywide			Rest			Total		
	mean	sd	median	mean	sd	median	mean	sd	median
Initial CTLV	91.78	8.825	95	89.62	9.137	90	90.15	9.109	90
Initial Interest Rate	8.268	1.331	8.2	8.087	1.256	7.99	8.131	1.277	8
Initial Vantage	651.7	67.40	648	665.5	74.65	661	662.1	73.18	657
Origination FICO	613.0	53.72	610	603.0	61.91	607	605.5	60.16	608
Origination Balance	207822.5	119954.8	177650	235239.9	146915.8	196800	228503.5	141264.7	191900
Low/No Doc	0.416	0.493	0	0.566	0.496	1	0.529	0.499	1
Utilization	0.484	0.337	.486	0.513	0.334	.532	0.506	0.335	.521
Originated 1Q2005	0.0111	0.105	0	0.0378	0.191	0	0.0313	0.174	0
Originated 2Q2005	0.0398	0.195	0	0.0710	0.257	0	0.0633	0.244	0
Originated 3Q2005	0.0728	0.260	0	0.0955	0.294	0	0.0899	0.286	0
Originated 4Q2005	0.0851	0.279	0	0.100	0.301	0	0.0966	0.295	0
Originated 1Q2006	0.0899	0.286	0	0.0977	0.297	0	0.0958	0.294	0
Originated 2Q2006	0.159	0.365	0	0.163	0.369	0	0.162	0.368	0
Originated 3Q2006	0.197	0.397	0	0.138	0.345	0	0.153	0.360	0
Originated 4Q2006	0.205	0.403	0	0.154	0.360	0	0.166	0.372	0
Originated 1Q2007	0.129	0.335	0	0.115	0.319	0	0.118	0.323	0
Originated 2Q2007	0.0129	0.113	0	0.0280	0.165	0	0.0243	0.154	0
CES+	0.0866	0.281	0	0.197	0.397	0	0.170	0.375	0
Low Util HELOC	0.0105	0.102	0	0.0142	0.119	0	0.0133	0.115	0
Observations	80615			247492			328107		
Observations with Util	60862			193967			254829		

Table 4: Summary Statistics for 2/28 Mortgages At September 2008, Current Two Months Ago-Matched Sample

	Countrywide			Rest			Total		
	mean	sd	median	mean	sd	median	mean	sd	median
Initial CTLV	91.42	8.997	95	89.51	9.194	90	89.96	9.184	90
Initial Interest Rate	8.008	1.258	7.875	7.930	1.201	7.875	7.948	1.215	7.875
Current Interest Rate	8.423	1.348	8.39	8.281	1.381	8.375	8.314	1.374	8.375
Current CLTV	122.3	28.08	117.8	120.4	27.53	115.8	120.8	27.67	116.3
Initial Vantage	668.5	65.95	665	684.8	72.79	680	681.0	71.58	676
Current Vantage	670.9	84.97	668	672.2	88.17	667	671.9	87.43	676
Origination FICO	621.0	55.03	620	620.2	56.47	621	620.4	56.13	621
Origination Balance	220858.8	120201.5	192000	244509.6	146136.3	206400	238952.8	140830.8	202400
Low/No Doc	0.419	0.493	0	0.562	0.496	1	0.529	0.499	1
Utilization	0.565	0.333	.615	0.567	0.332	.619	0.566	0.333	.618
Originated 1Q2005	0.00670	0.0816	0	0.0273	0.163	0	0.0225	0.148	0
Originated 2Q2005	0.0297	0.170	0	0.0550	0.228	0	0.0491	0.216	0
Originated 3Q2005	0.0620	0.241	0	0.0793	0.270	0	0.0752	0.264	0
Originated 4Q2005	0.0711	0.257	0	0.0882	0.284	0	0.0842	0.278	0
Originated 1Q2006	0.0729	0.260	0	0.0867	0.281	0	0.0835	0.277	0
Originated 2Q2006	0.158	0.365	0	0.153	0.360	0	0.154	0.361	0
Originated 3Q2006	0.206	0.405	0	0.145	0.353	0	0.160	0.366	0
Originated 4Q2006	0.227	0.419	0	0.178	0.382	0	0.189	0.392	0
Originated 1Q2007	0.150	0.357	0	0.145	0.352	0	0.146	0.354	0
Originated 2Q2007	0.0155	0.124	0	0.0424	0.201	0	0.0361	0.186	0
CES+	0.451	0.498	0	0.365	0.481	0	0.385	0.487	0
Low Util HELOC	0.0165	0.127	0	0.0200	0.140	0	0.0192	0.137	0
Observations	27170			88466			115641		
Observations with Util	22852			74595			97447		

Table 5: Mean Rate of 2/28 Mortgages Modified: By Month and Servicer Control Group–Lender Reported Mods, Conditional on 60+

	Countrywide		Rest		Total	
	mean	count	mean	count	mean	count
July ARM Mod	0.0000194	51662	0.00582	224286	0.00473	275948
August ARM Mod	0.0000384	52100	0.00420	224246	0.00341	276346
September ARM Mod	0.0000750	53312	0.00510	223977	0.00414	277289
October ARM Mod	0.0000371	53968	0.00470	222514	0.00379	276482
November ARM Mod	0.000126	55662	0.00587	218575	0.00470	274237
December ARM Mod	0.0000999	60060	0.00372	217744	0.00293	277804
January ARM Mod	0.0000492	60929	0.00292	214462	0.00229	275391
February ARM Mod	0.0156	59737	0.00297	213416	0.00573	273153
March ARM Mod	0.0126	59071	0.00256	208788	0.00476	267859
Average ARM Mods	0.00373	454401	0.00423	1743762	0.00413	2198163

Average values refer to preceding months

Table 6: Mean Rate of 2/28 Mortgages Rolling from Current Straight to 60-days Delinquent: By Month and Servicer Control Group

	Countrywide		Rest		Total	
	mean	count	mean	count	mean	count
July Rolling 60DPD	0.0399	41452	0.0383	127797	0.0387	169249
August Rolling 60DPD	0.0450	40276	0.0432	124470	0.0436	164746
September Rolling 60DPD	0.0557	39056	0.0436	118340	0.0466	157396
October Rolling 60DPD	0.0615	36855	0.0490	111998	0.0521	148853
November Rolling 60DPD	0.0691	33059	0.0489	103562	0.0538	136621
December 2008 Rolling 60DPD	0.0823	30087	0.0594	97833	0.0648	127920
January 2009 Rolling 60DPD	0.0798	27214	0.0664	92290	0.0694	119504
February Rolling 60DPD	0.0646	23422	0.0609	84378	0.0617	107800
March Rolling 60DPD	0.0652	22408	0.0585	79942	0.0600	102350
Average Rolling 60DPD	0.0631	253553	0.0519	816140	0.0546	1069693
July Rolling Strategic 60DPD	0.0134	41452	0.0122	127797	0.0125	169249
August Rolling Strategic 60DPD	0.0164	40276	0.0137	124470	0.0144	164746
September Rolling Strategic 60DPD	0.0201	39056	0.0147	118340	0.0160	157396
October Rolling Strategic 60DPD	0.0231	36855	0.0166	111998	0.0182	148853
November Rolling Strategic 60DPD	0.0303	33059	0.0173	103562	0.0204	136621
December 2008 Rolling Strategic 60DPD	0.0323	30087	0.0215	97833	0.0241	127920
January 2009 Rolling Strategic 60DPD	0.0324	27214	0.0253	92290	0.0269	119504
February Rolling Strategic 60DPD	0.0286	23422	0.0231	84378	0.0243	107800
March Rolling Strategic 60DPD	0.0288	22408	0.0218	79942	0.0234	102350
Average Strategic 60 DPD	0.0251	253553	0.0185	816140	0.0200	1069693

Average values refer to preceding months

Table 7: 2/28 ARMs OLS Panel 2008-20091Q–Rolling Straight 60 by Delinquency and Resets

	(1) BlackBox Sample	(2) Matched Sample	(3) Matched Sample, Strategic
Countrywide x Nov-Jan	0.00661** (4.39)	0.00379* (2.28)	0.00420** (3.73)
Nov-Jan	0.00988** (16.63)	0.0110** (15.22)	0.00539** (11.58)
Jan-Mar	-0.00234** (-4.70)	-0.00533** (-8.71)	-0.00179** (-4.69)
Countrywide x Jan-Mar	-0.00884** (-7.39)	-0.00747** (-5.59)	-0.00288** (-3.33)
Apr-Jun	-0.00466** (-9.15)	-0.00475** (-7.66)	-0.00145** (-3.71)
Countrywide x Apr-Jun	-0.0103** (-8.38)	-0.00965** (-7.09)	-0.00446** (-5.06)
Jul-Aug	-0.00370** (-6.50)	-0.00317** (-4.60)	-0.00211** (-4.91)
Countrywide x Jul-Aug	-0.0102** (-7.45)	-0.0107** (-7.14)	-0.00379** (-3.88)
Feb-Mar	0.0135** (18.84)	0.0126** (14.38)	0.00745** (12.96)
Countrywide x Feb-Mar	-0.0106** (-5.95)	-0.00962** (-4.84)	-0.00107 (-0.77)
Initial CTLV (x 100)	0.0721** (12.23)	-0.119** (-5.19)	-0.0492** (-3.15)
Initial CLTV ²	-0.0429** (-15.35)	0.0474** (3.72)	0.0182* (2.08)
Current CLTV (x 100)	0.0935** (36.36)	0.0617** (14.44)	0.00788** (2.71)
Current CLTV ² (x 100)	-0.00949** (-9.09)	0.00629** (3.68)	0.0123** (10.32)
Initial Interest Rate	0.00116** (8.67)	0.00255** (15.13)	0.00207** (20.10)
Δ in Int Rates	0.00678** (49.89)	0.0101** (58.70)	0.00539** (49.55)
Origination FICO	-0.0209** (-71.04)	-0.000617 (-1.41)	0.00158** (5.99)
Low/No Doc	0.0141** (51.71)	0.0105** (31.21)	0.00420** (19.84)
Origination Balance	0.00569** (55.10)	0.00911** (69.87)	0.00313** (37.27)
Countrywide	0.0121** (11.20)	0.0171** (14.31)	0.00649** (8.37)
Reset in 3 Months	0.00589** (9.31)	0.00659** (8.21)	0.00394** (7.42)
Countrywide x Reset in 3 Months	-0.00319* (-1.96)	-0.00436* (-2.37)	-0.00194 (-1.51)
Reset in 6 Months	0.0116** (21.29)	0.00889** (12.84)	0.00427** (9.55)
Countrywide x Reset in 6 Months	0.0115** (8.27)	0.0124** (7.91)	0.00732** (6.73)
Initial Vantage (x 100)		-0.0385** (-122.44)	-0.00451** (-23.50)
Δ Vantage (x 100)		-0.0680** (-113.10)	-0.0256** (-80.83)
Δ Vantage ²		0.00144** (3.12)	0.00795** (37.72)
CES+		-0.00462** (-11.90)	-0.000803** (-3.25)
Low Util HELOC		0.00292** (2.96)	0.000234 (0.33)
Origination Quarter	Yes	Yes	Yes
N. of cases	2900793	1774594	1774594
Avg Delinquency	0.0600	0.0585	0.0219
Avg Share Countrywide	0.210	0.248	0.248

