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MORTGAGE MODIFICATION AND STRATEGIC BEHAVIOR: EVIDENCE FROM A LEGAL SETTLEMENT WITH COUNTRYWIDE

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ABSTRACT

We investigate whether homeowners respond strategically to news of mortgage modification programs. We exploit plausibly exogenous variation in modification policy induced by U.S. state government lawsuits against Countrywide Financial Corporation, which agreed to offer modifications to seriously delinquent borrowers with subprime mortgages throughout the country. Using a difference-in-difference framework, we find that Countrywide's relative delinquency rate increased thirteen percent per month immediately after the program's announcement. The borrowers whose estimated default rates increased the most in response to the program were those who appear to have been the least likely to default otherwise, including those with substantial liquidity available through credit cards and relatively low combined loan-to-value ratios. These results suggest that strategic behavior should be an important consideration in designing mortgage modification programs.

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1 Introduction

More than five million U.S. homeowners lost their homes to foreclosure during the past three years.[1] An additional eleven million homeowners—about one out of every four with a mortgage—are at risk of foreclosure because their homes are worth less than what they owe to mortgage lenders (the mortgages are "underwater").[2] Federal and state governments have made foreclosure prevention an important policy goal and have repeatedly called on lenders to implement mortgage modification programs that would reduce the balances and interest rates of struggling homeowners.[3] Thus far, however, these programs have been viewed as having limited success in addressing the foreclosure crisis.[4]

An important challenge in designing cost-effective mortgage modification programs is developing eligibility criteria that efficiently identify homeowners who are highly likely default unless they receive help. In practice, it is difficult to identify these at-risk homeowners. Although millions of homeowners are "underwater" and therefore at risk of default, the majority of these homeowners are still making timely mortgage payments and may continue doing so without receiving a mortgage modification.[5] It could be quite costly to extend benefits to all of these underwater homeowners.

One approach to this problem is to extend benefits only to homeowners who are delinquent. For example, a number of modification programs have made bene-

[1] Moody's Analytics Regional Financial Review November 2010.

[2] March 2011 CoreLogic Data Release.

[3] We note that in times of adverse economic conditions, debt forgiveness and loan modification can create value for both borrowers and lenders (Bolton and Rosenthal, 2002; Kroszner, 2003; and Piskorski and Tchistyi, 2011). Moreover, because foreclosures may exert significant negative externalities (see, for example, Campbell et al., 2009), it might be socially optimal to modify mortgage contracts to a greater extent than lenders would select independently.

[4] The Obama administration, for example, has implemented the Home Affordable Mortgage Program (HAMP), which encourages private lenders to reduce the monthly payments owed by struggling homeowners. The program, however, has been generally viewed as a failure relative to its original ambitions. See, for example, Office of the Special Inspector General for the Troubled Asset Relief Program (2011).

[5] See, for example, March 2011 Written Testimony of David H. Stevens Assistant Secretary of Housing - Federal Housing Administration Commissioner U.S. Department of Housing and Urban Development.

fits available only to homeowners who failed to make at least two monthly mortgage payments (such homeowners are at least "sixty days delinquent").[6] This approach, however, could induce homeowners to default in order to obtain modification benefits even though they would not have defaulted otherwise. Lenders and policymakers are well aware of this "strategic behavior" problem. Nonetheless, some proponents of such policies argue that the costs of delinquency are sufficiently high to deter strategic behavior by most homeowners. Seriously delinquent borrowers, for example, face higher costs of accessing liquidity through credit cards, auto loans, and any new mortgages or refinancings. Additionally, bounded rationality or moral considerations may decrease a borrower's ability or willingness to behave strategically (see, for example, Guiso, Sapienza, and Zingales 2009)

An alternative way to target modification benefits—and one which alleviates the risk of strategic behavior—is to offer these benefits only to homeowners who undergo a rigorous audit that verifies that they are likely to default, or have defaulted, as a result of meaningful adverse conditions.[7] Such an audit, for example, would assess the home's value and the homeowner's current income and credit rating. Because this costly verification approach is time-consuming, however, it may fail to extend benefits to homeowners before they enter foreclosure or decide to exit their homes, and could thereby lead to higher costs for borrowers and lenders.

These alternatives to targeting modification benefits present a trade-off: one approach extends benefits quickly using a simple delinquency requirement, but generates potential strategic behavior. Another approach extends benefits more slowly using costly verification methods, minimizing strategic behavior, but potentially increases the

[6] The primary example of this approach is the Bank of America/Countrywide modification program. Other programs, like the IndyMac/FDIC program, JP Chase Enhanced Program, Citi Homeownership Preservation Program, and GSE Streamlined Modification Program have also targeted seriously delinquent borrowers, though some of them include additional eligibility requirements. See Citigroup (2009).

[7] An example of this approach is HAMP, which contains multiple eligibility requirements along with a trial period preceding any permanent modification.

number of foreclosures and results in higher costs for borrowers and lenders. The key factor affecting this trade-off is the extent to which simple delinquency requirements generate strategic behavior.

In this paper, we provide empirical evidence on the extent to which strategic behavior is induced by modification programs that use simple delinquency requirements to target benefits. We study a recent modification program—implemented by Countrywide Financial Corporation—that extended benefits to homeowners who were at least sixty days delinquent. The Countrywide program was the product of litigation commenced during Summer 2008 by U.S. state attorneys general, who alleged that Countrywide had engaged in deceptive lending practices. In October 2008, as part of a widely publicized Settlement, Countrywide agreed to modify all subprime mortgages that it serviced throughout the nation beginning in December 2008.[8]

A centerpiece of this Settlement was Countrywide's commitment to offer expedited, unsolicited loan modifications to borrowers who were at least sixty days delinquent. Three features of the Countrywide Settlement—its unexpected public announcement in advance of its implementation, its nationwide coverage, and its requirement that a borrower be delinquent in order to receive benefits—make it a potentially useful setting for assessing borrower behavior in response to the offer of mortgage modification featuring a simple delinquency requirement.

We examine borrower responses to the public announcement of the Countrywide Settlement using an extensive dataset with information about all privately securitized mortgages, including the name of the servicer, origination mortgage amount and interest rate, origination FICO, and monthly payment history. We match these mortgage-level data to borrower-level data supplied by Equifax, one of the three major credit bureaus. The Equifax data include the borrowers' updated credit scores as

[8]Although Countrywide had recently been acquired by Bank of America, the Settlement applied only to Countrywide mortgages.

well as their payment histories and utilization rates for credit cards, mortgages, second liens, and other sources of credit. These unique data allow us to track homeowner credit behavior during the months before and after an initial default on a mortgage and examine the extent to which borrowers who default on mortgages pay their other debts.

Most of our analysis focuses on 2/28 hybrid adjustable-rate mortgages (Hybrid ARMs), which were aimed primarily at subprime borrowers.[9] These mortgages offer a relatively low introductory "teaser" rate for the first two years, after which the rate typically resets to a higher level (indexed to LIBOR or Treasury rates) for the remaining 28 years of the loan term. We show below that the loan characteristics of Countrywide's 2/28 ARMs were comparable to those of other servicers prior to announcement of the Settlement. We say that a borrower exhibits "strategic behavior" if he or she defaults in response to the public announcement of the Settlement and would not have defaulted otherwise, at least in the near term.

In a difference-in-difference framework, we estimate the percentage increase in defaults among Countrywide borrowers during the months immediately following the Settlement announcement *relative to* the percentage increase during the same period among comparable borrowers who were unaffected by the Settlement because their loans were not serviced by Countrywide (the "Control Group"). In regressions controlling for many borrower attributes, including current credit scores and indebtedness, we find a thirteen percent increase in the overall probability that Countrywide 2/28 ARMs loans roll straight from current to sixty days delinquent during the three months immediately after the Settlement announcement (relative to a control group of loans with non-Countrywide servicers).[10] The effect of the Settlement rises to over twenty percent

[9]While the majority of subprime borrowers used 2/28 ARMs, we find similar results when we examine the behavior of borrowers with 3/27 ARMs. These results are not reported to save space, but are available from the authors upon request

[10]By "roll straight" we mean that the loans migrated from a "current" status to a "sixty-days delinquent" status during a two month period, implying that previously-current (paid up) borrowers missed two payments in a row.

when we subset on borrowers with (i) greater access to liquidity through credit cards and (ii) lower current combined loan-to-value (CLTV) ratios. These borrowers were arguably less likely to default in the near term because they had significant untapped liquidity through their credit cards or some positive equity in their homes.

We also find no effect of the Settlement on default rates among subprime Countrywide borrowers with respect to debts (credit cards, second mortgages) that were not targeted by the Settlement. In fact, Countrywide borrowers exhibit a very large increase in the likelihood of being delinquent on their first mortgage while remaining current on other debts relative to the control group.

We confirm that these results are not driven by idiosyncratic features of Countrywide loans or borrowers. While most Countrywide mortgages were covered by the Settlement, one product—non-subprime fixed-rate mortgages (FRMs)—were not eligible for the modification program. We split FRMs into subprime and non-subprime categories based on the initial FICO score of the borrower. We find no effect of the Settlement on default rates among high quality FRMs that were not eligible for benefits under the Settlement, but a strong effect of the Settlement on low quality FRMs that were potentially eligible for benefits.

Together, these results inform ongoing discussions on the trade-off between (i) quickly-implemented programs with simple but possibly manipulable eligibility criteria and (ii) slowly-implemented programs with more rigorous verification of homeowner distress. The Countrywide Settlement was a quickly-implemented program with a simple eligibility criterion. We find non-trivial effects on strategic behavior—up to over twenty percent relative increase in default rates among the borrowers least likely to default otherwise—during the months immediately after its announcement. Further research is needed to determine whether the costs of such strategic behavior are large relative to the potential benefits of a simple modification program that quickly extends benefits to a large number of homeowners.

Previous studies of incentives and strategic behavior in the context of the recent crisis have examined a number of questions, including the impact of bailouts on banks' incentives to take risk,[11] the likelihood that some lenders originated mortgages with greater risk due to their ability to sell the loans in the securitized market,[12] and the impact of securitization on servicer decisions to foreclose or renegotiate delinquent loans.[13] Little attention has been given so far to strategic behavior among homeowners.

Our analysis is also broadly connected to the household finance literature, surveyed by Campbell (2006) and Tufano (2009), especially the recent empirical literature examining household motives behind mortgage defaults. Most of this recent literature aims to assesses the relative importance of two key drivers of mortgage default: negative equity and illiquidity.[14] Guiso et al. (2009) also explore how moral and social considerations affect the decision to default on a mortgage. To the best of our knowledge, our paper is the first to assess the effect of mortgage modification programs on incentives to default on a mortgage.

Our paper is also related to the empirical literature examining the effects of various policies on household behavior, such as the impact of unemployment insurance on workers' incentives to work.[15] We contribute to this literature by examining the effects of mortgage modification policy on borrowers' incentives to repay their loans.

Finally, our paper helps inform the empirical literature on contract renegotiation.[16]

[11] See Farhi and Tirole (2009) and Poole (2009), for example.

[12] Keys, et al. (2010, 2011), Mian and Sufi (2009), Berndt and Gupta (2009), and Purnanandam (2010) provide evidence suggesting that originators might have made riskier loans when they were able to securitize these loans.

[13] Piskorski et al. (2010) show that bank-held delinquent loans were foreclosed at a lower rate relative to comparable mortgages that were securitized. Agarwal et al. (2011) corroborate their findings and provide further evidence that bank-held loans were much more likely to be renegotiated than comparable securitized mortgages.

[14] See, among others, Foote et al. (2008), Cohen-Cole and Morse (2010), and Elul et al. (2010). See also Mian and Sufi (2011) who examine the role of the home equity-based borrowing channel in the recent crisis using a data set consisting of individual credit files.

[15] See, for example, Meyer (1990) and Krueger and Meyer (2002).

[16] See, among others, recent research by Benmelech and Bergman (2008) and Roberts and Sufi (2009) in the context of corporate default, and Matvos (2009) for renegotiation in NFL football contracts.

Our paper is organized as follows. In Section 2 we describe the Countrywide Settlement and our hypotheses regarding its effects on homeowner behavior. Sections 3 and 4 describe our data and empirical methodology. We present our results in Section 5 and discuss their implications for the design of mortgage modification policies in Section 6.

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. The California complaint, for example, alleged that Countrywide had "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."[17] Over the next three months, similar suits were brought by attorneys general in over thirty other states.

On October 6, 2008, Countrywide entered a multi-state Settlement, pursuant to which it agreed to extend offers of loan modification to all seriously delinquent or near-delinquent subprime first-mortgage loans[18] that it services throughout the nation.[19] It is irrelevant whether the loan was originated by Countrywide, whether it is securitized

[17] State of California (2008a, p. 5). See also State of Illinois (2008).

[18] The Settlement defined a subprime first mortgage as one that "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." Countrywide (2008, p. 5).

[19] A summary of the settlement is provided by a "Multistate Settlement Term Sheet" (see Countrywide, 2008). More detailed terms are provided by State of California (2008b), among other sources.

or held in Countrywide's portfolio,[20] whether it previously received a modification, or whether the borrower's home is encumbered by a second mortgage or junior lien.

The Settlement targets subprime first mortgages currently serviced by Countrywide, including Hybrid ARMs, Option ARMs, and FRMs. To qualify for modification, the mortgage and borrower must satisfy four criteria: 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 seventy-five percent; payments of principal or interest must be sixty or more days delinquent (or likely to become delinquent as a result of an interest rate reset or negative amortization trigger); and the borrower's post-modification mortgage payments must not exceed certain thresholds.[21] Non-subprime FRMs are not eligible for modification under the Settlement.