Marginal effects; t statistics in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

Table 8: 2/28 ARMs OLS Panel 2008-20091Q–Straight 60 by Origination Quarter

	(1) 2005Q1	(2) 2005Q2	(3) 2005Q3	(4) 2005Q4	(5) 2006Q1	(6) 2006Q2	(7) 2006Q3	(8) 2006Q4	(9) 2007Q1	(10) 2007Q2
Countrywide x Nov-Jan	0.0101 (0.56)	-0.00325 (-0.36)	0.00657 (1.06)	-0.0156** (-2.71)	0.00198 (0.32)	0.00345 (0.70)	0.0229** (5.45)	-0.00207 (-0.61)	0.00304 (0.83)	-0.0000544 (-0.00)
Nov-Jan	0.00721 (1.90)	0.00471 (1.71)	0.00629** (2.64)	0.0129** (5.76)	0.00807** (3.27)	-0.00135 (-0.66)	0.0208** (9.93)	0.0189** (10.89)	0.0136** (7.65)	0.00774* (2.47)
Jan-Mar	0.00143 (0.38)	0.00391 (1.45)	0.00623** (2.71)	0.0124** (5.86)	-0.00590** (-2.84)	-0.0202** (-11.94)	-0.0106** (-6.52)	-0.00849** (-6.16)	-0.00984** (-6.77)	-0.00735** (-2.80)
Countrywide x Jan-Mar	-0.00353 (-0.22)	-0.0101 (-1.24)	0.00620 (1.11)	-0.00610 (-1.16)	-0.0142** (-1.16)	-0.0275** (-2.86)	-0.00604* (-2.02)	-0.00672* (-2.53)	-0.000685 (-0.23)	-0.0121 (-1.36)
Apr-Jun	0.000354 (0.10)	-0.000118 (-0.04)	0.00403 (1.77)	0.0123** (5.76)	0.00295 (1.32)	-0.0172** (-9.97)	-0.00999** (-6.11)	-0.00996** (-7.17)	-0.00754** (-5.12)	-0.00707** (-2.68)
Countrywide x Apr-Jun	-0.0242 (-1.59)	-0.0119 (-1.44)	-0.00896 (-1.61)	-0.00859 (-1.56)	-0.00585 (-1.08)	-0.0315** (-8.07)	-0.00829** (-2.74)	-0.00720** (-2.69)	-0.00231 (-0.77)	-0.0111 (-1.23)
Jul-Aug	-0.00280 (-0.72)	-0.00358 (-1.27)	-0.00191 (-0.78)	0.00268 (1.19)	0.00483 (1.93)	-0.00873** (-4.42)	-0.00519** (-2.84)	-0.00477** (-3.03)	-0.00374* (-2.25)	-0.00680* (-2.33)
Countrywide x Jul-Aug	-0.0215 (-1.31)	-0.0119 (-1.35)	-0.0106 (-1.76)	-0.0153** (-2.62)	-0.0127* (-2.08)	-0.0243** (-5.45)	-0.00811* (-2.41)	-0.0113** (-3.78)	-0.00388 (-1.16)	-0.0135 (-1.38)
Feb-Mar	0.00991* (2.27)	0.00910** (2.82)	0.0103** (3.67)	0.0184** (6.87)	0.00697* (2.39)	-0.00572* (-2.40)	0.00678** (2.79)	0.0319** (13.77)	0.0222** (9.81)	0.0101** (2.65)
Countrywide x Feb-Mar	-0.00988 (-0.49)	-0.0191 (-1.90)	-0.00893 (-1.28)	-0.0217** (-3.23)	-0.0257** (-3.82)	-0.0285** (-5.29)	0.0000425 (0.01)	0.00161 (0.34)	-0.000926 (-0.20)	0.00331 (0.25)
Initial CTLV (x 100)	0.0557 (0.81)	-0.345** (-3.94)	-0.133** (-3.41)	-0.0173 (-0.25)	-0.213* (-2.32)	-0.0209 (-0.32)	0.0703* (2.53)	-0.203* (-2.56)	-0.385** (-5.10)	-0.483** (-5.17)
Initial CLTV ²	-0.0435 (-1.17)	0.185** (3.71)	0.0716** (3.41)	0.0134 (0.34)	0.0918 (1.80)	-0.0101 (-0.28)	-0.0639** (-4.37)	0.0892* (2.02)	0.205** (4.84)	0.199** (3.92)
Current CLTV (x 100)	0.0509* (2.44)	0.0720** (4.48)	0.111** (3.67)	0.122** (9.12)	0.0860** (6.14)	0.0760** (7.12)	0.0275* (2.47)	0.0195 (1.72)	-0.0125 (-0.88)	0.0754* (2.40)
Current CLTV ² (x 100)	-0.00275 (-0.31)	-0.00777 (-1.23)	-0.0183** (-3.71)	-0.0192** (-3.78)	-0.000656 (-0.12)	0.00439 (1.04)	0.0231** (5.02)	0.0254** (5.51)	0.0330** (5.62)	0.00146 (0.11)
Initial Interest Rate	-0.00110 (-0.91)	-0.00104 (-1.16)	0.00113 (1.52)	0.0000985 (0.14)	0.00112 (1.65)	0.00175** (3.60)	0.00201** (4.53)	0.00175** (4.36)	0.00251** (6.08)	0.00400** (5.09)
Δ in Int Rates	0.00507** (7.40)	0.00566** (11.75)	0.00978** (21.05)	0.0118** (27.13)	0.0127** (18.19)	0.0141** (26.84)	0.0113** (18.68)	0.0146** (22.45)	0.00211** (4.32)	0.00474* (2.42)
Origination FICO	-0.00151 (-0.52)	-0.00222 (-1.22)	-0.00333* (-2.17)	-0.0126** (-8.46)	-0.00811** (-5.55)	-0.00269* (-2.35)	0.00580** (5.18)	-0.000869 (-0.84)	0.00520** (4.71)	0.00838** (3.64)
Initial Vantage (x 100)	-0.0380** (-18.03)	-0.0362** (-26.69)	-0.0378** (-31.55)	-0.0343** (-31.26)	-0.0374** (-35.45)	-0.0402** (-48.76)	-0.0424** (-50.89)	-0.0390** (-53.77)	-0.0399** (-51.66)	-0.0353** (-23.91)
Δ Vantage (x 100)	-0.0477** (-12.68)	-0.0574** (-23.22)	-0.0622** (-29.34)	-0.0704** (-36.18)	-0.0696** (-37.47)	-0.0732** (-47.91)	-0.0695** (-43.34)	-0.0699** (-46.31)	-0.0679** (-42.59)	-0.0542** (-15.83)
Δ Vantage ²	-0.00411 (-1.46)	0.000848 (0.48)	-0.000148 (-0.10)	0.00387** (2.82)	0.00231 (1.70)	0.00278* (2.36)	0.000202 (0.16)	0.00158 (1.29)	0.00204 (1.58)	-0.0112** (-3.86)
Low/No Doc	-0.0000331 (-0.01)	0.00447** (2.85)	0.00618** (4.86)	0.0102** (8.43)	0.0115** (9.94)	0.0136** (15.68)	0.00779** (9.27)	0.0144** (18.53)	0.0139** (16.57)	0.00372* (2.23)
Origination Balance	0.0109** (10.34)	0.0105** (15.23)	0.0108** (21.13)	0.0115** (22.82)	0.00940** (19.45)	0.00920** (25.96)	0.00853** (25.60)	0.00793** (27.40)	0.00765** (25.19)	0.00560** (11.60)
CES+	-0.00593* (-2.31)	-0.00339 (-1.92)	-0.00689** (-4.81)	-0.00316* (-2.31)	0.000540 (0.41)	-0.00542** (-5.57)	-0.00790** (-8.15)	-0.00487** (-5.32)	-0.00918** (-9.24)	-0.00700** (-3.23)
Low Util HELOC	0.00105 (0.20)	0.000246 (0.07)	-0.00199 (-0.66)	0.00791* (2.46)	0.00438 (1.32)	0.00144 (0.55)	0.00777** (2.74)	0.000840 (0.34)	-0.00136 (-0.51)	0.00394 (0.80)
Countrywide	0.0188 (1.47)	0.0235** (3.51)	0.0182** (4.02)	0.0287** (6.62)	0.0244** (5.43)	0.0364** (10.26)	0.0139** (5.24)	0.0155** (6.70)	0.0114** (4.44)	0.0179* (2.27)
N. of cases	38824	86212	135089	157264	158856	273965	274701	327668	258392	63623
Avg Delinquency	0.0463	0.0681	0.0653	0.0660	0.0711	0.0858	0.0550	0.0484	0.0397	0.0458
Avg Share Countrywide	0.0869	0.140	0.203	0.212	0.234	0.247	0.314	0.293	0.259	0.122

Marginal effects; *t* statistics in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

Table 9: 2/28 ARMs OLS Panel 2008-20091Q–Strategic 60 by Origination Quarter

	(1) 2005Q1	(2) 2005Q2	(3) 2005Q3	(4) 2005Q4	(5) 2006Q1	(6) 2006Q2	(7) 2006Q3	(8) 2006Q4	(9) 2007Q1	(10) 2007Q2
Countrywide x Nov-Jan	0.0183 (1.75)	-0.00819 (-1.36)	0.00373 (0.92)	-0.00640 (-1.67)	0.00488 (1.17)	-0.00211 (-0.59)	0.0183** (6.11)	0.00199 (0.90)	0.00304 (1.30)	0.00592 (0.90)
Nov-Jan	0.000142 (0.07)	0.00314* (1.99)	0.00267 (1.79)	0.00435** (3.23)	0.00352* (2.22)	-0.000777 (-0.57)	0.0105** (7.40)	0.0116** (10.27)	0.00647** (5.60)	0.000692 (0.35)
Jan-Mar	-0.000834 (-0.37)	0.00340* (2.20)	0.00232 (1.62)	0.00798** (6.05)	-0.00245 (-1.89)	-0.00896** (-8.12)	-0.00523** (-5.07)	-0.00190* (-2.30)	-0.00338** (-3.75)	-0.00298 (-1.81)
Countrywide x Jan-Mar	0.00617 (0.71)	-0.0130* (-2.40)	0.00481 (1.30)	-0.00227 (-0.64)	-0.00683* (-2.14)	-0.0194** (-7.08)	-0.00177 (-0.91)	-0.000163 (-0.11)	0.00120 (0.67)	0.00174 (0.34)
Apr-Jun	-0.000574 (-0.27)	0.00179 (1.18)	0.00264 (1.85)	0.00741** (5.58)	0.00275 (1.91)	-0.00782** (-6.89)	-0.00425** (-4.01)	-0.00205* (-2.43)	-0.00377** (-4.15)	-0.00473** (-2.90)
Countrywide x Apr-Jun	-0.00216 (-0.27)	-0.0139* (-2.55)	-0.00123 (-0.33)	-0.00443 (-1.19)	-0.00238 (-0.66)	-0.0200** (-7.15)	-0.00518** (-2.63)	-0.00109 (-0.69)	-0.000406 (-0.23)	0.00198 (0.38)
Jul-Aug	-0.00329 (-1.49)	0.00130 (0.79)	-0.00206 (-1.38)	0.00298* (2.15)	0.00197 (1.23)	-0.00481** (-3.67)	-0.00510** (-4.45)	-0.00105 (-1.11)	-0.00379** (-3.77)	-0.00572** (-3.24)
Countrywide x Jul-Aug	-0.00296 (-0.37)	-0.0182** (-3.22)	-0.00164 (-0.42)	-0.0109** (-2.85)	-0.00203 (-0.50)	-0.0148** (-4.63)	-0.000967 (-0.44)	-0.00245 (-1.39)	0.000734 (0.37)	0.00517 (0.88)
Feb-Mar	0.00273 (1.06)	0.00641** (3.33)	0.00468** (2.66)	0.00886** (5.29)	0.00381* (2.03)	-0.000919 (-0.57)	0.00356* (2.21)	0.0200** (12.85)	0.0116** (7.66)	0.00583* (2.27)
Countrywide x Feb-Mar	0.00335 (0.30)	-0.0123 (-1.77)	-0.00591 (-1.32)	-0.00443 (-0.93)	-0.00501 (-1.08)	-0.0181** (-4.67)	0.00578 (1.68)	0.00698* (2.05)	0.00166 (0.54)	0.0214* (2.13)
Initial CTLV (x 100)	0.0114 (0.39)	-0.132** (-2.68)	-0.0446* (-2.10)	0.00752 (0.22)	-0.133 (-1.52)	0.00332 (0.11)	0.0222 (1.28)	-0.0959 (-1.63)	-0.138** (-2.91)	-0.179** (-2.93)
Initial CLTV ²	-0.0146 (-0.97)	0.0738** (2.60)	0.0230* (2.07)	-0.000119 (-0.01)	0.0591 (1.21)	-0.0127 (-0.76)	-0.0232* (-2.54)	0.0410 (1.24)	0.0717** (2.70)	0.0692* (2.05)
Current CLTV (x 100)	0.0148 (1.17)	0.0331** (3.32)	0.0429** (5.14)	0.0451** (5.03)	0.0179 (1.91)	0.00141 (0.19)	-0.00979 (-1.27)	-0.0134 (-1.70)	-0.0285** (-2.87)	0.00347 (0.16)
Current CLTV ² (x 100)	0.000707 (0.13)	-0.00246 (-0.61)	-0.00377 (-1.15)	-0.00322 (-0.92)	0.00883* (2.36)	0.0165** (5.43)	0.0213** (6.53)	0.0224** (6.78)	0.0256** (6.14)	0.0144 (1.58)
Initial Interest Rate	0.00146* (2.26)	0.000460 (0.88)	0.00161** (3.50)	0.00117** (2.68)	0.00201** (4.69)	0.00157** (5.10)	0.00153** (5.56)	0.00204** (8.39)	0.00183** (7.52)	0.00233** (4.80)
Δ in Int Rates	0.00240** (6.37)	0.00283** (9.86)	0.00483** (16.86)	0.00542** (19.28)	0.00644** (15.56)	0.00733** (20.74)	0.00649** (16.10)	0.00881** (21.00)	0.00181** (6.49)	0.00252* (2.20)
Origination FICO	0.00309* (2.04)	-0.000314 (-0.29)	-0.000938 (-1.01)	-0.00185* (-2.02)	0.000582 (0.67)	0.00184** (2.60)	0.00345** (4.90)	0.00117 (1.87)	0.00219** (3.43)	0.00281 (1.95)
Initial Vantage (x 100)	-0.00587** (-4.92)	-0.00370** (-4.52)	-0.00257** (-3.44)	-0.00168* (-2.38)	-0.00330** (-5.09)	-0.00571** (-10.96)	-0.00595** (-11.69)	-0.00477** (-10.99)	-0.00562** (-12.81)	-0.00504** (-5.96)
Δ Vantage (x 100)	-0.0134** (-6.98)	-0.0191** (-15.17)	-0.0240** (-22.67)	-0.0256** (-23.07)	-0.0266** (-25.88)	-0.0314** (-36.57)	-0.0273** (-31.53)	-0.0257** (-33.76)	-0.0233** (-29.31)	-0.0209** (-13.05)
Δ Vantage ²	0.00395** (3.07)	0.00590** (7.45)	0.00833** (13.58)	0.00822** (11.84)	0.00826** (12.89)	0.0104** (18.07)	0.00798** (12.78)	0.00813** (15.43)	0.00670** (12.08)	0.00342** (2.86)
Low/No Doc	-0.00251 (-1.95)	0.00127 (1.34)	0.00314** (3.91)	0.00495** (6.34)	0.00451** (6.13)	0.00682** (12.10)	0.00308** (5.78)	0.00498** (10.19)	0.00534** (10.31)	0.000729 (0.71)
Origination Balance	0.00315** (5.42)	0.00425** (9.43)	0.00409** (12.09)	0.00371** (11.21)	0.00355** (10.84)	0.00340** (14.47)	0.00269** (12.57)	0.00265** (14.52)	0.00243** (12.78)	0.00177** (5.96)
CES+	0.000710 (0.50)	-0.00177 (-1.64)	-0.00119 (-1.32)	0.0000184 (0.02)	0.000412 (0.49)	-0.000964 (-1.52)	-0.00235** (-3.74)	-0.000850 (-1.45)	-0.00218** (-3.48)	-0.00176 (-1.33)
Low Util HELOC	-0.000931 (-0.29)	-0.000648 (-0.27)	-0.000299 (-0.13)	0.00298 (1.23)	-0.00168 (-0.72)	-0.000737 (-0.39)	0.00123 (0.62)	0.000211 (0.12)	-0.000968 (-0.53)	0.000692 (0.02)
Countrywide	-0.00178 (-0.28)	0.0179** (3.88)	0.00634* (2.16)	0.0141** (4.89)	0.00989** (3.37)	0.0215** (8.27)	0.00494** (2.77)	0.00387** (2.84)	0.00303 (1.94)	0.00213 (0.48)
N. of cases	38824	86212	135089	157264	158856	273965	274701	327668	258392	63623
Avg Delinquency	0.00896	0.0291	0.0249	0.0252	0.0275	0.0397	0.0207	0.0145	0.0125	0.0119
Avg Share Countrywide	0.0869	0.140	0.203	0.212	0.234	0.247	0.314	0.293	0.259	0.122

Marginal effects; *t* statistics in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