Countrywide's obligations under the Settlement depend on when the mortgages became delinquent and on the mortgage type. With respect to subprime Hybrid ARMs, which are the primary focus of this paper, borrowers should receive *unsolicited* restoration of the introductory interest rate for five years if they were current prior to their first rate reset and became sixty 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

[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." Countrywide (2008, p. 4).

[21] The threshold is forty-two percent of income if taxes and insurance are escrowed and thirty-four percent of income otherwise.

interest-only period and also reduce the (adjusting) interest rate over the life of the loan (to as low as 3.5 percent).

Countrywide agreed to be proactive in contacting borrowers eligible for modifications under the Settlement. Although it made this commitment on October 6, 2008, it announced that it would not be ready to contact borrowers until December 1, 2008.[22] Countrywide also agreed to reach out to Hybrid ARM borrowers whose mortgage payments were scheduled to change after the Settlement. These borrowers would be encouraged to contact Countrywide if they expected to have trouble making the new payments. Finally, Countrywide agreed to suspend the foreclosure process for any borrower who might be eligible for a modification. The suspension should last as long as necessary to determine borrower eligibility.

2.2 Public Awareness of the Settlement

The Countrywide Settlement was widely reported in October 2008, prior to its nationwide rollout in December 2008. Figure 1 documents the sudden interest in the Settlement during this period: as reported by Google Trends, internet searches for the term "Countrywide Modification" spiked in October, as newspapers around the country announced the Settlement. Search activity increased steadily thereafter.

Internet discussion forums also show that Countrywide borrowers were well aware that the Settlement targeted borrowers who were at least sixty days delinquent. In one forum, borrowers report that they were in touch with Countrywide as early as October 2008 regarding their eligibility and that they were told that benefits were

[22] In a press release, for example, the Attorney General for Washington State explained that "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." See http://www.atg.wa.gov/countrywidePR100608.aspx.

available to borrowers who were sixty days delinquent. Some forum participants also indicate that they missed mortgage payments in order to qualify for benefits.[23]

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."[24] It appears that this provision was not widely reported and may not have deterred homeowners from strategically defaulting on their mortgages in order to qualify for modifications.

2.3 Hypotheses

We view the Settlement as a unique opportunity to assess homeowner response to sudden announcement of a modification policy using simple but manipulable qualification criteria. Most of our analysis focuses on 2/28 hybrid adjustable-rate mortgages (2/28 ARMs), a type of loan primarily targeted by the Settlement and very common among subprime borrowers.[25] These mortgages offer a relatively low introductory "teaser" rate for the first two or three years, after which the rate typically resets to a higher level (indexed to LIBOR or Treasury rates) for the remaining 28 years of the loan term.

[23]The information reported in this paragraph is drawn from comments posted at http://loanworkout.org/2009/02/countrywide-idiots/. This site includes statements such as: "We started the process back in Oct of 2008. We have an ARM with a 8.75% rate currently. We have applied for a rate reductions but were told we would have to be delinquent on our account to qualify."; "We received a loan modification agreement in December, but this was after we were told not to make a mortgage payment, because if we made a payment and we were current we would not qualify."; "In order to get the help we were requesting, we had to go from having an excellent pay history to completely tarnishing our record by missing 2 months of payments...so we skipped our payments for 2 months."; "We would not even be behind if they did not advise us to enter into the loan modification and not send any payments in until it was approved or denied!"

[24]Multi-State Settlement, p. 9.

[25]Mayer et al. (2009) report that among subprime borrowers, over 75 percent of mortgages originated over the 2003–2007 period were of the hybrid type.

Assuming the announcement was an exogenous shock—an assumption we justify in the next section—we propose the following differences-in-differences (DD) estimation strategy: Relative to the same type of mortgages held by comparable borrowers and serviced by other servicers, were Countrywide 2/28 ARMs more likely to roll from current to sixty days delinquent during the period immediately after public announcement of the Settlement? By abruptly stopping payment, homeowners could make themselves eligible for the benefits of the Settlement.

We test for this DD effect 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.[26] This program may have affected homeowner behavior, across all servicers, possibly in much the same way as the Countrywide Settlement. It is a potential confound because its effect on Countrywide borrowers, who may have already obtained modifications pursuant to the Countrywide Settlement, may differ from its effect on non-Countrywide borrowers, who may have been more likely to apply for and obtain benefits under the HAMP. To avoid the potential confound, we focus our analysis on the behavior of borrowers during the first few months after Settlement announcement (October 2008 to February 2009).

To be sure, an increase in the delinquency rate among Countrywide borrowers (relative to those in the Control Group) does not necessarily show that they were acting strategically to become eligible for modification. They may have been struggling to make monthly mortgage payments and been likely to default in the near future. The Settlement announcement may only have convinced them to default slightly earlier than they would have otherwise. Such defaults are not strategic because the borrowers were already distressed and likely to default.

[26]Bob Willis, "HUD's Donovan Says U.S. to 'Accelerate' Mortgage Modification," Bloomberg (Feb. 7, 2009).

To assess whether economic distress—rather than strategic behavior—is driving excess post-Settlement defaults among Countrywide borrowers (relative to the Control Group), we examine the behavior of homeowners who were *least* likely to default when the Settlement was announced: (i) homeowners with substantial available credit on their credit cards (equal to at least five times their monthly mortgage payment) and (ii) homeowners with lower current CLTV ratios. Because these homeowners had access to significant amounts of additional liquidity, or might have had some positive equity left in their houses, they were 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.

As an additional test of strategic behavior, we examine the behavior of homeowners with respect to debts that were not targeted by the Settlement. The Settlement obligated Countrywide to modify the terms of subprime first mortgages only; debts arising from second mortgages and credit cards were unaffected. If strategic behavior—not economic distress—induced excess defaults on Countrywide subprime first mortgages, we do not expect to observe excess defaults (relative to the Control Group) with respect to non-targeted debts during the period immediately after Settlement announcement.

Relatedly, if strategic behavior is an important driver of post-Settlement excess defaults among Countrywide borrowers, we expect to find that Countrywide borrowers were more likely to default on subprime first mortgages while remaining current on non-targeted debts immediately after the Settlement announcement. For example, the probability of defaulting on subprime first mortgages while remaining current on second liens should have increased among Countrywide borrowers, relative to the Control Group, immediately after the announcement.

Finally, we consider the behavior of borrowers with FRMs. While hybrid ARMs are a risky mortgage product usually targeted at subprime borrowers, FRMs are a

more conventional mortgage product that are often taken out by prime borrowers who would not have qualified for modification under the Settlement. We might observe a response to Settlement announcement among subprime FRM borrowers, but we do not expect to observe a response among non-subprime FRMs. This comparison is particularly useful because it tests whether the Settlement announcement altered the behavior of some but not all Countrywide borrowers. We can therefore assess whether the post-Settlement increase in Countrywide defaults (relative to the Control group) reflects strategic behavior among targeted borrowers (those with subprime FRMs) or just a generalized rise in default rates across all Countrywide borrowers, including non-targeted homeowners (those with non-subprime FRMs).

3 Data

Our primary dataset links two databases: (i) loan-level mortgage data collected by BlackBox Logic and (ii) borrower-level credit report information collected by Equifax.

BlackBox is a private company that provides a comprehensive, dynamic dataset with information about twenty-one million privately securitized Subprime, Alt-A, and Prime loans originated after 1999. These loans account for about ninety percent of all privately securitized mortgages from that period. The BlackBox data, which are obtained from mortgage servicers and securitization trustees, include static information taken at the time of origination, such as mortgage date and amount, FICO credit score, servicer name, interest rate, term, and interest rate type. The BlackBox data also include dynamic data on monthly payments, mortgage balances, and delinquency status.

Equifax is a credit reporting agency that provides monthly data on borrowers' current credit scores, 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 is linked to the BlackBox sample. The initial linkage was performed by 1010Data, a provider of data warehousing and processing, using a proprietary match algorithm. We impose four restrictions on the merged BlackBox-Equifax data in order to create a "Base Sample." First, we restrict the data to the types of loans that might have been eligible for the Countrywide Settlement, namely first-lien mortgages on residential properties that were the owners' primary residences (we excluded mortgages on properties that were purchased as second homes or by investors). First-liens were identifed as loans with the following characteristics in the BlackBox dataset: (i) a lien type of "first" or "unknown" and (ii) a current or origination mortgage balance that was within five percent of the current or origination balance reported for the largest two first mortgages in the Equifax dataset. Second, we retain only loans that were originated during 2005, 2006, and the first half of 2007. Third, we exclude mortgages with an origination LTV less than seventy. Borrowers with lower LTVs are unlikely to have been subprime borrowers at the time of origination. Finally, we exclude mortgages serviced by Citibank, IndyMac, and J.P. Morgan, all of which implemented modification programs around the time that the Settlement was announced. We are interested in comparing the behavior of Countrywide borrowers to that of similar borrowers who were not offered a modification benefits around the time of the announcement. After imposing these restrictions, we obtain a Base Sample that includes about 574,000 2/28 ARMs and 705,000 FRMs.

Although 1010Data was able to link every BlackBox mortgage to an Equifax credit report, 1010Data had a high degree of confidence about the linkage in only a

minority of the cases. To minimize the risk of poor quality linkages, we created a "Matched Sample" on which we perform all analysis involving Equifax covariates. We exclude from the Matched Sample any observation for which the borrower zip code reported in Equifax does not match the property zip code in the BlackBox dataset at the beginning of our analysis period (December 2007-January 2008). This exclusion omits mismatched loans at the level of zip code and provides additional verification that owner-occupants held the loans in our sample. Due to this exclusion, the Matched Sample is smaller than the Base sample and includes about 394,000 2/28 ARMs and 524,000 FRMs.

Because the Equifax data include information about current balances on other mortgages held by the borrower, we are able to compute a dynamic combined loan balance for each property. We can then calculate a current CLTV using zip-level home prices indices provided by Zillow.[27] To avoid the possibility of including liens from other properties when computing loan balances, we compute a current CLTV only for borrowers with no more than one closed-end second lien.

In the analysis below, we report results both for the full Base Sample as well as the smaller Matched Sample. Variables provided by Equifax are used as covariates only in the Matched Sample.

4 Methodology

Our objective is to measure the effect of the Countrywide Settlement on borrower behavior immediately after it was announced in October 2008. To do this, we implement a differences-in-differences (DD) approach that compares Countrywide mortgages (treatment group) to comparable mortgages (control group) before and after the Settlement announcement.

[27] For both the Base and Matched Samples, we use the MAPLE/Geocorr2k engine provided by the Missouri Census to link property zip code to Metropolitan Statistical Areas.

For our analysis of a particular class of mortgages (2/28 ARMs, subprime FRMs, and non-subprime FRMs), we select as a Control Group the same class of loans serviced by institutions other than Countrywide, excluding Citibank, IndyMac, and J.P. Morgan for the reasons given above. As we show below, Countrywide and Control Group loans (within a given class of mortgage) exhibit small differences in observable attributes both at origination and at time the Settlement was announced. Additionally, there is little change in these observable attributes around the time of the announcement. This is unsurprising because, during the period when loans in our sample were originated (2005-2007), the market for subprime lending was extremely competitive. Mortgage brokers typically accessed databases that listed mortgage terms for many wholesale lenders.

Although the Countrywide and Control Group loans are similar along observable dimensions, one might be concerned that unobservable differences are potentially important because Countrywide was sued while other mortgage lenders and servicers were not (an omitted variable bias). Alternatively, one might be concerned that the lawsuit itself was triggered by already-mounting delinquencies among Countrywide loans (a reverse causality problem). While potentially troubling, we do not believe that these issues generate an appreciable bias in our results. First, 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 lawsuits (its financial distress was resolved through its acquisition by "deep-pocketed" Bank of America). Other subprime originators, such as New Century and IndyMac, had already collapsed and either filed for bankruptcy or been placed into receivership by the federal government. Second, although Countrywide allegedly failed to disclose all features of its mortgage products, its lending practices may not have differed substantially from those of other institutions, who appear to have limited their disclosures

to borrowers as well.[28] Finally, as we show below, the homeowners who responded most strongly to the Settlement were borrowers with relatively high available liquidity (through credit cards) and low current CLTV. Not only were these borrowers the least likely to default in the absence of the Settlement, but there is little evidence of a pre-Settlement increase in the delinquency rates of these borrowers relative to Control group. These findings are inconsistent with the notion that post-Settlement increases in delinquency rates are merely a continuation of pre-existing trends.

For these reasons, we view the Countrywide Settlement as a plausibly exogenous shock to Countrywide mortgages, which are closely similar to mortgages serviced by other institutions. Nonetheless, our analysis below includes detailed controls for time-varying mortgage terms and borrower characteristics, as well as Countrywide-specific fixed effects interacted with time dummies (which allow us to observe any pre-Settlement changes in delinquency rates among Countrywide or Control Group mortgages).[29] Even if similar borrowers were offered different terms by Countrywide than by 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.

4.1 Comparability of Countrywide and Control Group Loans

Tables 1, 8, and 9 (see Appendix for tables 8 and 9) help justify our identifying assumption that Countrywide and Control Group servicers had similar borrower bases

[28] See, e.g., Lacko and Pappalardo (2007). Moreover, it is not clear whether any differences in disclosure policies would have affected borrowers' choices. Using data from the Survey of Consumer Finances, Bucks and Pence (2008) report that although most borrowers seem to know basic mortgage terms, borrowers with adjustable-rate mortgages appear likely to underestimate or not know how much their interest rates could change.