Table 10: 2/28 ARMs OLS Panel 2008-20091Q–Straight 60 by Utilization and CLTV

	(1)	(2)	(3)	(4)	(5)	(6)
	Util < 30	30 ≤ Util < 80	Util ≥ 80	CLTV < 90	90 ≤ CLTV < 110	110 ≤ CLTV
Countrywide x Nov-Jan	0.00789* (2.40)	-0.000342 (-0.13)	0.00383 (1.14)	0.00782 (1.83)	0.00639* (2.32)	0.00445* (1.99)
Nov-Jan	0.00846** (5.81)	0.0133** (11.94)	0.0145** (10.07)	0.00409* (2.18)	0.00771** (6.60)	0.0140** (14.10)
Jan-Mar	-0.00650** (-5.38)	-0.00548** (-6.06)	-0.0105** (-8.44)	-0.00839** (-5.44)	-0.00768** (-8.23)	-0.00479** (-5.20)
Countrywide x Jan-Mar	-0.00294 (-1.15)	-0.0124** (-6.17)	-0.0110** (-3.98)	0.00107 (0.32)	-0.00506* (-2.41)	-0.0137** (-7.03)
Apr-Jun	-0.00403** (-3.28)	-0.00399** (-4.31)	-0.00997** (-7.89)	-0.00902** (-5.69)	-0.00847** (-8.90)	-0.00271** (-3.01)
Countrywide x Apr-Jun	-0.00700** (-2.69)	-0.0136** (-6.60)	-0.0134** (-4.74)	0.0000756 (0.02)	-0.00829** (-3.90)	-0.0150** (-7.82)
Jul-Aug	-0.00385** (-2.82)	-0.00249* (-2.41)	-0.00293* (-2.07)	-0.00644** (-3.58)	-0.00428** (-3.96)	-0.00229* (-2.34)
Countrywide x Jul-Aug	-0.00707* (-2.46)	-0.0139** (-6.11)	-0.0129** (-4.08)	0.00186 (0.47)	-0.00968** (-4.08)	-0.0146** (-7.03)
Feb-Mar	0.0135** (7.46)	0.0173** (12.42)	0.0118** (6.87)	0.00253 (1.13)	0.0104** (7.17)	0.0167** (14.11)
Countrywide x Feb-Mar	-0.00554 (-1.38)	-0.0127** (-4.05)	0.000275 (0.07)	-0.00485 (-0.98)	0.00324 (0.93)	-0.0130** (-4.97)
Initial CTLV (x 100)	-0.0468 (-1.55)	-0.0878* (-2.00)	-0.107* (-2.36)	-0.183** (-4.21)	-0.304** (-6.10)	-0.0976** (-3.19)
Initial CLTV ²	0.0130 (0.78)	0.0354 (1.44)	0.0427 (1.70)	0.109** (4.28)	0.158** (5.64)	0.0298 (1.79)
Current CLTV (x 100)	0.0790** (9.79)	0.0619** (9.27)	0.0984** (11.14)	-0.00218 (-0.12)	-0.247 (-1.58)	0.270** (22.84)
Current CLTV ² (x 100)	0.00163 (0.51)	0.00640* (2.39)	-0.00860* (-2.45)	0.0178 (1.27)	0.151 (1.93)	-0.0613** (-15.36)
Initial Interest Rate	0.00306** (9.48)	0.00331** (13.32)	0.00447** (13.15)	0.00195** (5.28)	0.00134** (5.56)	0.00613** (23.17)
Δ in Int Rates	0.0112** (36.18)	0.0110** (45.80)	0.0109** (34.11)	0.00398** (11.42)	0.00556** (23.33)	0.0141** (60.78)
Origination FICO	0.00336** (4.09)	-0.000896 (-1.31)	-0.00854** (-9.38)	-0.00296** (-2.96)	-0.00231** (-3.52)	0.00215** (3.26)
Initial Vantage (x 100)	-0.0296** (-48.32)	-0.0459** (-81.02)	-0.0674** (-87.48)	-0.0314** (-41.11)	-0.0334** (-69.80)	-0.0423** (-90.38)
Δ Vantage (x 100)	-0.0876** (-68.07)	-0.0676** (-63.75)	-0.0829** (-69.68)	-0.0514** (-34.21)	-0.0510** (-53.10)	-0.0837** (-97.56)
Δ Vantage ²	0.0170** (20.64)	-0.00233** (-2.78)	-0.00478** (-5.57)	0.00235 (1.91)	-0.00226** (-2.89)	0.00569** (9.09)
Low/No Doc	0.0113** (17.57)	0.00922** (18.72)	0.00783** (11.51)	0.00345** (4.55)	0.00571** (11.83)	0.0140** (27.62)
Origination Balance	0.00932** (38.51)	0.0106** (53.21)	0.0112** (40.61)	0.00662** (21.65)	0.00782** (40.19)	0.0109** (54.73)
CES+	-0.00342** (-4.57)	-0.00552** (-9.52)	-0.00350** (-4.39)	-0.00248* (-1.96)	-0.00617** (-10.60)	-0.00341** (-6.18)
Low Util HELOC	-0.000420 (-0.27)	-0.00469** (-3.15)	-0.00923** (-3.46)	0.00690** (3.85)	0.00493** (3.50)	-0.00366* (-2.26)
Countrywide	0.0136** (6.10)	0.0213** (11.88)	0.0267** (11.19)	0.00575 (1.90)	0.0134** (7.09)	0.0279** (17.76)
N. of cases	385415	626419	488549	221248	623570	929776
Avg Delinquency	0.0441	0.0458	0.0706	0.0342	0.0464	0.0794
Avg Share Countrywide	0.245	0.246	0.248	0.209	0.217	0.240

Marginal effects; *t* statistics in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

Table 11: 2/28 ARMs OLS Panel 2008-20091Q–Strategic 60 by Utilization and CLTV

	(1)	(2)	(3)	(4)	(5)	(6)
	Util < 30	30 ≤ Util < 80	Util ≥ 80	CLTV < 90	90 ≤ CLTV < 110	110 ≤ CLTV
Countrywide x Nov-Jan	0.00830** (3.04)	0.00277 (1.43)	0.00512* (2.58)	0.00261 (1.11)	0.00340* (2.06)	0.00592** (3.75)
Nov-Jan	0.00612** (5.21)	0.00767** (9.76)	0.00684** (8.61)	0.00168 (1.61)	0.00314** (4.60)	0.00735** (11.04)
Jan-Mar	-0.00316** (-3.32)	-0.00187** (-3.06)	-0.00374** (-5.92)	-0.00305** (-3.62)	-0.00284** (-5.28)	-0.00227** (-3.77)
Countrywide x Jan-Mar	-0.00175 (-0.85)	-0.00727** (-5.08)	-0.00435** (-2.91)	0.000585 (0.33)	-0.00249* (-2.05)	-0.00533** (-4.01)
Apr-Jun	-0.000800 (-0.82)	-0.00162** (-2.59)	-0.00348** (-5.36)	-0.00274** (-3.16)	-0.00357** (-6.56)	-0.000782 (-1.32)
Countrywide x Apr-Jun	-0.00415* (-1.97)	-0.00886** (-6.08)	-0.00491** (-3.19)	-0.000716 (-0.39)	-0.00348** (-2.86)	-0.00752** (-5.75)
Jul-Aug	-0.00307** (-2.87)	-0.00193** (-2.79)	-0.00245** (-3.40)	-0.00134 (-1.35)	-0.00272** (-4.49)	-0.00222** (-3.50)
Countrywide x Jul-Aug	-0.00169 (-0.73)	-0.00729** (-4.51)	-0.00397* (-2.32)	0.00147 (0.67)	-0.00267* (-1.97)	-0.00602** (-4.27)
Feb-Mar	0.0107** (7.24)	0.0106** (10.59)	0.00786** (8.03)	0.00316* (2.43)	0.00481** (5.59)	0.0104** (12.92)
Countrywide x Feb-Mar	-0.000742 (-0.22)	-0.00330 (-1.38)	0.00383 (1.54)	0.000491 (0.17)	0.00336 (1.55)	-0.00206 (-1.09)
Initial CTLV (x 100)	-0.0142 (-0.65)	-0.0658 (-1.87)	-0.0266 (-1.55)	-0.105** (-4.68)	-0.132** (-5.42)	-0.0373 (-1.70)
Initial CLTV ²	-0.00248 (-0.21)	0.0293 (1.48)	0.0101 (1.07)	0.0617** (4.69)	0.0707** (5.17)	0.00844 (0.70)
Current CLTV (x 100)	0.0376** (5.61)	0.0135** (2.76)	0.0133** (2.61)	0.0176* (2.05)	0.0225 (0.25)	0.129** (15.43)
Current CLTV ² (x 100)	0.00855** (3.14)	0.0117** (5.82)	0.00520* (2.52)	-0.00528 (-0.76)	-0.00137 (-0.03)	-0.0272** (-9.52)
Initial Interest Rate	0.00350** (13.99)	0.00242** (14.51)	0.00202** (11.46)	0.000970** (4.94)	0.00110** (8.14)	0.00413** (24.09)
Δ in Int Rates	0.00832** (33.41)	0.00608** (35.84)	0.00368** (21.81)	0.00152** (7.78)	0.00252** (18.55)	0.00782** (50.70)
Origination FICO	0.00312** (4.75)	0.00138** (3.14)	-0.000108 (-0.25)	-0.00138** (-2.63)	0.0000714 (0.20)	0.00375** (8.92)
Initial Vantage (x 100)	-0.00842** (-17.92)	-0.0122** (-33.99)	-0.00752** (-20.83)	-0.00420** (-10.05)	-0.00412** (-15.32)	-0.00434** (-14.57)
Δ Vantage (x 100)	-0.0522** (-57.39)	-0.0298** (-49.59)	-0.0201** (-38.92)	-0.0123** (-17.82)	-0.0157** (-36.27)	-0.0353** (-72.36)
Δ Vantage ²	0.0155** (30.84)	0.00701** (17.14)	0.00700** (22.69)	0.00300** (5.94)	0.00472** (15.89)	0.0117** (37.98)
Low/No Doc	0.00661** (13.01)	0.00369** (10.92)	0.000732* (2.02)	0.00146** (3.52)	0.00163** (5.97)	0.00601** (17.81)
Origination Balance	0.00509** (26.33)	0.00436** (32.02)	0.00317** (20.96)	0.00180** (10.26)	0.00249** (21.39)	0.00421** (31.39)
CES+	-0.000273 (-0.46)	-0.00134** (-3.38)	-0.00118** (-2.80)	-0.00160* (-2.41)	-0.00209** (-6.25)	0.000445 (1.22)
Low Util HELOC	-0.000692 (-0.52)	-0.00345** (-3.39)	-0.00366** (-2.61)	0.000384 (0.35)	0.00225* (2.25)	-0.00275* (-2.29)
Countrywide	0.00888** (4.93)	0.0113** (8.76)	0.00830** (6.21)	0.00102 (0.63)	0.00422** (3.83)	0.0131** (12.15)
N. of cases	385415	626419	488549	221248	623570	929776
Avg Delinquency	0.0257	0.0218	0.0195	0.00905	0.0145	0.0335
Avg Share Countrywide	0.245	0.246	0.248	0.209	0.217	0.240

Marginal effects; *t* statistics in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

Table 12: 2/28 ARMs OLS Panel Originated 2006Q3–Straight 60 by Utilization and CLTV

	(1)	(2)	(3)	(4)	(5)	(6)
	Util < 30	30 ≤ Util < 80	Util ≥ 80	CLTV < 90	90 ≤ CLTV < 110	110 ≤ CLTV
Countrywide x Nov-Jan	0.0354** (4.02)	0.00703 (1.03)	0.0254** (3.13)	0.0200* (1.98)	0.0273** (3.92)	0.0209** (3.71)
Nov-Jan	0.0162** (3.66)	0.0238** (7.41)	0.0261** (6.45)	0.0129* (2.44)	0.0114** (3.42)	0.0263** (9.16)
Jan-Mar	-0.0143** (-4.30)	-0.00647** (-2.76)	-0.00996** (-3.07)	-0.0102** (-2.62)	-0.0105** (-4.20)	-0.00980** (-4.00)
Countrywide x Jan-Mar	0.00303 (0.53)	-0.0199** (-4.31)	-0.00296 (-0.49)	0.00825 (1.26)	-0.00163 (-0.35)	-0.0137** (-3.06)
Apr-Jun	-0.0107** (-3.15)	-0.00566* (-2.40)	-0.0111** (-3.35)	-0.00733 (-1.81)	-0.0113** (-4.44)	-0.00951** (-4.00)
Countrywide x Apr-Jun	-0.00220 (-0.38)	-0.0202** (-4.27)	-0.00242 (-0.39)	0.00396 (0.57)	-0.00340 (-0.71)	-0.0116** (-2.70)
Jul-Aug	-0.00939* (-2.56)	-0.00205 (-0.77)	-0.00134 (-0.36)	-0.00459 (-1.01)	-0.00636* (-2.24)	-0.00406 (-1.56)
Countrywide x Jul-Aug	-0.00108 (-0.17)	-0.0204** (-3.96)	0.00128 (0.18)	0.00492 (0.63)	-0.00697 (-1.33)	-0.00982* (-2.09)
Feb-Mar	0.00460 (0.89)	0.0171** (4.41)	0.00111 (0.24)	0.0102 (1.57)	0.00851* (2.04)	0.00784* (2.42)
Countrywide x Feb-Mar	-0.000941 (-0.10)	-0.0108 (-1.34)	0.0110 (1.18)	0.00517 (0.41)	0.0105 (1.24)	-0.00486 (-0.76)
Initial CTLV (x 100)	0.201* (2.35)	0.151** (4.16)	0.0456 (1.06)	-0.257 (-1.18)	-0.217* (-2.29)	0.105** (3.08)
Initial CLTV ²	-0.136** (-2.88)	-0.0964** (-5.20)	-0.0515* (-2.41)	0.150 (1.19)	0.104* (1.97)	-0.0895** (-5.42)
Current CLTV (x 100)	-0.0391 (-1.77)	0.0314 (1.90)	0.0860** (3.70)	-0.0767 (-1.66)	-0.371 (-0.95)	0.213** (6.33)
Current CLTV ² (x 100)	0.0490** (5.32)	0.0187** (2.72)	0.000277 (0.03)	0.0738* (2.05)	0.214 (1.10)	-0.0383** (-3.31)
Initial Interest Rate	-0.000375 (-0.44)	0.00164* (2.40)	0.00291** (3.21)	0.00288** (3.16)	-0.0000362 (-0.06)	0.00368** (4.94)
Δ in Int Rates	0.0127** (9.55)	0.0144** (13.50)	0.0134** (12.11)	0.00100 (0.66)	0.00314** (3.02)	0.0166** (20.52)
Origination FICO	0.00653** (3.04)	0.00449** (2.65)	-0.00106 (-0.45)	0.00172 (0.74)	0.00351* (2.14)	0.00830** (4.76)
Initial Vantage (x 100)	-0.0326** (-19.67)	-0.0485** (-33.23)	-0.0736** (-36.73)	-0.0335** (-17.24)	-0.0368** (-29.22)	-0.0476** (-37.97)
Δ Vantage (x 100)	-0.0940** (-27.80)	-0.0651** (-22.30)	-0.0835** (-26.90)	-0.0399** (-10.20)	-0.0514** (-20.23)	-0.0902** (-38.97)
Δ Vantage ²	0.0216** (9.93)	-0.00777** (-3.16)	-0.00739** (-3.10)	-0.00518 (-1.49)	-0.00214 (-0.99)	0.00572** (3.26)
Low/No Doc	0.0108** (6.57)	0.00558** (4.57)	0.00737** (4.29)	0.00345 (1.90)	0.00429** (3.55)	0.0115** (8.59)
Origination Balance	0.00711** (12.00)	0.0101** (19.77)	0.0109** (15.23)	0.00685** (9.00)	0.00694** (13.94)	0.00973** (18.90)
CES+	-0.00426* (-2.24)	-0.0108** (-7.63)	-0.00502* (-2.49)	-0.00566 (-1.71)	-0.0106** (-7.52)	-0.00690** (-4.88)
Low Util HELOC	0.00607 (1.43)	0.000223 (0.05)	0.00270 (0.37)	0.0181** (3.82)	0.0105** (2.65)	-0.00267 (-0.54)
Countrywide	0.00281 (0.54)	0.0257** (6.02)	0.0119* (2.28)	-0.00173 (-0.29)	0.00780 (1.82)	0.0194** (5.33)
N. of cases	58136	97991	77045	35429	97969	141303
Avg Delinquency	0.0387	0.0504	0.0607	0.0226	0.0422	0.0780
Avg Share Countrywide	0.311	0.307	0.314	0.286	0.278	0.305

Marginal effects; *t* statistics in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

Table 13: Summary Statistics for FRMs At Origination-FICO < 620-Matched Sample

	Countrywide			Rest			Total		
	mean	sd	median	mean	sd	median	mean	sd	median
Initial CTLV	81.92	10.35	80	83.81	10.70	84.3	83.04	10.60	82.3
Initial Interest Rate	8.130	1.406	7.875	8.386	1.346	8.25	8.282	1.377	8.1
Initial Vantage	644.2	57.48	643	655.4	66.48	651	650.8	63.21	647
Origination FICO	576.4	30.94	582.5	564.9	43.16	576	569.6	39.08	579
Origination Balance	177499.6	111323.6	146000	173548.2	129811.5	132000	175153.6	122651.5	138000
Low/No Doc	0.181	0.385	0	0.373	0.484	0	0.295	0.456	0
Utilization	0.453	0.342	.434	0.512	0.336	.534	0.488	0.340	.496
Originated 1Q2005	0.0160	0.125	0	0.0528	0.224	0	0.0378	0.191	0
Originated 2Q2005	0.0710	0.257	0	0.0721	0.259	0	0.0716	0.258	0
Originated 3Q2005	0.149	0.356	0	0.0870	0.282	0	0.112	0.316	0
Originated 4Q2005	0.146	0.353	0	0.0698	0.255	0	0.101	0.301	0
Originated 1Q2006	0.0583	0.234	0	0.0808	0.273	0	0.0717	0.258	0
Originated 2Q2006	0.145	0.352	0	0.155	0.362	0	0.151	0.358	0
Originated 3Q2006	0.143	0.350	0	0.147	0.354	0	0.145	0.352	0
Originated 4Q2006	0.143	0.350	0	0.153	0.360	0	0.149	0.356	0
Originated 1Q2007	0.103	0.304	0	0.116	0.320	0	0.111	0.314	0
Originated 2Q2007	0.0263	0.160	0	0.0662	0.249	0	0.0500	0.218	0
CES+	0.0382	0.192	0	0.0990	0.299	0	0.0743	0.262	0
Low Util HELOC	0.0108	0.103	0	0.0151	0.122	0	0.0134	0.115	0
Observations	32396			47343			79739		
Observations with Util	23759			35158			58917		

Table 14: Summary Statistics for FRMs At Origination-FICO \geq 620-Matched Sample