[29] In unreported regressions, we also included fixed effects for the top five servicers, fully interacted with pre- and post-Settlement time dummies. Results from those regressions were comparable to those reported below.

with comparable loan terms around the time of Settlement announcement. The tables present summary statistics for the stock of mortgages that were current sixty days prior to September 2008. The summary statistics include characteristics of the loans at origination and as of September 2008, the month just before public announcement of the Settlement on October 6, 2008.

Table 1 focuses on 2/28 ARMs. Measured at means, Countrywide and Control Group loans had similar CLTVs, interest rates, and credit scores: origination and current CLTV differ by at most 2.1 points, origination and current interest rates differ by at most eleven basis points, and origination FICO and current Vantage differ by at most 1 point. Origination balances differ by about $10,000, less than ten percent of the standard deviation. Available utilization on credit cards ("Months of Utilization") is measured by first computing the difference between (i) the total credit limit available on all credit cards and (ii) the total amount charged to all credit cards. This difference is then divided by the monthly mortgage payment. Thus, the variable "5+ Months Utilization" measures the proportion of borrowers who had sufficient remaining credit card utilization that they could charge the equivalent of at least five monthly mortgage payments. Comparing Countrywide and Control Group borrowers, Table 1 shows comparable levels of credit card utilization.

Tables 8 and 9 present the same summary statistics for subprime and non-subprime FRMs. We define a loan as "subprime" if the borrower's origination FICO was less than 620. Subprime and non-subprime loans are comparable across most dimensions, including origination and current CLTV, origination FICO and current Vantage, origination balance, and credit card utilization. Substantial differences exist, however, with respect to initial and current interest rates. Among subprime FRMs, both origination and current interest rates are about 76 basis points lower for Countrywide loans (over fifty percent of the standard deviation for each variable). Among non-subprime FRMs, both origination and current interest rates are 30 basis points

lower for Countrywide loans (again over fifty percent of the standard deviation). Note, however, that the differences between Countrywide and Control Group loans are virtually identical both at origination and at the beginning of the analysis period. A persistent difference between treatment and control groups is consistent with our identifying assumption.

Figures 3 through 5 (see Appendix) explore our identifying assumption further for 2/28 ARMs. They track the evolution of interest rates, Vantage scores, and CLTV among 2/28 ARMs over time by quarter of origination. Figure 3 plots current interest rates and shows that Countrywide and Control Group loans generally track each other during the months preceding the Settlement announcement. We do see small differences in interest rates during the quarter following the reset date: Countrywide loans tend to reset to a higher average interest rate than Control Group loans. This suggests that Countrywide loans may have been riskier than those in the Control Group. We account for this difference by controlling for variation in interest rates over time in the regressions reported below.

Figures 4 and 5 show that Vantage scores and CLTV evolved in nearly identical patterns for Countrywide and Control Group loans. The current Vantage score was virtually identical across the two groups during the months preceding the Settlement announcement: the difference never exceeds ten Vantage score points (less than twelve percent of a standard deviation) in any origination quarter. Similarly, CLTV is very similar across Countrywide and Control Group loans in all origination vintages except the fourth quarter of 2005, and even in that vintage the difference is consistently below five percentage points over time.[30]

We observe similar patterns among FRMs. Overall, these patterns point to a close comparability across Countrywide and Control Group loans before the Settlement was announced in October 2008. As some variation between these two groups could

[30]Moreover, we note that loans originated in Q4 2005 account for less than 4% of our observations.

be due to differences in the timing and mix of mortgages originated, we include a wide range of controls (for loan, loan pool, and individual borrower characteristics) in the regressions reported below.

4.2 Empirical Specification

We estimate a probit specification of the following form:

$$\Pr(Y_{it} = 1|\text{Current}_{t-2}) = \Phi(\alpha+\beta\cdot CW_{it}+\mu\cdot Oct\text{-}Dec_{it}+\delta\cdot CW_{it}\cdot Oct\text{-}Dec_{it}+\gamma\cdot X_{it}) \quad (1)$$

The dependent variable is the probability that a mortgage becomes sixty days past due in month t ($Y_{it} = 1$), conditional upon being current sixty days (two months) earlier (Current_{t-2}). We call this the "rollover rate" from current to sixty days delinquent. CW_{it} is a dummy variable that takes the value 1 if the loan is serviced by Countrywide. $Oct\text{-}Dec_{it}$ is another dummy, taking the value 1 if month t occurs during the period October through December 2008. October 2008 is the first month during which we would observe a borrower response to announcement of the Settlement on October 6, 2008.[31] Because the federal government announced HAMP in early 2009—a potential confound as discussed above—we focus primarily on the three months (ending in December) after the Settlement announcement.[32] X_{it} is a vector of loan and borrower characteristics that includes variables such as initial Vantage score and the change in Vantage score from origination to the current period, 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 (CW_{it}).

[31] Our data record the payment status of the borrower as of the end of a given month. For example, a borrower who is thirty-days delinquent in September will be recorded as being sixty-days delinquent in October if no new payments were received by the end of October. Thus, a delinquency status in October 2008 is the first record that could reflect a borrower's decisions made after the Settlement announcement.

[32] We include January and February 2009 in our analysis, however, because HAMP was not formally announced until March 2009.

The coefficient of interest is δ, which measures the "difference in difference:" the (i) difference between Countrywide and Control Group borrowers with respect to the (ii) change in rollover rates between the quarter immediately before the Settlement announcement (July-September 2008) to quarter immediately after (October-December 2008). Standard errors are clustered by mortgage.[33] The estimation period runs from January 2008 to February 2009.

We also estimate equation (1) separately for subsamples of loans with the same origination quarter. This allows us to control more carefully for heterogeneity across loans due to vintage-specific effects, such as the date of an interest rate reset.

5 Results

We observe a marked increase in delinquency rates among Countrywide loans, relative to the Control Group, immediately after the Settlement announcement. Figure 2 plots the quarterly probability that non-delinquent ("current") 2/28 ARMs become sixty days past due (the "sixty-day rollover rate"). The averages are displayed for each of the three quarters preceding the Settlement announcement, the quarter just after the announcement (Oct-Dec 2008), and the Jan-Feb 2009 period. The sixty-day rollover rate is the primary dependent variable in our regressions below because the Settlement targets borrowers who are at least 60-days delinquent on their mortgages. The top panel of Figure 2 examines all loans. The middle panel subsets on "low utilization" borrowers: those who had sufficiently large liquidity available to them through credit cards that they could charge the equivalent of five or more months of mortgage payments when they become delinquent on their mortgages. The bottom panel subsets on borrowers whose mortgages had a CLTV less then 100 percent at the time of their delinquency. These low utilization and low CLTV borrowers were

[33] We obtain comparable results with standard errors clustered by mortgage servicer.

arguably less likely to default in the near term because they had significant untapped liquidity through their credit cards or some positive equity in their homes.

The top panel of Figure 2 shows a significant increase in the sixty-day rollover rate of Countrywide loans relative to the Control Group (top panel) during the October-December 2008 period, the first quarter in which we could observe an effect of the Settlement announcement. However, we also observe an increase in the delinquency rate of Countrywide loans relative to Control Group in the quarter immediately preceding the Settlement announcement, suggesting the possibility of a pre-Settlement trend in delinquency rates.

This pre-Settlement increase in the delinquency rate of Countrywide loans relative to Control Group is less evident when we subset on "low utilization" borrowers in the middle panel of Figure 2. Here we continue to see a significant increase in the rollover rate among Countrywide loans, relative to the Control group, after Settlement announcement. But for these borrowers we observe only a slight pre-Settlement increase in Countrywide rollover rates relative to the Control Group.

When we subset on low CLTV borrowers in the bottom panel of Figure 2, we again observe a substantial post-Settlement increase in Countrywide delinquencies relative to the Control Group. But we also observe virtually no pre-Settlement difference between Countrywide and the Control Group.

Overall, Figure 2 suggests that a number of Countrywide borrowers might have missed payments in response to the Settlement announcement. Although we observe a pre-Settlement increase in delinquencies among Countrywide borrowers, relative to the Control Group, the increase appears to be driven primarily by the lowest quality loans (borrowers with relatively high utilization of credit cards and high CLTVs). Among more creditworthy borrowers we observe little relative change in delinquencies prior to the Settlement announcement, suggesting that our identification assumptions are

reasonable at least with respect to these borrowers. Indeed, as we will show next, after controlling for observables, we do not find a statistically significant *pre*-Settlement increase in the relative delinquency rate among low utilization and low CLTV Countrywide borrowers. Instead, we find that their delinquency rates increased substantially, relative to the Control Group, immediately *after* the announcement.

5.1 Baseline Model of Settlement Effects

Table 2 implements equation (1) for Hybrid 2/28 ARMs. Column (1) estimates the model using the full Base Sample, but includes only a minimal set of controls: time dummies, a Countrywide dummy, and interactions between the Countrywide and time dummies. The time dummies identify the months (usually quarters) before and after Settlement announcement. The excluded category is July-September 2008, the quarter immediately preceding announcement. The final time dummy—Jan-Feb 2009—includes only two months because we stop our analysis in February 2009, the month before the HAMP was announced. These time dummies, along with the Countrywide $\times$ Time interactions, control for time-varying differences between Countrywide and Control Group loans.

Column (2) adds additional controls from BlackBox, listed in Table 1. These controls include a wide range of loan- and borrower-level characteristics, such as origination FICO, initial CLTV, current LTV, initial interest rate and any change in rate over time. Column (2) also includes MSA fixed effects,[34] dummies that identify loans that had reset within the preceding three or six months, and interactions between these reset variables and the Countrywide dummy (see Table 10 in the Appendix for the full set of coefficients). These variables account for heterogeneity across loans and systematic differences between Countrywide and the Control Group, including the possibility

[34]In unreported regressions, we obtained virtually identical results when we included both State dummies and State $\times$ Time interactions.

that Countrywide mortgages experienced 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.

Columns (3) and (4) analyze the Matched Sample: Column (3) includes the same controls as in Column (2); Column (4) includes the full set of Equifax controls, including information about second liens, credit card utilization, and current credit scores (Vantage). Column (4) also uses current and origination CLTV, whereas prior columns use current and origination LTV.

The key covariate is the Countrywide × Oct-Dec 2008 interaction, 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 July to September 2008). The coefficients in these tables are marginal effects and can be compared to the mean monthly rollover rate among Countrywide loans during the July to September 2008 period, as reported at the bottom of the table ("Avg. Delinquency").[35]

Across all columns in Table 2, the Countrywide × Oct-Dec 2008 interaction is positive, highly significant, and economically meaningful. Relative to the pre-Settlement rollover rate among Countrywide loans (between 4.8 and 4.9 percent, as shown in the bottom panel), the effect ranges from twenty-three percent in Column (1) to fifteen percent in Column (2) to thirteen percent in Columns (3) and (4). Because the magnitude of the effect does not vary substantially between Columns (2) and (3), we conclude that restricting our attention to the Matched Sample does not bias our inference. In the regressions reported below, we use the specification reported in

[35]Following Kremer and Snyder (2010) and Puhani (2008), we do not make the adjustments recommended by Ai and Norton (2003) because our interaction measures a difference-in-difference treatment effect.

Column (4) (this is our "preferred specification").[36]

While strongly statistically significant and economically meaningful (in relative terms), these effects are derived from a model that implicitly constrains the effect of the Settlement announcement to be the same for all loan vintages. The Settlement, however, could have impacted some loan vintages more than others. By its terms, it targeted loans that reset around or after the Settlement announcement. We therefore separately examined loans by vintage to determine whether the effect is larger for some vintages than others. In particular, we reran the specification in Column (4) for each quarterly origination cohort (see Table 11 in the Appendix). Our regressions show that the relative increase in delinquency for Countrywide loans is present in a number of origination cohorts. The fact that we find these results among cohorts that were not resetting around the Settlement announcement alleviates the concern that these results are driven by unobservable differences between Countrywide and the Control Groups around the reset date (note also that our regressions control for the magnitude of any interest rate reset).

5.2 Settlement Effects by Credit Card Utilization and CLTV

The baseline models in Table 2 present two inferential problems. First, although they report a marked post-Settlement increase in the rollover rate of Countrywide loans relative to the Control Group, this increase does not necessarily reflect strategic behavior. It could instead reflect an increase in defaults by economically distressed borrowers who were already highly likely to default in the near term. Second, the coefficients in Table 2 reveal a pre-Settlement increase in rollover rates of Countrywide

[36] We obtained qualitatively similar results in unreported regressions that augment the specification in Column (4) to include fixed effects identifying each of the top five non-Countrywide mortgage servicers (other, smaller servicers comprised the omitted category). These servicer fixed effects were interacted with each of the quarterly time dummies. The Countrywide × Oct-Dec interaction remained positive, highly significant, and economically large. It was also greater than and statistically different from each "Servicer" × Oct-Dec interaction for the non-Countrywide servicers.

loans relative to Control group. Although the estimated pre-Settlement increase in relative delinquency rates of Countrywide loans is (about fifty percent) smaller than the estimated post-Settlement increase, one could argue that a pre-existing trend, not the Settlement announcement, possibly explains part of the post-Settlement relative increase in the delinquency rate.