	Countrywide			Rest			Total		
	mean	sd	median	mean	sd	median	mean	sd	median
Initial CTLV	84.29	11.83	80	85.63	11.62	85	84.99	11.74	83.5
Initial Interest Rate	6.481	0.644	6.375	6.866	0.881	6.75	6.681	0.800	6.5
Initial Vantage	781.8	87.12	776	778.8	100.3	766	780.2	94.21	771
Origination FICO	712.8	50.43	712	702.1	51.18	696	707.2	51.10	704
Origination Balance	318443.1	220826.7	252000	303142.1	226702.2	225000	310500.0	224026.2	239447
Low/No Doc	0.666	0.472	1	0.665	0.472	1	0.665	0.472	1
Utilization	0.259	0.260	.174	0.314	0.286	.237	0.288	0.275	.204
Originated 1Q2005	0.0569	0.232	0	0.0498	0.218	0	0.0532	0.224	0
Originated 2Q2005	0.0906	0.287	0	0.0737	0.261	0	0.0819	0.274	0
Originated 3Q2005	0.156	0.363	0	0.0958	0.294	0	0.125	0.331	0
Originated 4Q2005	0.124	0.330	0	0.0900	0.286	0	0.106	0.308	0
Originated 1Q2006	0.0901	0.286	0	0.0881	0.283	0	0.0891	0.285	0
Originated 2Q2006	0.108	0.310	0	0.124	0.330	0	0.116	0.321	0
Originated 3Q2006	0.0941	0.292	0	0.121	0.326	0	0.108	0.310	0
Originated 4Q2006	0.102	0.303	0	0.193	0.395	0	0.149	0.356	0
Originated 1Q2007	0.103	0.304	0	0.106	0.308	0	0.105	0.306	0
Originated 2Q2007	0.0752	0.264	0	0.0577	0.233	0	0.0661	0.249	0
CES+	0.116	0.320	0	0.247	0.431	0	0.184	0.387	0
Low Util HELOC	0.0828	0.276	0	0.0955	0.294	0	0.0894	0.285	0
Observations	168209			181588			349797		
Observations with Util	158386			169543			327929		

Table 15: Summary Statistics for FRMs At September 2008, Current Two Months Ago–Matched Sample–FICO < 620

	Countrywide			Rest			Total		
	mean	sd	median	mean	sd	median	mean	sd	median
Initial CTLV	80.10	10.36	80	81.42	10.72	80	80.81	10.58	80
Initial Interest Rate	7.678	1.254	7.5	8.164	1.289	7.99	7.942	1.296	7.75
Current Interest Rate	7.678	1.254	7.5	8.164	1.289	7.99	7.942	1.296	7.75
Initial Vantage	660.5	57.32	658	667.0	61.94	663	664.0	59.96	661
Current Vantage	673.5	76.18	672	666.7	75.58	664	669.8	75.93	668
Origination FICO	580.4	29.69	587	577.5	34.59	587	578.8	32.47	587
Origination Balance	206782.7	121491.6	175031	187471.8	125770.3	152000	196289.0	124205.9	163000
Low/No Doc	0.175	0.380	0	0.319	0.466	0	0.253	0.435	0
Utilization	0.600	0.323	.659	0.589	0.330	.649	0.594	0.327	.654
Originated 1Q2005	0.0184	0.134	0	0.0593	0.236	0	0.0406	0.197	0
Originated 2Q2005	0.0747	0.263	0	0.0780	0.268	0	0.0765	0.266	0
Originated 3Q2005	0.171	0.376	0	0.0815	0.274	0	0.122	0.328	0
Originated 4Q2005	0.156	0.363	0	0.0642	0.245	0	0.106	0.308	0
Originated 1Q2006	0.0554	0.229	0	0.0707	0.256	0	0.0637	0.244	0
Originated 2Q2006	0.137	0.343	0	0.148	0.355	0	0.143	0.350	0
Originated 3Q2006	0.131	0.338	0	0.138	0.345	0	0.135	0.342	0
Originated 4Q2006	0.135	0.342	0	0.160	0.366	0	0.148	0.356	0
Originated 1Q2007	0.0966	0.295	0	0.132	0.339	0	0.116	0.320	0
Originated 2Q2007	0.0254	0.157	0	0.0682	0.252	0	0.0487	0.215	0
CES+	0.183	0.387	0	0.154	0.361	0	0.167	0.373	0
Low Util HELOC	0.0349	0.184	0	0.0228	0.149	0	0.0283	0.166	0
Observations	13438			15993			29431		
Observations with Util	11032			12808			23840		

Table 16: Summary Statistics for FRMs At September 2008, Current Two Months Ago–Matched Sample–FICO ≥ 620

	Countrywide			Rest			Total		
	mean	sd	median	mean	sd	median	mean	sd	median
Initial CTLV	83.00	11.72	80	84.18	11.70	80	83.59	11.72	80
Initial Interest Rate	6.402	0.540	6.375	6.720	0.783	6.625	6.562	0.692	6.5
Current Interest Rate	6.402	0.540	6.375	6.720	0.783	6.625	6.562	0.692	6.5
Initial Vantage	792.4	85.59	788	797.4	99.45	788	794.9	92.86	788
Current Vantage	815.5	111.4	821	799.4	118.7	797	807.4	115.4	810
Origination FICO	716.9	49.67	717	708.8	51.19	705	712.8	50.60	712
Origination Balance	347047.5	224719.4	288300	346381.1	234119.3	283500	346712.1	229498.0	286400
Low/No Doc	0.670	0.470	1	0.668	0.471	1	0.669	0.471	1
Utilization	0.316	0.299	.226	0.349	0.311	.272	0.333	0.305	.248
Originated 1Q2005	0.0579	0.234	0	0.0493	0.216	0	0.0536	0.225	0
Originated 2Q2005	0.0914	0.288	0	0.0724	0.259	0	0.0818	0.274	0
Originated 3Q2005	0.160	0.367	0	0.0992	0.299	0	0.130	0.336	0
Originated 4Q2005	0.121	0.326	0	0.0931	0.291	0	0.107	0.309	0
Originated 1Q2006	0.0880	0.283	0	0.0880	0.283	0	0.0880	0.283	0
Originated 2Q2006	0.0996	0.299	0	0.121	0.326	0	0.110	0.313	0
Originated 3Q2006	0.0902	0.286	0	0.110	0.313	0	0.100	0.300	0
Originated 4Q2006	0.101	0.301	0	0.196	0.397	0	0.149	0.356	0
Originated 1Q2007	0.109	0.311	0	0.108	0.310	0	0.108	0.311	0
Originated 2Q2007	0.0818	0.274	0	0.0637	0.244	0	0.0727	0.260	0
CES+	0.392	0.488	0	0.406	0.491	0	0.399	0.490	0
Low Util HELOC	0.182	0.386	0	0.153	0.360	0	0.167	0.373	0
Observations	119395			120967			240362		
Observations with Util	113740			114724			228464		

Table 17: Mean Rate of FRMs Rolling from Current Straight to 60-days Delinquent: By Month and Servicer Control Group–FICO < 620

	Countrywide		Rest		Total	
	mean	count	mean	count	mean	count
July Rolling 60DPD	0.0143	21269	0.0221	29101	0.0188	50370
August Rolling 60DPD	0.0157	21360	0.0252	28575	0.0211	49935
September Rolling 60DPD	0.0205	21059	0.0247	27675	0.0229	48734
October Rolling 60DPD	0.0236	20636	0.0241	27250	0.0239	47886
November Rolling 60DPD	0.0234	19597	0.0175	25462	0.0200	45059
December 2008 Rolling 60DPD	0.0268	18798	0.0202	24883	0.0231	43681
January 2009 Rolling 60DPD	0.0265	18356	0.0214	24583	0.0236	42939
February Rolling 60DPD	0.0197	16884	0.0172	23283	0.0182	40167
March Rolling 60DPD	0.0206	16687	0.0169	22859	0.0185	39546
Average Rolling 60DPD	0.0219	153286	0.0207	205096	0.0212	358382
July Rolling Strategic 60DPD	0.00315	21269	0.00519	29101	0.00433	50370
August Rolling Strategic 60DPD	0.00337	21360	0.00612	28575	0.00495	49935
September Rolling Strategic 60DPD	0.00437	21059	0.00632	27675	0.00548	48734
October Rolling Strategic 60DPD	0.00674	20636	0.00488	27250	0.00568	47886
November Rolling Strategic 60DPD	0.00699	19597	0.00460	25462	0.00564	45059
December 2008 Rolling Strategic 60DPD	0.00835	18798	0.00551	24883	0.00673	43681
January 2009 Rolling Strategic 60DPD	0.00834	18356	0.00671	24583	0.00741	42939
February Rolling Strategic 60DPD	0.00652	16884	0.00511	23283	0.00570	40167
March Rolling Strategic 60DPD	0.00545	16687	0.00446	22859	0.00488	39546
Average Strategic 60 DPD	0.00617	153286	0.00536	205096	0.00571	358382

Average values refer to preceding months

Table 18: Mean Rate of FRMs Rolling from Current Straight to 60-days Delinquent: By Month and Servicer Control Group–FICO ≥ 620