We address the first problem by identifying subsets of borrowers who were unlikely to default in the absence of the Settlement. In particular, we hypothesize that borrowers with access to substantial liquidity (through credit cards) or with some positive equity in their houses would be much less likely to default otherwise. For that purpose, we stratify our sample by levels of credit card utilization (utilization is measured monthly) and CLTV. With respect to utilization, we identify three groups: borrowers with access to credit equal to at least five months of mortgage payments ("5+ Months"), those with available credit equal to two to four months of payments ("2-4 Months"), and those with available credit equal to no more the one payment ("0-1 Months"). We hypothesize that borrowers with high levels of available credit (e.g., "5+ Months") are likely to be less liquidity constrained and therefore less vulnerable to economic shocks than borrowers with lower levels of available credit. We similarly separated borrowers into three groups based on their current CLTV: borrowers with CLTV less than 100 ("above water"), those with CLTV between 100 and 120, and those with CLTV greater than 120 ("underwater"). Again, we hypothesize that borrowers with CLTV under 100 are less likely to default because they have some positive housing equity.

Table 3 reruns our preferred specification—Column (4) in Table 2—for each group of borrowers. Columns (1) through (3) separate borrowers by credit card utilization, (4) through (6) separate them by CLTV. Note that the pre-Settlement rollover rate is substantially lower among low utilization (5+ months) and above water (CTLV<100) borrowers. Their rollover rates appear in the row labeled "Avg. Delinquency" at the

bottom of the table. There we see that low utilization borrowers had a pre-Settlement rollover rate (three percent) that was forty-five percent lower than the rollover rate among borrowers with the lowest available credit (5.5 percent). Similarly, the rollover rate among above-water borrowers (3.1 percent) was sixty percent lower than the rate among under-water borrowers (7.8 percent). This confirms our hypothesis that these borrowers should have relatively low default rates.

Separating borrowers by credit card utilization, Columns (1) through (3) show that the effect of the Settlement was strongest among borrowers with the most available credit. The relative increase in delinquency is greater than twenty percent among borrowers in the"5+ Months" category, but only about twelve percent among borrowers in the "2-4 Months" and "0-1 Months" categories. Equally important, Column (1) shows no statistically significant pre-Settlement increase in rollover rates among low utilization Countrywide borrowers. This increase appears only among borrowers with relatively low available credit (Columns 2 and 3).

Together, these results are inconsistent with the possibility that idiosyncratic economic shocks to Countrywide borrowers explain the differences between Countrywide and the Control Group borrowers immediately after the Settlement announcement. Our results—especially the absence of a pre-Settlement increase in rollover rates among borrowers with higher available credit—also support the hypothesis that the Settlement induced defaults among borrowers who were unlikely to default otherwise, at least in the near future.

Separating borrowers by CLTV, we obtain comparable results in Columns (4) through (6) of Table 3. We find sizeable post-Settlement effects (around fifteen percent) among above-water Countrywide borrowers with CTLV<100, but observe no statistically significant pre-Settlement increase. The effect of the Settlement is comparable among borrowers with mid-range CLTV (between 100 and 120), but smaller among under-water borrowers (a 10.6 percent effect). Additionally, Countrywide borrowers

in each of the latter groups exhibit a pre-Settlement increase in rollover rates. These results offer further support for the hypothesis that the Settlement induced defaults among borrowers who were much less likely to default otherwise, at least in the near future.

5.3 Effects of Settlement on Non-Targeted Debts

If the Settlement induced strategic default by Countrywide borrowers, we do not expect to observe an effect of the Settlement on default rates for non-targeted debts, such as second liens and credit card debt. To the contrary, we expect to observe Countrywide borrowers remaining current on these debts while defaulting on first mortgages in order to obtain the benefits of the Settlement.

Table 4 tests the first hypothesis—that rollover rates for non-targeted debts should not exhibit a post-Settlement increase among Countrywide borrowers, relative to the Control Group. Columns (1) and (2) re-estimate our preferred specification, but change the dependent variable to measure the probability of delinquency on a second lien (Column 1) or on credit card debt (Column 2), conditional upon being current two months earlier on the first lien. Column (1), for example, predicts a borrower's monthly probability of becoming delinquent on a second lien, conditional upon being current sixty days earlier on his or her first mortgage. Borrowers are included in this regressions only if they have a second lien (similarly, they are included in the regression reported in Column 2 only if they have a credit card).

Column (1) shows that the delinquency rate for second liens increased slightly—by 0.4 percent—among Countrywide borrowers (relative to the Control Group) during the quarter immediately after the Settlement announcement. However, we find no effect of the Settlement on the delinquency rate for credit cards in Column (2). Columns (3) through (6) re-run these regressions for low utilization (5+ Months Utilization) and

above-water (CLTV<100) borrowers. Recall that, although these borrowers had the lowest default rates on first mortgages prior to the Settlement, their rollover rates exhibited the strongest response to the Settlement announcement (see Table 3). Columns (3) through (6) show that, within each group of borrowers, there is no evidence that delinquency rates on second liens and credit cards increased more among Countrywide borrowers than among Control Group borrowers after the Settlement announcement. This is consistent with the hypothesis that strategic default—not general economic distress—is the driver of excess defaults among Countrywide first mortgages after the Settlement. Indeed, Column (4) shows that credit card delinquency rates *decreased* among low utilization Countrywide borrowers, relative to the Control Group, after the Settlement announcement. This pattern suggests that some of the borrowers who strategically defaulted on first mortgages might have used additional available cash flow to service their credit card debts.

Table 5 tests the hypothesis that the Settlement induced Countrywide borrowers to default on first mortgages while remaining current on other, non-targeted debts for at least three months following the mortgage default. This type of default is consistent with strategic behavior.[37] Column (1) estimates the probability that a borrower became sixty days delinquent on a first mortgage in month t, conditional (i) upon being current on that mortgage in month t-*2* and (ii) remaining current on a second lien at least from month t until month t+*3*. Only borrowers with second liens are included in the Column (1) regression. The covariates are the same as in our preferred specification for the baseline model (Column 4 of Table 2). Column (2) estimates a similar model, but changes the dependent variable to measure the probability of rolling from current to sixty days delinquent on a first mortgage while, at the same time, remaining current on credit cards for at least three months after becoming sixty days delinquent.

[37]Some industry observers have defined "strategic default" as a default on the first mortgage while remaining current on credit cards for at least six months following the default. See Experian-Oliver Wyman Market Intelligence Reports.

In both Columns (1) and (2), we observe sizeable post-Settlement increases in the probability that Countrywide borrowers (relative to the Control Group) roll from current to sixty days delinquent while remaining current on other debts. The effect is very large (around fifty-seven percent) in Column (1), but still sizeable (15.5 percent) in Column (2). When we subset on low utilization borrowers in Columns (3) and (4) and above-water borrowers in Columns (5) and (6), we generally find even larger effects. For example, the probability of rolling from current to sixty days delinquent while remaining current on second liens increased over 100 percent among Countrywide borrowers, relative to the Control Group. These results provide additional support for the hypothesis that the Settlement induced strategic default among Countrywide borrowers. The results also point to a form of "debt substitution" in which borrowers allocated their cash flow to non-targeted debts (credit card and second lien debts) instead of targeted first mortgages. With respect to second liens, this debt substitution effectively reverses the legal priorities of first and second liens: in response to the Settlement announcement, Countrywide borrowers favored low-priority second liens at the expense of high-priority first mortgages.

5.4 Strategic Defaults Among FRMs

To alleviate remaining concerns about our identification strategy, we examined the behavior of borrowers with fixed-rate mortgages (FRMs). Although the Settlement offered relief to subprime FRM borrowers, a substantial fraction of securitized FRMs in our data are non-subprime loans offered to borrowers with relatively high credit ratings. These "non-subprime FRMs" 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 non-subprime FRMs serviced by Control Group institutions).

Subprime status is difficult to define because 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.[38] While some borrowers with an above-620 FICO might also be considered subprime (because, for example, they made low down payments), mortgages with a FICO below 620 are highly likely to be viewed as subprime and thus qualify for modification under the Settlement if they were also delinquent.

Tables 6 and 7 implement the probit specification in equation (1) for subprime and non-subprime FRMs, respectively. Column (4) of Table 6 shows that the rollover rate among subprime Countrywide borrowers increased substantially, relative to the Control Group, immediately after the Settlement announcement.[39] The effect amounts to a thirty percent increase over the pre-Settlement delinquency rate among Countrywide subprime FRMs (1.5 percent).[40] Among non-subprime FRMs, Table 7 shows no increase in Countrywide delinquencies relative to the Control Group (the coefficient is negative and economically small).

Overall, these results parallel those we obtain for 2/28 ARMs: announcement of the Settlement induced a substantial 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.

[38] Most lenders define a borrower as subprime if the borrower's FICO credit score is below 620 on a scale that ranges from 300 to 850. This is also how Office of the Comptroller of the Currency and Office of Thrift Supervision defines subprime status in their mortgage metrics reports. See also Keys et al. (2010).

[39] In unreported regressions, we split both FRM samples by credit card utilization and current CLTV. Among subprime FRMs, we found strong effects among borrowers with high available utilization and low CLTV, though the effect for low CLTV borrowers was only marginally significant. Among non-subprime FRMs, the effect of the Settlement was negative and often insignificant across all utilization and CLTV buckets.

[40] We obtain similar but only marginally significant results in models similar to Column (4) that include fully-interacted servicer fixed effects along the lines described in footnote 26. When we split the sample by credit card utilization and current CLTV, the effects for high utilization and low CLTV borrowers are positive and sizeable, but insignificant, due in part to relatively small sample sizes.

6 Conclusion

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. In the months immediately following the announcement of the Countrywide Settlement, the number of Countrywide 2/28 ARMs borrowers rolling from current to sixty days delinquent rose by more than thirteen percent relative to comparable servicers whose mortgages were not covered by the legal settlement. The estimated effects are stronger (up to over twenty percent) among those who appear least likely to have defaulted otherwise: borrowers who had the most available credit and those with lower current CLTVs.

We confirm that these results are not due to idiosyncratic features of Countrywide borrowers: post-Settlement delinquency rates on non-targeted debts (second liens and credit cards) do not differ meaningfully between Countrywide and Control Group borrowers. To the contrary, we observe a pronounced increase in the likelihood that Countrywide borrowers became delinquent on their first mortgage while remaining current on credit cards or second liens, relative to borrowers in the Control Group.

We also confirm that our results are not due to idiosyncratic features of Countrywide ARMs: we observe comparable effects among subprime FRMs (eligible for relief under the Settlement), but not among non-subprime FRMs (ineligible).

Although our results document strategic behavior in response to mortgage modification policies—particularly policies that use simple but manipulable eligibility criteria, such as requiring that homeowners be delinquent—we cannot say whether the economic costs of strategic behavior are large relative to the potential gains to borrowers, lenders, and neighborhoods from these policies. Our results instead highlight a trade-off that merits further empirical investigation: mortgage modification policies that use simple but potentially manipulable eligibility criteria (i) do generate economically meaningful strategic behavior, but (ii) may also offer benefits more quickly to

homeowners at risk of default. More work must be done to assess the overall costs and benefits of such modification policies and their effectiveness in preventing foreclosures, both in the near term and in the long run.

References

Ai, Chunrong and Edward C. Norton, 2003, "Interaction Terms in Logit and Probit Models," *Economics Letters* 80: 123-129.

Agarwal, Sumit, Gene Amromin, Itzhak Ben-David, Souphala Chomsisengphet, and Douglas D. Evanoff, "The Role of Securitization in Mortgage Renegotiation," *Journal of Financial Economics* forthcoming.

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 Y., 2006. "Household Finance," *Journal of Finance* 61, 1553-1604.

Campbell, John, Stefano Giglio, and Parag Pathak, 2009, "Forced Sales and House Prices," *American Economic Review* forthcoming.

Citigroup, 2009, "A Brief (And Complete) History of Loan Modifications," Working paper.

Cohen-Cole, Ethan, and Jonathan Morse, 2010, "Your House or Your Credit Card, Which Would You Choose? Personal Delinquency Tradeoffs and Precautionary Liquidity Motives," SSRN Working paper.

Countrywide Financial Corp., 2008, "Multistate Settlement Term Sheet (Oct. 6, 2008)."

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, 2010, "Did Securitization Lead to Lax Screening? Evidence From Subprime Loans," *Quarterly Journal of Economics* 125, 307-362.

Keys, Benjamin, Amit Seru, and Vikrant Vig, 2011, "Lender Screening and the Role of Securitization: Evidence from Prime and Subprime Mortgage Markets," *Review of Financial Studies* forthcoming.

Kremer, Michael, and Christopher M. Snyder, 2010, "When are Drugs More Lucrative than Vaccines?" Harvard University working paper.

Krueger, Alan B., and Bruce D. Meyer, 2002, "Labor supply effects of social insurance," In A. J. Auerbach and M. Feldstein (ed.), *Handbook of Public Economics* 1st edition, volume 4, 2327-2392, Amsterdam: Elsevier.

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.

Office of the Special Inspector General for the Troubled Asset Relief Program, 2011, "Quarterly Report to Congress, January 26, 2011."

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.

Piskorski, Tomasz, and Alexei Tchistyi, 2011, "Stochastic House Appreciation and Optimal Mortgage Lending," *Review of Financial Studies* 24, 1407-1446.

Poole, William, 2009, "Moral Hazard: The Long-Lasting Legacy of Bailouts," Cato Institute working paper.

Puhani, Patrick A., 2008, "The Treatment Effect, the Cross Difference, and the Interaction Terms in Nonlinear 'Difference-in-Differences' Models," IZA Discussion Paper no. 3478.