	Countrywide		Rest		Total	
	mean	count	mean	count	mean	count
July Rolling 60DPD	0.00469	155123	0.00479	163167	0.00474	318290
August Rolling 60DPD	0.00523	154596	0.00525	165403	0.00524	319999
September Rolling 60DPD	0.00586	153367	0.00581	163784	0.00583	317151
October Rolling 60DPD	0.00681	151937	0.00725	162445	0.00703	314382
November Rolling 60DPD	0.00746	149481	0.00857	158734	0.00803	308215
December 2008 Rolling 60DPD	0.0106	147391	0.0117	154039	0.0112	301430
January 2009 Rolling 60DPD	0.0115	144890	0.0122	151492	0.0118	296382
February Rolling 60DPD	0.0106	141026	0.0115	146925	0.0111	287951
March Rolling 60DPD	0.0106	138001	0.0114	143965	0.0110	281966
Average Rolling 60DPD	0.00843	1181216	0.00905	1244551	0.00875	2425767
July Rolling Strategic 60DPD	0.00149	155123	0.00137	163167	0.00143	318290
August Rolling Strategic 60DPD	0.00163	154596	0.00141	165403	0.00152	319999
September Rolling Strategic 60DPD	0.00199	153367	0.00169	163784	0.00184	317151
October Rolling Strategic 60DPD	0.00220	151937	0.00243	162445	0.00232	314382
November Rolling Strategic 60DPD	0.00263	149481	0.00261	158734	0.00262	308215
December 2008 Rolling Strategic 60DPD	0.00388	147391	0.00408	154039	0.00398	301430
January 2009 Rolling Strategic 60DPD	0.00457	144890	0.00409	151492	0.00433	296382
February Rolling Strategic 60DPD	0.00453	141026	0.00414	146925	0.00433	287951
March Rolling Strategic 60DPD	0.00444	138001	0.00425	143965	0.00434	281966
Average Strategic 60 DPD	0.00317	1181216	0.00303	1244551	0.00310	2425767

Average values refer to preceding months

Table 19: FRM OLS Panel 2008-20091Q-Straight 60 by Delinquency and Servicer Type

	(1)	(2)	(3)	(4)
	BBX Sample	Matched Sample	FICO < 620	FICO ≥ 620
Countrywide x Nov-Jan	0.000610 (1.90)	0.000212 (0.61)	0.00496** (3.23)	-0.000467 (-1.35)
Nov-Jan	-0.000138 (-0.62)	0.000355 (1.42)	-0.00299** (-2.98)	0.000851** (3.38)
Jan-Mar	-0.00277** (-10.42)	-0.00349** (-11.78)	-0.00242 (-1.81)	-0.00462** (-16.99)
Countrywide x Jan-Mar	-0.000126 (-0.33)	0.000249 (0.61)	-0.00271 (-1.38)	0.00149** (3.94)
Apr-Jun	-0.00338** (-20.13)	-0.00321** (-17.50)	-0.00127 (-1.46)	-0.00405** (-24.22)
Countrywide x Apr-Jun	0.000525* (2.19)	0.000314 (1.23)	-0.00568** (-4.70)	0.00153** (6.37)
Jul-Aug	-0.00316** (-16.11)	-0.00267** (-12.38)	0.00208* (2.01)	-0.00363** (-18.45)
Countrywide x Jul-Aug	-0.000217 (-0.78)	-0.000454 (-1.55)	-0.00846** (-5.97)	0.000803** (2.91)
Feb-Mar	-0.000419 (-1.30)	0.000116 (0.32)	-0.00389* (-2.38)	0.000853** (2.58)
Countrywide x Feb-Mar	0.000677 (1.47)	0.00000964 (0.02)	0.00385 (1.61)	-0.000745 (-1.63)
Initial CTLV (x 100)	-0.101** (-19.64)	-0.0710** (-13.06)	-0.268** (-10.27)	-0.0412** (-8.02)
Initial CLTV ²	0.0690** (21.97)	0.0448** (13.41)	0.186** (11.32)	0.0250** (7.89)
Current CLTV (x 100)	-0.0121** (-10.52)	-0.0378** (-25.46)	-0.0397** (-5.54)	-0.0383** (-25.94)
Current CLTV ² (x 100)	0.0151** (27.71)	0.0253** (35.49)	0.0312** (9.26)	0.0250** (34.93)
Initial Interest Rate	0.00228** (27.63)	0.00127** (13.60)	-0.00200** (-7.72)	0.00118** (11.85)
Origination FICO	-0.0110** (-98.18)	0.0000354 (0.23)	-0.0287** (-29.15)	0.00532** (44.20)
Low/No Doc	0.00604** (66.76)	0.00408** (42.06)	0.0149** (26.53)	0.00294** (34.16)
Origination Balance	0.000829** (43.32)	0.00217** (87.76)	0.00561** (24.18)	0.00187** (78.35)
Countrywide	0.000530** (3.01)	0.00193** (10.15)	0.00263** (3.07)	0.00143** (7.60)
Initial Vantage (x 100)		-0.00994** (-101.72)	-0.0232** (-47.29)	-0.0103** (-109.65)
Δ Vantage (x 100)		-0.0103** (-44.39)	-0.0335** (-31.31)	-0.00757** (-32.04)
Δ Vantage ²		-0.00449** (-26.14)	-0.00461** (-5.16)	-0.00521** (-29.91)
CES+		-0.00401** (-32.81)	0.000117 (0.17)	-0.00374** (-31.71)
Low Util HELOC		0.00121** (12.28)	0.00398** (3.93)	0.00105** (11.01)
Origination Quarter	Yes	Yes	Yes	Yes
N. of cases	5481425	3991141	443851	3547290
Avg Delinquency	0.00900	0.00798	0.0221	0.00633
Avg Share Countrywide	0.440	0.481	0.432	0.483

Marginal effects; *t* statistics in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

Table 20: FRM OLS Panel 2008-20091Q-Strategic 60 by Delinquency and Servicer Type

	(1)	(2)	(3)
	Matched Sample, Strategic	FICO < 620	FICO ≥ 620
Countrywide x Nov-Jan	-0.000208 (-0.96)	0.00150 (1.68)	-0.000420 (-1.92)
Nov-Jan	0.000131 (0.85)	-0.000546 (-0.93)	0.000228 (1.45)
Jan-Mar	-0.00121** (-6.89)	-0.00109 (-1.45)	-0.00143** (-8.57)
Countrywide x Jan-Mar	-0.0000163 (-0.07)	-0.000747 (-0.68)	0.000258 (1.12)
Apr-Jun	-0.00116** (-10.53)	-0.0000925 (-0.19)	-0.00143** (-13.75)
Countrywide x Apr-Jun	-0.000292 (-1.90)	-0.00267** (-4.00)	0.000121 (0.81)
Jul-Aug	-0.00136** (-10.87)	0.000352 (0.60)	-0.00165** (-14.03)
Countrywide x Jul-Aug	-0.000179 (-1.02)	-0.00316** (-4.07)	0.000250 (1.46)
Feb-Mar	-0.0000828 (-0.39)	-0.000977 (-1.08)	0.0000867 (0.43)
Countrywide x Feb-Mar	-0.000185 (-0.64)	0.000553 (0.42)	-0.000331 (-1.19)
Initial CTLV (x 100)	-0.0389** (-11.90)	-0.107** (-7.03)	-0.0296** (-9.49)
Initial CLTV ²	0.0255** (12.58)	0.0740** (7.61)	0.0194** (10.00)
Current CLTV (x 100)	-0.0237** (-22.43)	-0.0236** (-5.41)	-0.0241** (-22.34)
Current CLTV ² (x 100)	0.0150** (29.16)	0.0159** (7.62)	0.0151** (28.51)
Initial Interest Rate	0.000719** (13.53)	0.0000662 (0.48)	0.000630** (10.46)
Origination FICO	-0.0000217 (-0.26)	-0.00477** (-10.55)	0.00141** (18.94)
Initial Vantage (x 100)	-0.00205** (-40.23)	-0.00282** (-10.16)	-0.00230** (-47.25)
Δ Vantage (x 100)	-0.00578** (-57.94)	-0.0111** (-27.82)	-0.00532** (-51.72)
Δ Vantage ²	0.00103** (17.22)	0.00342** (12.59)	0.000812** (13.25)
Low/No Doc	0.00153** (27.13)	0.00425** (13.65)	0.00132** (25.09)
Origination Balance	0.000583** (41.00)	0.00138** (11.45)	0.000531** (37.83)
CES+	-0.00177** (-23.97)	-0.000393 (-1.04)	-0.00173** (-23.52)
Low Util HELOC	-0.000179** (-2.85)	0.00120 (1.84)	-0.000190** (-3.09)
Countrywide	0.000928** (7.69)	0.000555 (1.13)	0.000849** (6.96)
Origination Quarter	Yes	Yes	Yes
N. of cases	3991141	443851	3547290
Avg Delinquency	0.00261	0.00612	0.00227
Avg Share Countrywide	0.481	0.432	0.483

Marginal effects; *t* statistics in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

Table 21: FRMs OLS Panel 2008-20091Q–Straight 60 by Utilization and CLTV, FICO < 620