Purnanandam, Amiyatosh K., 2010, "Originate-to-Distribute Model and the Subprime Mortgage Crisis," *Review of Financial Studies* forthcoming.

State of California, 2008a, "Complaint for Restitution, Injunctive Relief, Other Equitable Relief, and Civil Penalties," *California v. Countrywide Financial Corp.*, Case No. LC083076, Superior Court of the State of California for the County of Los Angeles (June 24, 2008).

State of California, 2008b, "Stipulated Judgment and Injunction," *California v. Countrywide Financial Corp.*, Case No. LC083076, Superior Court of the State of California for the County of Los Angeles (Oct. 20, 2008).

State of Illinois, 2008, "Complaint for Injunctive and Other Relief," *Illinois v. Countrywide Financial Corp.* (June 25, 2008).

Tufano, Peter, 2009, "Consumer Finance," *Annual Review of Financial Economics* 1, 227-247.

Figure 1: Index of Web Searches for the Term "Countrywide Modification," as Reported by Google Trends

Figure 2: Probability of Rolling from Current to 60 Days Past Due

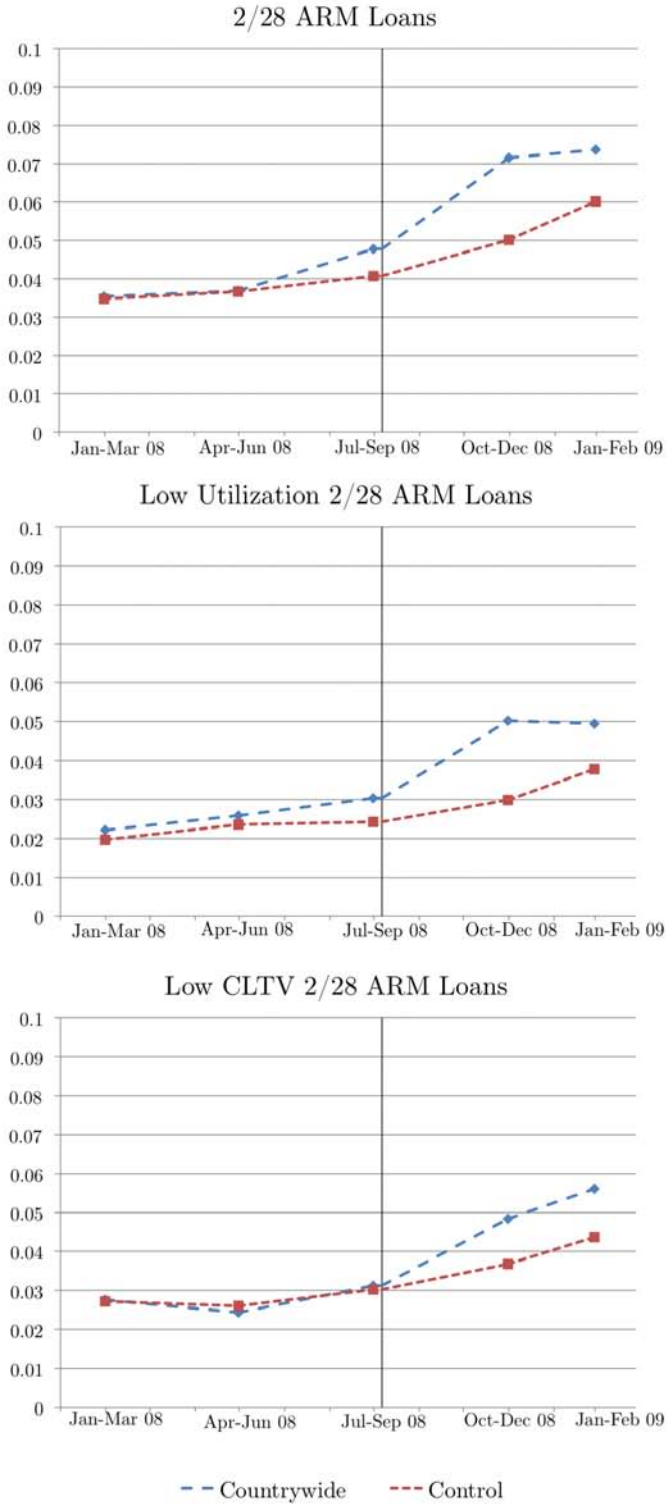

Table 1: Summary Statistics for 2/28 ARMs

	Countrywide			**Rest**			**Total**		
	mean	sd	count	mean	sd	count	mean	sd	count
0-1 Months of Utilization	0.57	0.49	43,418	0.52	0.50	203,960	0.53	0.50	247,378
2-4 Months of Utilization	0.16	0.36	43,418	0.14	0.35	203,960	0.14	0.35	247,378
5+ Months of Utilization	0.20	0.40	43,418	0.19	0.39	203,960	0.19	0.39	247,378
Current CLTV < 100	0.16	0.37	43,418	0.19	0.39	203,960	0.19	0.39	247,378
$100 \leq$ Current CLTV < 120	0.27	0.44	43,418	0.25	0.44	203,960	0.26	0.44	247,378
$120 \leq$ Current CLTV	0.32	0.47	43,418	0.30	0.46	203,960	0.31	0.46	247,378
BlackBox Controls									
- Initial CTLV	92.0	8.76	40,081	89.9	8.87	93,430	90.5	8.89	133,511
- Current LTV	110.2	23.4	33,195	110.1	23.9	155,911	110.1	23.8	189,106
- Initial Interest Rate	8.18	1.28	43,418	8.07	1.24	203,960	8.09	1.25	247,378
- Current Interest Rate	8.63	1.35	43,418	8.56	1.37	203,957	8.57	1.37	247,375
- Origination FICO	618.0	54.0	40,351	617.0	56.3	126,661	617.2	55.8	167,012
- Origination Balance	196,287	114,402	43,418	206,337	133,265	203,960	204,573	130,209	247,378
- Low/No Doc	0.42	0.49	43,418	0.60	0.49	203,960	0.57	0.50	247,378
- Doc Missing	0.078	0.27	43,418	0.36	0.48	203,960	0.31	0.46	247,378
- Refi	0.055	0.23	43,418	0.10	0.30	203,960	0.095	0.29	247,378
- Cash Out Refi	0.39	0.49	43,418	0.37	0.48	203,960	0.37	0.48	247,378
- Purchase Missing	0.0042	0.065	43,418	0.052	0.22	203,960	0.044	0.20	247,378
- Interest Only	0.28	0.45	43,418	0.12	0.32	203,960	0.15	0.35	247,378
- Interest Only Missing	0.0043	0.065	43,418	0.028	0.17	203,960	0.024	0.15	247,378
- Mortgage Insured	0.066	0.25	43,418	0.019	0.14	203,960	0.027	0.16	247,378
- Prepay Penalty	0.79	0.41	43,418	0.66	0.47	203,960	0.68	0.47	247,378
- Prior 60 DPD	0.15	0.36	43,418	0.14	0.35	203,960	0.15	0.35	247,378
- 60 DPD in Prior Year	0.12	0.32	43,418	0.11	0.31	203,960	0.11	0.31	247,378
Equifax Controls									
- Current CLTV	120.7	27.9	32,657	118.9	27.9	152,614	119.2	27.9	185,271
- CLTV Missing	0.25	0.43	43,418	0.25	0.43	203,960	0.25	0.43	247,378
- Initial Vantage	663.3	65.0	43,418	675.4	72.6	203,960	673.3	71.5	247,378
- Current Vantage	666.8	82.4	43,258	666.0	84.7	203,279	666.1	84.3	246,537
- 2^{nd} Lien Balance	47,922	31,419	19,044	52,411	38,403	76,234	51,514	37,155	95,278
- CES+	0.44	0.50	43,418	0.38	0.48	203,960	0.39	0.49	247,378
- Low Util HELOC	0.014	0.12	43,418	0.017	0.13	203,960	0.016	0.13	247,378
- Utilization	0.47	0.37	43,213	0.47	0.37	202,934	0.47	0.37	246,147
- Months of Credit	2.99	4.39	39,907	3.06	4.49	175,694	3.05	4.47	215,601

Sample Statistics are measured as of September 2008 among loans in the matched sample that were current two months prior

Table 2: 2/28 ARM Probit Panel 2008-Feb 2009-Rolling 60 DPD

	(1) Base Sample	(2) Base Sample	(3) Matched Sample	(4) Matched Sample
Countrywide × Jan-Mar 2008(d)	-0.0063**	-0.00086	-0.00093	-0.00059
	(-9.96)	(-1.38)	(-1.37)	(-0.93)
Countrywide × Apr-Jun 2008(d)	-0.0064**	-0.0026**	-0.0026**	-0.0025**
	(-9.67)	(-4.09)	(-3.92)	(-3.96)
Countrywide × Oct-Dec 2008(d)	**0.011****	**0.0072****	**0.0063****	**0.0062****
	(12.54)	**(9.45)**	**(7.80)**	**(8.08)**
Countrywide × Jan-Feb 2009(d)	0.0030**	0.00087	0.00020	0.00067
	(3.58)	(1.18)	(0.26)	(0.91)
Countrywide (d)	0.0061**	0.0017**	0.0021**	0.0031**
	(10.62)	(3.23)	(3.68)	(5.60)
Jan-Mar 2008(d)	-0.0049**	-0.0023**	-0.0027**	-0.0032**
	(-18.08)	(-9.09)	(-8.84)	(-11.41)
Apr-Jun 2008(d)	-0.0037**	-0.0028**	-0.0029**	-0.0034**
	(-13.10)	(-11.07)	(-9.80)	(-12.20)
Oct-Dec 2008(d)	0.0090**	0.0078**	0.0078**	0.0076**
	(27.03)	(25.88)	(21.79)	(22.41)
Jan-Feb 2009(d)	0.017**	0.014**	0.014**	0.014**
	(44.90)	(40.84)	(33.56)	(34.73)
Origination Quarter	No	Yes	Yes	Yes
BlackBox Control	No	Yes	Yes	Yes
MSA Control	No	Yes	Yes	Yes
Reset Control	No	Yes	Yes	Yes
Equifax Control	No	No	No	Yes
N. of cases	5747839	5747839	3964533	3964533
Avg. Delinquency	0.049	0.049	0.048	0.048
Avg. Share Countrywide	0.15	0.15	0.18	0.18

Marginal effects; t statistics in parentheses
(d) for discrete change of dummy variable from 0 to 1
* $p < 0.05$, ** $p < 0.01$

Table 3: 2/28 ARMs Probit Panel 2008-Feb 2009–Straight 60 DPD by Utilization and Current CLTV

	Months of Utilization			Current CLTV		
	(1) 5+ Months	(2) 2-4 Months	(3) 0-1 Months	(4) CLTV < 100	(5) 100 ≤ CLTV < 120	(6) 120 ≤ CLTV
Countrywide × Jan-Mar (d)	0.00054	-0.0014	-0.00094	0.00074	0.00029	-0.0055**
	(0.54)	(-1.06)	(-1.05)	(0.65)	(0.24)	(-2.88)
Countrywide × Apr-Jun (d)	-0.00033	-0.0029*	-0.0033**	-0.0018	-0.0023*	-0.0052**
	(-0.34)	(-2.18)	(-3.78)	(-1.56)	(-1.97)	(-2.95)
Countrywide × Oct-Dec (d)	**0.0062****	**0.0048****	**0.0066****	**0.0047****	**0.0066****	**0.0083****
	(4.71)	**(2.81)**	**(6.31)**	**(3.10)**	**(4.35)**	**(4.29)**
Countrywide × Jan-Feb (d)	0.00026	-0.0015	0.0017	0.0043**	0.0020	-0.0030
	(0.23)	(-0.96)	(1.66)	(2.58)	(1.30)	(-1.63)
Countrywide (d)	0.00033	0.0026*	0.0043**	0.0013	0.0033**	0.0074**
	(0.41)	(2.13)	(5.64)	(1.33)	(3.17)	(4.94)
Jan-Mar (d)	-0.0038**	-0.0029**	-0.0031**	-0.0021**	-0.0020**	0.00027
	(-9.03)	(-4.75)	(-8.08)	(-4.64)	(-3.85)	(0.28)
Apr-Jun (d)	-0.0012**	-0.0015*	-0.0048**	-0.0039**	-0.0034**	0.00036
	(-2.64)	(-2.49)	(-12.67)	(-8.83)	(-6.60)	(0.41)
Oct-Dec (d)	0.0046**	0.0070**	0.0087**	0.0057**	0.0078**	0.011**
	(8.28)	(8.81)	(19.04)	(9.25)	(11.71)	(12.73)
Jan-Feb (d)	0.011**	0.017**	0.014**	0.0094**	0.014**	0.023**
	(15.70)	(16.29)	(27.17)	(12.79)	(17.14)	(22.90)
Origination Quarter	Yes	Yes	Yes	Yes	Yes	Yes
BlackBox Control	Yes	Yes	Yes	Yes	Yes	Yes
MSA Control	Yes	Yes	Yes	Yes	Yes	Yes
Reset Control	Yes	Yes	Yes	Yes	Yes	Yes
Equifax Control	Yes	Yes	Yes	Yes	Yes	Yes
N. of cases	764847	607871	2585730	945976	1062283	971722
Avg. Delinquency	0.030	0.039	0.055	0.031	0.039	0.078
Avg. Share Countrywide	0.18	0.19	0.17	0.16	0.18	0.19

Marginal effects; t statistics in parentheses
(d) for discrete change of dummy variable from 0 to 1
* $p < 0.05$, ** $p < 0.01$

Table 4: 2/28 ARMs Probit Panel 2008-Feb 2009–Delinquency on Other Debt

			5+ Months Utilization		CLTV < 100	
	(1)	(2)	(3)	(4)	(5)	(6)
Delinquent on:	2nd Lien	Credit Card	2nd Lien	Credit Card	2nd Lien	Credit Card
Countrywide × Jan-Mar (d)	-0.000050	-0.0018	0.00030	-0.0028	0.0000040	0.0023
	(-0.50)	(-0.86)	(0.75)	(-1.07)	(0.17)	(0.46)
Countrywide × Apr-Jun (d)	-0.00039**	-0.0049**	-0.00045	0.00099	-0.0000076	-0.0041
	(-4.77)	(-2.88)	(-1.34)	(0.42)	(-0.35)	(-0.97)
Countrywide × Oct-Dec (d)	**0.00025***	**-0.0023**	**0.000082**	**-0.0064***	**0.000013**	**0.0050**
	(2.30)	**(-1.14)**	**(0.21)**	**(-2.46)**	**(0.44)**	**(1.00)**
Countrywide × Jan-Feb (d)	-0.00017	-0.0096**	-0.00050	-0.0056	0.000037	0.0012
	(-1.51)	(-3.65)	(-1.22)	(-1.65)	(0.97)	(0.17)
Countrywide (d)	0.00013	0.0028	0.00012	0.00064	-0.0000055	0.0056
	(1.43)	(1.16)	(0.37)	(0.24)	(-0.26)	(0.99)
Jan-Mar (d)	-0.00034**	-0.0026**	-0.0010**	-0.0029*	-0.0000092	0.000098
	(-7.59)	(-2.79)	(-5.78)	(-2.52)	(-0.97)	(0.05)
Apr-Jun (d)	-0.00045**	0.0018*	-0.00031	-0.0020*	-0.000042**	0.0028
	(-11.45)	(2.41)	(-1.90)	(-2.04)	(-4.95)	(1.61)
Oct-Dec (d)	0.00066**	-0.0025**	0.0017**	-0.0018	0.000038**	-0.00020
	(12.43)	(-3.04)	(7.60)	(-1.64)	(2.97)	(-0.10)
Jan-Feb (d)	0.0013**	-0.0047**	0.0036**	-0.0044**	0.00011**	-0.0076**
	(17.41)	(-4.29)	(10.66)	(-3.01)	(5.23)	(-2.96)
Origination Quarter	Yes	Yes	Yes	Yes	Yes	Yes
BlackBox Control	Yes	Yes	Yes	Yes	Yes	Yes
MSA Control	Yes	Yes	Yes	Yes	Yes	Yes
Reset Control	Yes	Yes	Yes	Yes	Yes	Yes
Equifax Control	Yes	Yes	Yes	Yes	Yes	Yes
N. of cases	3964533	3964533	765304	768659	943305	946083
Avg. Delinquency	0.056	0.31	0.042	0.12	0.014	0.36
Avg. Share Countrywide	0.18	0.18	0.18	0.18	0.16	0.16

Marginal effects; t statistics in parentheses
(d) for discrete change of dummy variable from 0 to 1
* $p < 0.05$, ** $p < 0.01$

Table 5: 2/28 ARMs Probit Panel 2008-Feb 2009–Delinquency on First Lien while Current on Other Debt

			5+ Months Utilization		CLTV < 100	
	(1)	(2)	(3)	(4)	(5)	(6)
Delinquent on First Lien while Current on:	2nd Lien	Credit Card	2nd Lien	Credit Card	2nd Lien	Credit Card
Countrywide × Jan-Mar (d)	0.000084	0.00032	0.0000050	0.000034	-0.0014	0.00044
	(0.22)	(0.80)	(0.01)	(0.05)	(-1.86)	(0.66)
Countrywide × Apr-Jun (d)	-0.00091**	-0.0013**	-0.00048	-0.0011	-0.0019**	-0.0014*
	(-2.67)	(-3.70)	(-0.90)	(-1.68)	(-2.66)	(-2.24)
Countrywide × Oct-Dec (d)	**0.0045****	**0.0031****	**0.0063****	**0.0035****	**0.00064**	**0.0019***
	(7.14)	**(6.51)**	**(4.64)**	**(3.83)**	**(0.49)**	**(2.10)**
Countrywide × Jan-Feb (d)	0.00017	0.00031	0.00062	-0.00032	0.00045	0.0021*
	(0.40)	(0.74)	(0.88)	(-0.44)	(0.33)	(2.15)
Countrywide (d)	0.00085*	0.0010**	-0.000069	0.00048	0.0027*	0.00045
	(2.48)	(3.20)	(-0.15)	(0.82)	(2.10)	(0.75)
Jan-Mar (d)	-0.0012**	-0.0020**	-0.0017**	-0.0028**	-0.00040	-0.0011**
	(-7.55)	(-11.86)	(-7.21)	(-9.39)	(-0.84)	(-4.08)
Apr-Jun (d)	-0.00076**	-0.0010**	-0.00078**	-0.00056	-0.00035	-0.0014**
	(-4.49)	(-6.13)	(-3.07)	(-1.80)	(-0.71)	(-5.44)
Oct-Dec (d)	0.0018**	0.0036**	0.0011**	0.0029**	0.0028**	0.0027**
	(8.06)	(17.10)	(3.19)	(7.34)	(3.54)	(7.11)
Jan-Feb (d)	0.0042**	0.0074**	0.0032**	0.0078**	0.0041**	0.0044**
	(14.68)	(28.99)	(6.55)	(14.43)	(4.30)	(9.44)
Origination Quarter	Yes	Yes	Yes	Yes	Yes	Yes
BlackBox Control	Yes	Yes	Yes	Yes	Yes	Yes
MSA Control	Yes	Yes	Yes	Yes	Yes	Yes
Reset Control	Yes	Yes	Yes	Yes	Yes	Yes
Equifax Control	Yes	Yes	Yes	Yes	Yes	Yes
N. of cases	1595162	3964010	395546	753781	171505	944970
Avg. Delinquency	0.0079	0.020	0.0055	0.021	0.0083	0.0097
Avg. Share Countrywide	0.18	0.18	0.18	0.18	0.16	0.16

Marginal effects; t statistics in parentheses
Current on other debt for period of three months after month of observation
(d) for discrete change of dummy variable from 0 to 1
* $p < 0.05$, ** $p < 0.01$

Table 6: Subprime FRMs Probit Panel 2008-Feb 2009-Rolling 60 DPD

	(1) Base Sample	(2) Base Sample	(3) Matched Sample	(4) Matched Sample
Countrywide x Jan-Mar (d)	0.0042**	0.0046**	0.0049**	0.0044**
	(2.74)	(3.49)	(3.60)	(3.57)
Countrywide x Apr-Jun (d)	-0.000028	0.00068	0.00045	0.00045
	(-0.02)	(0.59)	(0.40)	(0.43)
Countrywide x Oct-Dec (d)	**0.0085****	**0.0053****	**0.0056****	**0.0049****
	(4.95)	**(4.01)**	**(4.07)**	**(3.93)**
Countrywide x Jan-Feb (d)	0.0090**	0.0083**	0.0085**	0.0079**
	(5.01)	(5.48)	(5.41)	(5.42)
Countrywide (d)	-0.011**	-0.0054**	-0.0050**	-0.0035**
	(-15.51)	(-8.30)	(-7.32)	(-5.44)
Jan-Mar (d)	-0.0048**	-0.0027**	-0.0028**	-0.0030**
	(-11.68)	(-7.76)	(-7.15)	(-8.48)
Apr-Jun (d)	-0.0034**	-0.0025**	-0.0024**	-0.0026**
	(-8.02)	(-7.28)	(-6.31)	(-7.40)
Oct-Dec (d)	0.00098*	0.0011**	0.00075	0.0011**
	(2.07)	(2.97)	(1.73)	(2.71)
Jan-Feb (d)	-0.00033	-0.0011**	-0.0012**	-0.00057
	(-0.69)	(-2.79)	(-2.79)	(-1.42)
Origination Quarter	No	Yes	Yes	Yes
BlackBox Control	No	Yes	Yes	Yes
MSA Control	No	Yes	Yes	Yes
Equifax Control	No	No	No	Yes
N. of cases	1172403	1168955	856911	856911
Avg. Delinquency	0.016	0.016	0.015	0.015
Avg. Share Countrywide	0.15	0.15	0.19	0.19

Marginal effects; t statistics in parentheses

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

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

Table 7: Non-Subprime FRMs Probit Panel 2008-Feb 2009-Rolling Straight 60 DPD

	(1) Base Sample	(2) Base Sample	(3) Matched Sample	(4) Matched Sample
Countrywide x Jan-Mar (d)	0.00055*	0.00046**	0.00015	0.000058
	(2.28)	(2.73)	(0.94)	(0.55)
Countrywide x Apr-Jun (d)	0.00087**	0.00064**	0.00048**	0.00029*
	(3.50)	(3.74)	(2.84)	(2.57)
Countrywide x Oct-Dec (d)	**-0.00045***	**-0.00048****	**-0.00044****	**-0.00028****
	(-2.23)	**(-3.69)**	**(-3.52)**	**(-3.24)**
Countrywide x Jan-Feb (d)	-0.00027	-0.00032*	-0.00033**	-0.00016
	(-1.39)	(-2.51)	(-2.67)	(-1.88)
Countrywide (d)	-0.00013	0.00087**	0.00085**	0.00085**
	(-0.79)	(7.27)	(7.10)	(10.05)
Jan-Mar (d)	-0.0022**	-0.00064**	-0.00049**	-0.00046**
	(-21.48)	(-8.28)	(-5.93)	(-8.66)
Apr-Jun (d)	-0.0018**	-0.00079**	-0.00066**	-0.00053**
	(-17.32)	(-10.65)	(-8.37)	(-10.41)
Oct-Dec (d)	0.0037**	0.0025**	0.0023**	0.0015**
	(27.20)	(25.89)	(21.70)	(21.34)
Jan-Feb (d)	0.0070**	0.0046**	0.0041**	0.0028**
	(44.61)	(40.21)	(33.11)	(31.65)
Origination Quarter	No	Yes	Yes	Yes
BlackBox Control	No	Yes	Yes	Yes
MSA Control	No	Yes	Yes	Yes
Equifax Control	No	No	No	Yes
N. of cases	8201680	8176257	6153830	6153795
Avg. Delinquency	0.0068	0.0068	0.0061	0.0061
Avg. Share Countrywide	0.27	0.27	0.29	0.29