	(1)	(2)	(3)	(4)	(5)	(6)
	Util < 30	30 ≤ Util < 80	Util ≥ 80	CLTV < 90	90 ≤ CLTV < 110	110 ≤ CLTV
Countrywide x Nov-Jan	0.00658* (2.08)	0.00275 (1.31)	0.0107** (3.50)	0.000272 (0.12)	0.00236 (0.95)	0.0128** (4.03)
Nov-Jan	-0.00414* (-1.98)	-0.00338* (-2.31)	-0.00397* (-2.06)	-0.000721 (-0.51)	-0.000354 (-0.22)	-0.00917** (-4.07)
Jan-Mar	-0.00305 (-1.09)	-0.00581** (-3.08)	-0.000371 (-0.14)	-0.00265 (-1.55)	-0.00141 (-0.62)	-0.00938* (-2.07)
Countrywide x Jan-Mar	-0.00296 (-0.75)	0.00285 (1.07)	-0.00784 (-1.94)	-0.00202 (-0.76)	-0.00336 (-1.02)	0.00402 (0.65)
Apr-Jun	0.00195 (1.01)	-0.00195 (-1.51)	-0.00302 (-1.71)	-0.00199 (-1.76)	-0.00205 (-1.53)	0.00121 (0.48)
Countrywide x Apr-Jun	-0.00761** (-3.04)	-0.00438** (-2.58)	-0.00416 (-1.68)	-0.00589** (-3.45)	-0.00493** (-2.60)	-0.00928** (-2.97)
Jul-Aug	0.00450 (1.95)	0.00355* (2.22)	0.00292 (1.38)	-0.00246 (-1.87)	-0.00262 (-1.76)	0.0155** (5.48)
Countrywide x Jul-Aug	-0.00862** (-2.90)	-0.0106** (-5.29)	-0.00754* (-2.56)	-0.00355 (-1.76)	-0.00374 (-1.76)	-0.0236** (-6.87)
Feb-Mar	-0.00477 (-1.40)	-0.00220 (-0.95)	-0.00626 (-1.89)	-0.000966 (-0.46)	-0.00402 (-1.48)	-0.00518 (-0.97)
Countrywide x Feb-Mar	0.00637 (1.34)	-0.00198 (-0.62)	0.0117* (2.37)	0.00115 (0.35)	0.00224 (0.57)	0.00236 (0.32)
Initial CTLV (x 100)	-0.450** (-5.93)	-0.256** (-6.77)	-0.156** (-3.52)	-0.0846* (-2.53)	-0.267** (-5.20)	-0.515** (-6.54)
Initial CLTV ²	0.305** (6.32)	0.186** (7.74)	0.118** (4.26)	0.0607** (2.72)	0.175** (5.56)	0.347** (7.32)
Current CLTV (x 100)	-0.0598** (-3.81)	-0.0322** (-3.30)	-0.0362* (-2.43)	-0.0613 (-1.74)	-0.303 (-1.27)	0.193** (5.35)
Current CLTV ² (x 100)	0.0428** (5.61)	0.0252** (5.43)	0.0300** (4.41)	0.0431 (1.79)	0.171 (1.43)	-0.0508** (-4.00)
Initial Interest Rate	-0.00278** (-5.03)	-0.00340** (-9.02)	-0.00190** (-3.65)	-0.000848* (-2.28)	-0.00112** (-2.74)	-0.00191** (-2.87)
Origination FICO	-0.0224** (-10.84)	-0.0265** (-17.42)	-0.0338** (-17.55)	-0.0161** (-11.81)	-0.0259** (-16.32)	-0.0431** (-18.87)
Initial Vantage (x 100)	-0.0130** (-13.57)	-0.0209** (-25.48)	-0.0363** (-31.10)	-0.0208** (-30.24)	-0.0229** (-29.18)	-0.0285** (-24.62)
Δ Vantage (x 100)	-0.0415** (-18.80)	-0.0236** (-12.26)	-0.0384** (-19.62)	-0.0282** (-17.00)	-0.0322** (-19.27)	-0.0473** (-20.96)
Δ Vantage ²	0.00656** (4.52)	-0.00905** (-5.28)	-0.0106** (-6.50)	-0.00226 (-1.57)	-0.00392** (-2.77)	-0.00320 (-1.84)
Low/No Doc	0.0179** (15.68)	0.0121** (15.10)	0.0165** (13.91)	0.00791** (10.59)	0.0117** (13.22)	0.0269** (18.59)
Origination Balance	0.00478** (10.24)	0.00587** (17.12)	0.00607** (12.57)	0.00466** (14.06)	0.00530** (14.40)	0.00821** (14.51)
CES+	0.00452** (2.69)	-0.00126 (-1.30)	0.000739 (0.55)	-0.000305 (-0.24)	-0.00234* (-2.29)	0.000709 (0.54)
Low Util HELOC	-0.000743 (-0.46)	-0.0000673 (-0.05)	0.00362 (1.13)	0.00275** (2.67)	0.0000607 (0.04)	0.00606* (1.97)
Countrywide	-0.000935 (-0.52)	-0.000281 (-0.23)	0.00474** (2.84)	0.00406** (3.09)	0.00408** (3.04)	0.00302 (1.71)
Origination Quarter	Yes	Yes	Yes	Yes	Yes	Yes
N. of cases	81312	151749	127860	171381	163469	109001
Avg Delinquency	0.0141	0.0126	0.0269	0.00443	0.0198	0.0315
Avg Share Countrywide	0.418	0.444	0.441	0.415	0.444	0.517

Marginal effects; *t* statistics in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

Table 22: FRMs OLS Panel 2008-20091Q–Strategic 60 by Utilization and CLTV, FICO < 620

	(1)	(2)	(3)	(4)	(5)	(6)
	Util < 30	30 ≤ Util < 80	Util ≥ 80	CLTV < 90	90 ≤ CLTV < 110	110 ≤ CLTV
Countrywide x Nov-Jan	0.00151 (0.69)	0.000888 (0.66)	0.00353* (2.19)	0.000785 (0.60)	0.00117 (0.83)	0.00268 (1.41)
Nov-Jan	-0.00114 (-0.78)	-0.000603 (-0.68)	-0.000575 (-0.59)	-0.000380 (-0.47)	-0.0000664 (-0.07)	-0.00149 (-1.11)
Jan-Mar	-0.000551 (-0.28)	-0.00145 (-1.29)	-0.00133 (-1.10)	-0.00124 (-1.32)	-0.00115 (-0.92)	-0.00172 (-0.64)
Countrywide x Jan-Mar	-0.000468 (-0.17)	-0.000903 (-0.57)	-0.00316 (-1.63)	0.000381 (0.25)	-0.00191 (-1.09)	-0.000111 (-0.03)
Apr-Jun	0.00330* (2.41)	0.0000172 (0.02)	-0.00133 (-1.65)	-0.00141* (-2.26)	-0.000701 (-0.93)	0.00315* (2.12)
Countrywide x Apr-Jun	-0.00596** (-3.45)	-0.00328** (-3.27)	-0.00166 (-1.45)	-0.00105 (-1.15)	-0.00176 (-1.71)	-0.00773** (-4.33)
Jul-Aug	0.00389* (2.36)	0.00149 (1.58)	-0.00187* (-2.11)	-0.00177* (-2.53)	-0.00222** (-2.85)	0.00718** (4.21)
Countrywide x Jul-Aug	-0.00670** (-3.30)	-0.00469** (-3.93)	-0.000398 (-0.30)	-0.00144 (-1.43)	0.000811 (0.71)	-0.0117** (-5.78)
Feb-Mar	-0.00164 (-0.69)	-0.00120 (-0.89)	-0.000525 (-0.35)	-0.000668 (-0.59)	-0.000613 (-0.41)	-0.00224 (-0.72)
Countrywide x Feb-Mar	0.000689 (0.21)	0.000845 (0.44)	0.00298 (1.28)	-0.000208 (-0.12)	0.00114 (0.55)	-0.000197 (-0.05)
Initial CTLV (x 100)	-0.300** (-4.70)	-0.0966** (-4.45)	-0.0282 (-1.48)	-0.0232 (-0.99)	-0.110** (-3.89)	-0.252** (-5.41)
Initial CLTV ²	0.199** (4.90)	0.0701** (5.01)	0.0221 (1.82)	0.0182 (1.16)	0.0715** (4.13)	0.164** (5.83)
Current CLTV (x 100)	-0.0453** (-3.78)	-0.0216** (-3.32)	-0.0108 (-1.53)	-0.0144 (-0.71)	-0.264* (-2.04)	0.0669** (2.97)
Current CLTV ² (x 100)	0.0303** (5.09)	0.0145** (4.57)	0.00792* (2.41)	0.00965 (0.70)	0.138* (2.11)	-0.0157* (-1.96)
Initial Interest Rate	-0.000537 (-1.50)	-0.000437* (-2.06)	0.000382 (1.54)	-0.0000391 (-0.20)	0.000233 (1.07)	0.000795* (2.07)
Origination FICO	-0.00577** (-4.60)	-0.00453** (-6.25)	-0.00286** (-4.17)	-0.00335** (-5.26)	-0.00430** (-6.07)	-0.00417** (-3.88)
Initial Vantage (x 100)	-0.000871 (-1.26)	-0.00366** (-8.19)	-0.00417** (-8.58)	-0.00357** (-9.96)	-0.00278** (-6.45)	-0.00215** (-3.07)
Δ Vantage (x 100)	-0.0180** (-14.42)	-0.0104** (-14.01)	-0.00861** (-15.00)	-0.00786** (-13.84)	-0.00968** (-14.97)	-0.0181** (-19.93)
Δ Vantage ²	0.00553** (7.96)	0.00261** (4.94)	0.00287** (8.28)	0.00222** (5.65)	0.00266** (5.68)	0.00655** (12.01)
Low/No Doc	0.00910** (11.40)	0.00362** (7.76)	0.00209** (3.86)	0.00177** (4.54)	0.00274** (5.74)	0.00971** (11.29)
Origination Balance	0.00145** (5.20)	0.00164** (8.88)	0.00130** (6.19)	0.000971** (6.72)	0.00139** (6.99)	0.00227** (7.20)
CES+	0.00120 (1.02)	-0.000380 (-0.67)	-0.000555 (-0.95)	-0.00177** (-3.16)	-0.00112* (-2.09)	0.000378 (0.51)
Low Util HELOC	0.000552 (0.42)	-0.000966 (-1.35)	-0.000122 (-0.09)	0.000205 (0.32)	-0.000303 (-0.30)	0.00397 (1.88)
Countrywide	0.000205 (0.16)	0.000822 (1.08)	0.00133 (1.58)	0.000342 (0.46)	0.000344 (0.46)	0.00216* (2.06)
Origination Quarter	Yes	Yes	Yes	Yes	Yes	Yes
N. of cases	81312	151749	127860	171381	163469	109001
Avg Delinquency	0.00542	0.00471	0.00551	0.00522	0.00519	0.00902
Avg Share Countrywide	0.418	0.444	0.441	0.415	0.444	0.517

Marginal effects; *t* statistics in parentheses

(d) for discrete change of dummy variable from 0 to 1

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