Marginal effects; t statistics in parentheses

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

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

Appendix

Figure 3: 2/28 ARMs: Current Interest Rate by Origination Quarter

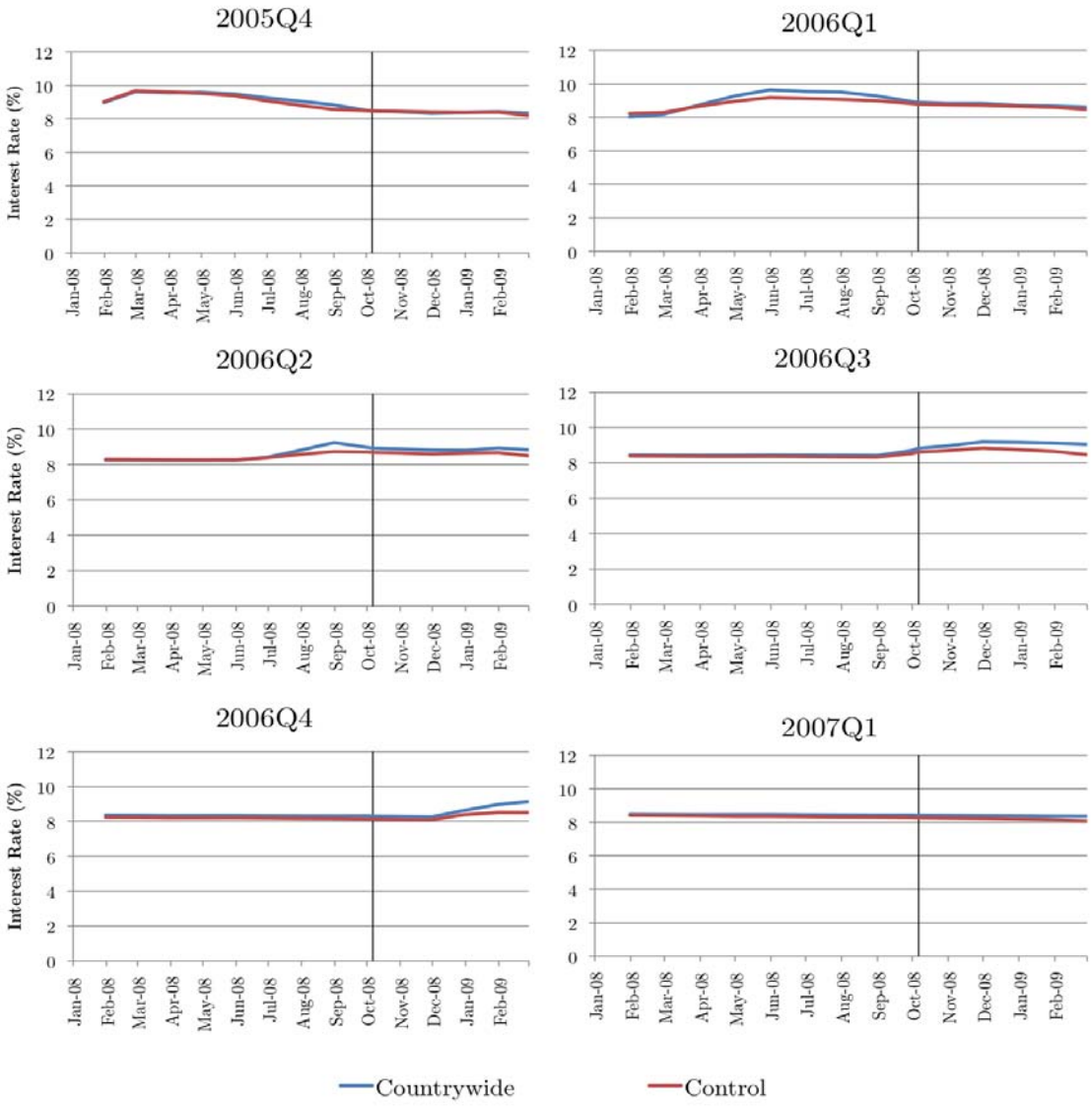

Figure 4: 2/28 ARMs: Current Vantage Score by Origination Quarter

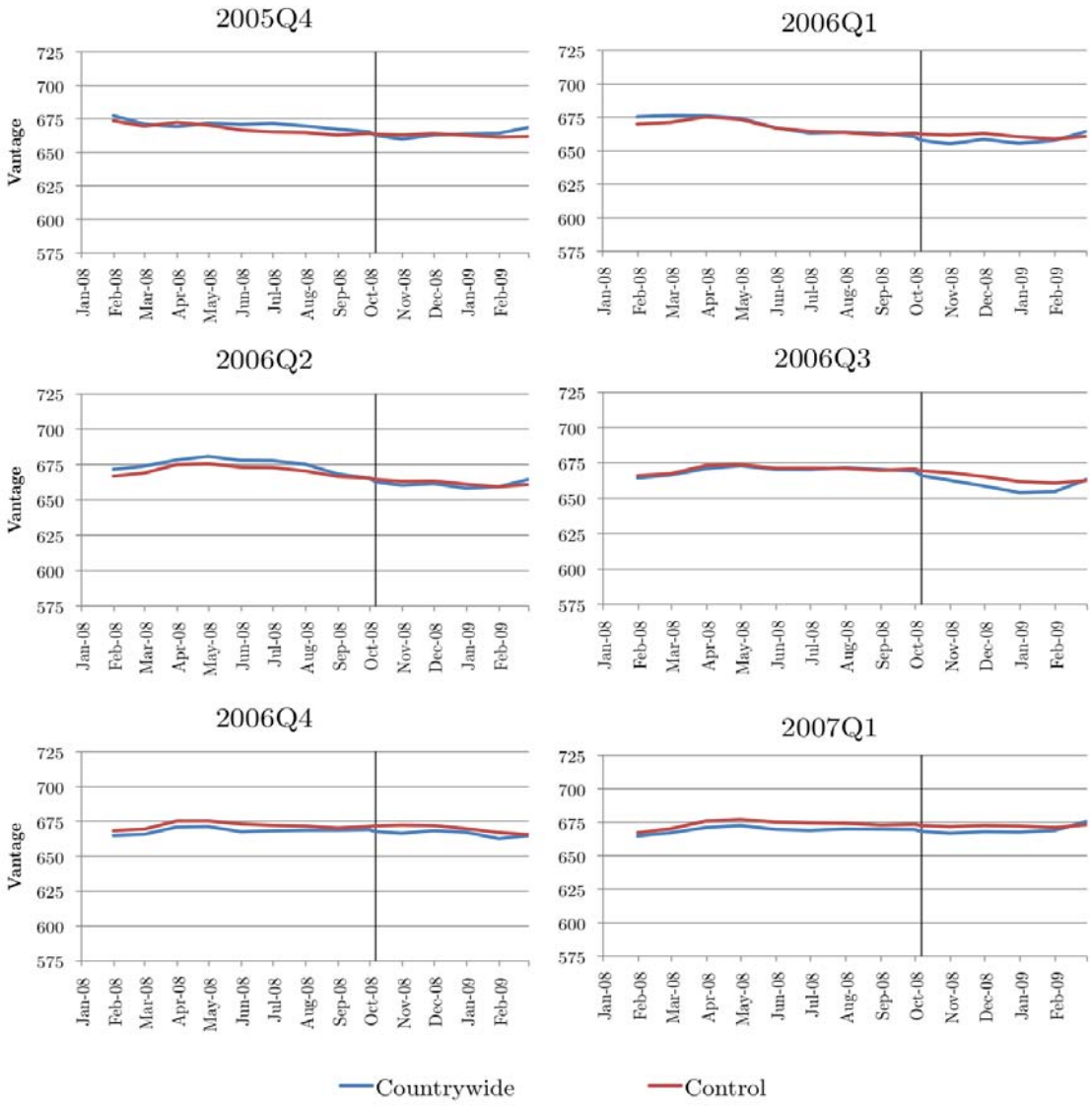

Figure 5: 2/28 ARMs: Current CLTV by Origination Quarter

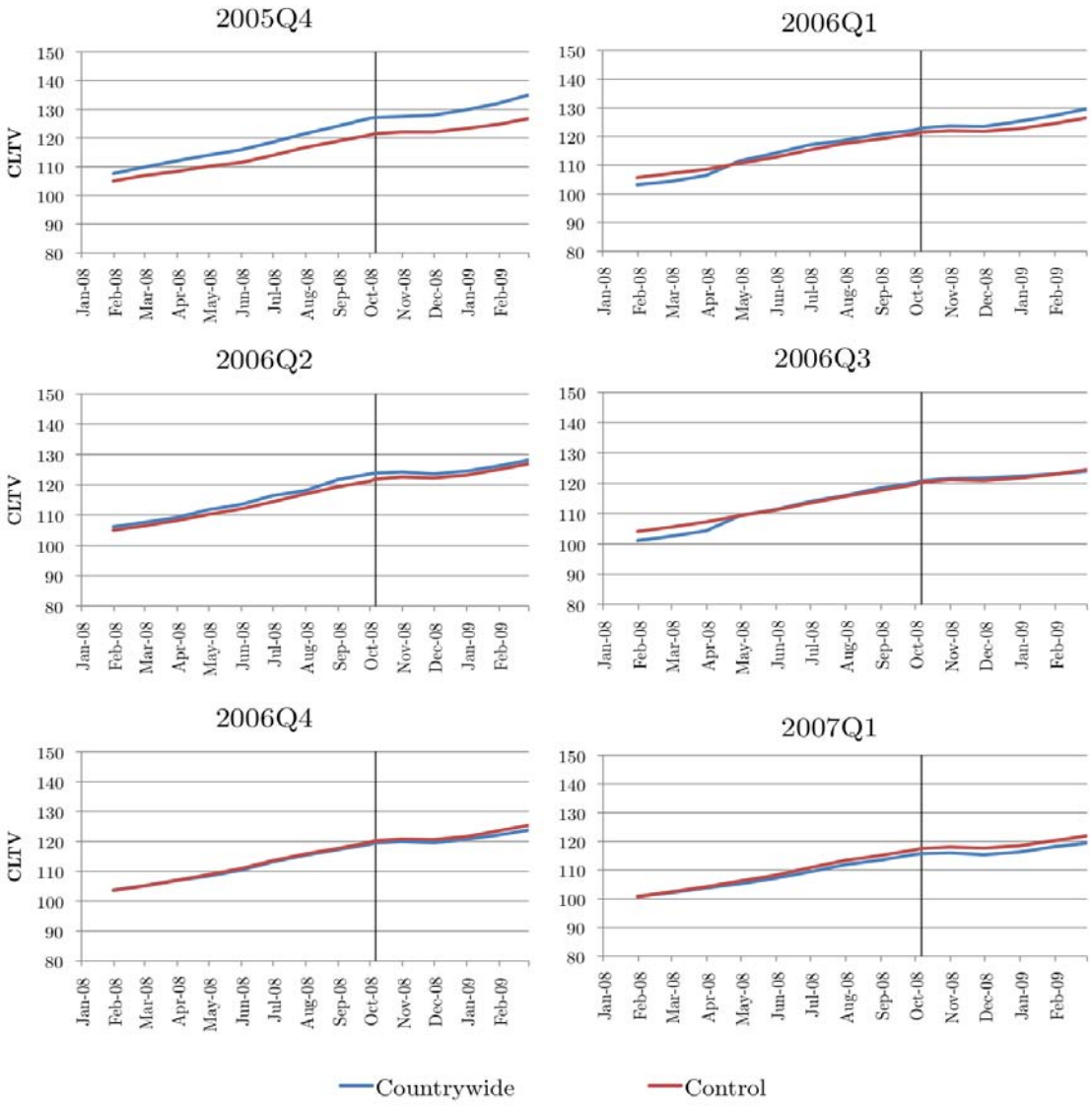

Table 8: Summary Statistics for Subprime FRMs

	Countrywide			**Rest**			**Total**		
	mean	sd	count	mean	sd	count	mean	sd	count
0-1 Months of Utilization	0.56	0.50	10,516	0.59	0.49	45,577	0.58	0.49	56,093
2-4 Months of Utilization	0.16	0.37	10,516	0.13	0.34	45,577	0.14	0.35	56,093
5+ Months of Utilization	0.20	0.40	10,516	0.16	0.36	45,577	0.17	0.37	56,093
Current CLTV < 100	0.34	0.47	10,516	0.34	0.47	45,577	0.34	0.47	56,093
$100 \leq$ Current CLTV < 120	0.20	0.40	10,516	0.21	0.41	45,577	0.21	0.41	56,093
$120 \leq$ Current CLTV	0.15	0.36	10,516	0.11	0.31	45,577	0.12	0.32	56,093
BlackBox Controls									
- Initial CTLV	84.6	8.14	10,477	85.2	8.26	30,086	85.1	8.23	40,563
- Current LTV	101.2	22.9	7,385	99.2	20.0	30,298	99.6	20.6	37,683
- Initial Interest Rate	7.77	1.23	10,516	8.53	1.31	45,577	8.39	1.33	56,093
- Current Interest Rate	7.67	1.23	10,516	8.45	1.40	45,575	8.31	1.40	56,091
- Origination FICO	580.2	30.1	10,516	578.1	34.0	45,577	578.5	33.3	56,093
- Origination Balance	171049	105,817	10,516	154361	108744	45,577	157,490	108,396	56,093
- Low/No Doc	0.15	0.36	10,516	0.33	0.47	45,577	0.30	0.46	56,093
- Doc Missing	0.00067	0.026	10,516	0.16	0.37	45,577	0.13	0.34	56,093
- Refi	0.12	0.32	10,516	0.20	0.40	45,577	0.18	0.38	56,093
- Cash Out Refi	0.74	0.44	10,516	0.45	0.50	45,577	0.51	0.50	56,093
- Purchase Missing	0.00076	0.028	10,516	0.18	0.39	45,577	0.15	0.35	56,093
- Interest Only	0.069	0.25	10,516	0.038	0.19	45,577	0.044	0.20	56,093
- Interest Only Missing	0.00076	0.028	10,516	0.13	0.34	45,577	0.11	0.31	56,093
- Mortgage Insured	0.0013	0.036	10,516	0.046	0.21	45,577	0.038	0.19	56,093
- Prepay Penalty	0.76	0.42	10,516	0.56	0.50	45,577	0.60	0.49	56,093
- Prior 60 DPD	0.12	0.33	10,516	0.13	0.34	45,577	0.13	0.34	56,093
- 60 DPD in Prior Year	0.074	0.26	10,516	0.095	0.29	45,577	0.091	0.29	56,093
Equifax Controls									
- Current CLTV	104.8	24.1	7,291	102.1	21.3	29,873	102.6	21.9	37,164
- CLTV Missing	0.31	0.46	10,516	0.34	0.48	45,577	0.34	0.47	56,093
- Initial Vantage	659.3	56.0	10,516	655.8	58.4	45,577	656.5	58.0	56,093
- Current Vantage	672.5	74.5	10,462	656.6	73.1	45,334	659.6	73.7	55,796
- 2^{nd} Lien Balance	41,590	29,719	2,445	39,069	34,687	7,360	39,697	33,533	9,805
- CES+	0.22	0.42	10,516	0.16	0.37	45,577	0.17	0.38	56,093
- Low Util HELOC	0.029	0.17	10,516	0.015	0.12	45,577	0.018	0.13	56,093
- Utilization	0.49	0.37	10,472	0.47	0.39	45,380	0.47	0.38	55,852
- Months of Credit	3.45	5.74	9,682	2.85	5.31	40,156	2.96	5.41	49,838

Sample Statistics are measured as of September 2008 among loans in the matched sample that were current two months prior

Table 9: Summary Statistics for Non-Subprime FRMs

	Countrywide			**Rest**			**Total**		
	mean	sd	count	mean	sd	count	mean	sd	count
0-1 Months of Utilization	0.15	0.35	119,686	0.18	0.39	286,199	0.17	0.38	405,885
2-4 Months of Utilization	0.14	0.34	119,686	0.15	0.36	286,199	0.15	0.36	405,885
5+ Months of Utilization	0.68	0.47	119,686	0.60	0.49	286,199	0.63	0.48	405,885
Current CLTV < 100	0.33	0.47	119,686	0.35	0.48	286,199	0.34	0.47	405,885
$100 \leq$ Current CLTV < 120	0.26	0.44	119,686	0.26	0.44	286,199	0.26	0.44	405,885
$120 \leq$ Current CLTV	0.22	0.42	119,686	0.19	0.39	286,199	0.20	0.40	405,885
BlackBox Controls									
- Initial CTLV	87.2	9.63	119,447	88.5	9.24	170,576	88.0	9.43	290,023
- Current LTV	102.0	21.5	99,270	100.8	20.9	233,971	101.2	21.1	333,241
- Initial Interest Rate	6.40	0.52	119,686	6.72	0.92	286,199	6.63	0.83	405,885
- Current Interest Rate	6.40	0.51	119,686	6.73	0.89	286,196	6.63	0.81	405,882
- Origination FICO	719.2	48.5	119,686	710.8	51.9	286,199	713.3	51.0	405,885
- Origination Balance	317,841	202,217	119,686	339,687	222,572	286,199	333,245	216,997	405,885
- Low/No Doc	0.67	0.47	119,686	0.66	0.47	286,199	0.66	0.47	405,885
- Doc Missing	0.00058	0.024	119,686	0.23	0.42	286,199	0.16	0.37	405,885
- Refi	0.16	0.37	119,686	0.22	0.42	286,199	0.21	0.40	405,885
- Cash Out Refi	0.30	0.46	119,686	0.21	0.41	286,199	0.24	0.43	405,885
- Purchase Missing	0.00033	0.018	119,686	0.074	0.26	286,199	0.053	0.22	405,885
- Interest Only	0.36	0.48	119,686	0.15	0.36	286,199	0.21	0.41	405,885
- Interest Only Missing	0.00070	0.026	119,686	0.041	0.20	286,199	0.029	0.17	405,885
- Mortgage Insured	0.015	0.12	119,686	0.067	0.25	286,199	0.051	0.22	405,885
- Prepay Penalty	0.11	0.31	119,686	0.21	0.41	286,199	0.18	0.39	405,885
- Prior 60 DPD	0.015	0.12	119,686	0.017	0.13	286,199	0.017	0.13	405,885
- 60 DPD in Prior Year	0.0091	0.095	119,686	0.011	0.11	286,199	0.011	0.10	405,885
Equifax Controls									
- Current CLTV	108.8	24.5	97,257	106.9	23.9	229,029	107.5	24.1	326,286
- CLTV Missing	0.19	0.39	119,686	0.20	0.40	286,199	0.20	0.40	405,885
- Initial Vantage	788.3	83.3	119,686	799.0	102.0	286,197	795.9	97.0	405,883
- Current Vantage	809.5	109.6	119,328	802.3	122.4	285,355	804.4	118.8	404,683
- 2^{nd} Lien Balance	68,308	58,194	70,844	77,000	65,531	145.393	74,152	63,352	216,237
- CES+	0.46	0.50	119,686	0.40	0.49	286,199	0.42	0.49	405,885
- Low Util HELOC	0.16	0.37	119,686	0.15	0.35	286,199	0.15	0.36	405,885
- Utilization	0.31	0.30	117,944	0.33	0.31	282,204	0.32	0.31	400,148
- Months of Credit	13.2	10.7	115,291	11.2	10.1	269,542	11.8	10.3	384,833

Sample Statistics are measured as of September 2008 among loans in the matched sample that were current two months prior

Table 10: 2/28 ARM Probit Panel 2008-Feb 2009-Rolling 60 DPD

	(1) Base Sample	(2) Base Sample	(3) Matched Sample	(4) Matched Sample
Countrywide × Jan-Mar (d)	-0.0063**	-0.00086	-0.00093	-0.00059
	(-9.96)	(-1.38)	(-1.37)	(-0.93)
Countrywide × Apr-Jun (d)	-0.0064**	-0.0026**	-0.0026**	-0.0025**
	(-9.67)	(-4.09)	(-3.92)	(-3.96)
Countrywide × Oct-Dec (d)	**0.011****	**0.0072****	**0.0063****	**0.0062****
	(12.54)	**(9.45)**	**(7.80)**	**(8.08)**
Countrywide × Jan-Feb (d)	0.0030**	0.00087	0.00020	0.00067
	(3.58)	(1.18)	(0.26)	(0.91)
Countrywide (d)	0.0061**	0.0017**	0.0021**	0.0031**
	(10.62)	(3.23)	(3.68)	(5.60)
Jan-Mar (d)	-0.0049**	-0.0023**	-0.0027**	-0.0032**
	(-18.08)	(-9.09)	(-8.84)	(-11.41)
Apr-Jun (d)	-0.0037**	-0.0028**	-0.0029**	-0.0034**
	(-13.10)	(-11.07)	(-9.80)	(-12.20)
Oct-Dec (d)	0.0090**	0.0078**	0.0078**	0.0076**
	(27.03)	(25.88)	(21.79)	(22.41)
Jan-Feb (d)	0.017**	0.014**	0.014**	0.014**
	(44.90)	(40.84)	(33.56)	(34.73)
Initial CLTV		-0.068*	-0.088*	
		(-2.00)	(-2.20)	
Initial $CTLV^2$		0.052**	0.063**	
		(2.75)	(2.82)	
Initial CLTV Missing (d)		-0.020	-0.029	
		(-1.39)	(-1.66)	
Current LTV		0.071**	0.071**	

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	(1) Base Sample	(2) Base Sample	(3) Matched Sample	(4) Matched Sample
		(25.53)	(21.64)	
Current LTV^2		-0.020**	-0.020**	
		(-18.23)	(-15.52)	
Current LTV Missing (d)		0.049**	0.050**	
		(17.77)	(15.10)	
Initial Interest Rate		0.0032**	0.0032**	0.0035**
		(37.75)	(32.34)	(36.11)
Δ in Int Rates		0.0082**	0.0078**	0.0080**
		(106.52)	(87.29)	(94.85)
Interest Rate Missing (d)		0.0084**	0.0093**	0.011**
		(3.00)	(2.81)	(3.21)
Origination FICO Score		-0.013**	-0.013**	-0.0067**
		(-68.74)	(-55.78)	(-29.40)
Origination FICO Missing (d)		-0.065**	-0.064**	-0.038**
		(-76.10)	(-61.18)	(-35.62)
Low/No Doc (d)		0.011**	0.010**	0.0094**
		(57.43)	(46.31)	(45.30)
Origination Balance (x 100k)		0.0023**	0.0019**	0.0034**
		(26.23)	(18.94)	(33.07)
Refi (d)		-0.0090**	-0.0074**	-0.0048**
		(-34.34)	(-24.00)	(-15.76)
Cash Out Refi (d)		-0.0085**	-0.0074**	-0.0030**
		(-46.68)	(-34.82)	(-13.73)
Purchase Missing (d)		-0.0019**	-0.0018**	-0.0010*
		(-4.29)	(-3.48)	(-1.97)
Interest Only (d)		0.0066**	0.0061**	0.0053**
		(26.02)	(20.44)	(18.44)
Interest Only Missing (d)		-0.00054	0.00011	-0.0014*

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	(1) Base Sample	(2) Base Sample	(3) Matched Sample	(4) Matched Sample
		(-0.85)	(0.15)	(-1.97)
Mortgage Insured (d)		-0.0029**	-0.0032**	-0.00077
		(-6.00)	(-5.75)	(-1.41)
Prepay Penalty (d)		-0.00060**	-0.000091	-0.00018
		(-2.85)	(-0.37)	(-0.80)
3 Months After Reset (d)		0.0030**	0.0025**	0.0027**
		(9.61)	(6.70)	(7.84)
Countrywide × 3 Months Reset (d)		-0.0029**	-0.0029**	-0.0027**
		(-4.15)	(-3.95)	(-3.80)
6 Months After Reset (d)		0.0071**	0.0073**	0.0066**
		(24.75)	(21.12)	(20.47)
Countrywide × 6 Months Reset (d)		0.0062**	0.0066**	0.0061**
		(8.09)	(7.90)	(7.78)
Prior 60 DPD (d)		0.040**	0.041**	0.024**
		(60.57)	(52.65)	(37.14)
60 DPD in Prior Year (d)		0.025**	0.024**	0.016**
		(39.66)	(33.09)	(25.87)
Initial CLTV				0.016*
				(2.27)
Initial CLTV^2				-0.0051
				(-1.40)
Initial CLTV Missing (d)				0.012**
				(2.91)
Current CLTV				0.056**
				(23.28)
Current CLTV^2				-0.012**
				(-14.11)
Current CLTV Missing (d)				0.055**

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	(1) Base Sample	(2) Base Sample	(3) Matched Sample	(4) Matched Sample
				(19.35)
Initial Vantage (x 100)				-0.016**
				(-87.73)
Δ Vantage (x 100)				-0.025**
				(-90.98)
Δ Vantage^2				0.0027**
				(15.49)
2nd Lien Balance (x 100k)				0.0098**
				(25.91)
CES+ (d)				-0.00019
				(-0.64)
Low Util HELOC (d)				-0.0082**
				(-13.82)
Utilization				-0.0099**
				(-38.46)
Months of Credit				-0.00060**
				(-22.38)
Vantage Missing (d)				0.021**
				(8.74)
Utilization Missing (d)				-0.0030*
				(-2.43)
Months of Credit Missing (d)				-0.0034**
				(-11.70)
Origination Quarter	No	Yes	Yes	Yes
MSA Control	No	Yes	Yes	Yes
N. of cases	5747839	5747839	3964533	3964533
Avg. Delinquency	0.049	0.049	0.048	0.048

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	(1) Base Sample	(2) Base Sample	(3) Matched Sample	(4) Matched Sample
Avg. Share Countrywide	0.15	0.15	0.18	0.18

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 Probit Panel 2008-Feb 2009–Straight 60 DPD by Origination Quarter

	(1) 2005Q1	(2) 2005Q2	(3) 2005Q3	(4) 2005Q4	(5) 2006Q1	(6) 2006Q2	(7) 2006Q3	(8) 2006Q4	(9) 2007Q1	(10) 2007Q2
Countrywide × Jan-Mar (d)	0.0072	-0.0012	-0.0016	-0.0061	-0.0075**	-0.0019	0.0029	0.0014	-0.00058	-0.0050
	(1.31)	(-0.35)	(-0.36)	(-1.28)	(-3.13)	(-0.78)	(1.61)	(0.92)	(-0.36)	(-1.37)
Countrywide × Apr-Jun (d)	0.0044	-0.00063	0.00100	-0.0069	-0.0069**	-0.0053**	-0.0022	0.00033	-0.00045	-0.0055
	(0.78)	(-0.17)	(0.33)	(-1.95)	(-2.83)	(-2.91)	(-1.36)	(0.22)	(-0.27)	(-1.55)
Countrywide × Oct-Dec (d)	**0.016***	**0.011***	**0.0052**	**0.0016**	**0.013****	**0.015****	**0.0046***	**0.0026**	**0.00047**	**-0.0029**
	(2.32)	**(2.35)**	**(1.54)**	**(0.53)**	**(3.24)**	**(5.02)**	**(2.12)**	**(1.46)**	**(0.28)**	**(-0.73)**
Countrywide × Jan-Feb (d)	0.0062	-0.0023	0.0000060	-0.0098**	-0.0068*	-0.0015	0.0040	0.0014	0.0015	0.0034
	(0.98)	(-0.59)	(0.00)	(-4.02)	(-2.37)	(-0.61)	(1.41)	(0.51)	(0.71)	(0.66)
Countrywide (d)	-0.0042	0.0055	0.0047	0.012**	0.0079*	0.0032	-0.00045	0.0015	0.0029*	0.010*
	(-1.25)	(1.79)	(1.95)	(4.59)	(2.43)	(1.30)	(-0.34)	(1.36)	(2.20)	(2.35)
Jan-Mar (d)	0.0040**	0.0035**	-0.0033*	-0.0059**	-0.010**	-0.0052**	-0.0034**	-0.0043**	-0.0029**	-0.0030
	(2.71)	(2.81)	(-2.00)	(-3.00)	(-9.79)	(-4.70)	(-4.19)	(-6.14)	(-3.70)	(-1.90)
Apr-Jun (d)	-0.0012	0.00049	-0.00086	0.0038*	-0.0028*	-0.0061**	-0.0040**	-0.0054**	-0.0040**	-0.0024
	(-0.91)	(0.42)	(-0.82)	(2.32)	(-2.48)	(-7.16)	(-5.13)	(-7.96)	(-5.34)	(-1.52)
Oct-Dec (d)	0.0062**	0.0035**	0.0053**	0.0062**	-0.00082	0.0096**	0.010**	0.0085**	0.0091**	0.0099**
	(4.00)	(2.83)	(4.50)	(5.18)	(-0.69)	(7.50)	(9.07)	(8.75)	(9.36)	(4.81)
Jan-Feb (d)	0.011**	0.011**	0.011**	0.015**	0.0031*	0.012**	0.019**	0.021**	0.018**	0.017**
	(6.42)	(7.62)	(8.19)	(10.76)	(2.13)	(8.50)	(10.94)	(10.85)	(13.32)	(6.72)
BlackBox Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSA Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Reset Control	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Equifax Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. of cases	148955	260305	365238	404434	447657	599925	596938	598507	422210	82363
Avg. Delinquency	0.038	0.052	0.055	0.059	0.068	0.063	0.041	0.038	0.033	0.037
Avg. Share Countrywide	0.068	0.076	0.11	0.12	0.14	0.21	0.23	0.24	0.22	0.11

Marginal effects; t statistics in parentheses
(d) for discrete change of dummy variable from 0 to 1
* $p < 0.05$, ** $p < 0.01$