The Cost of Delay

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Abstract

In this study, we make use of a massive database of mortgage defaults to estimate REO liquidation timelines and time-related costs resulting from the recent post-crisis government interventions in the mortgage market and the freezing of foreclosures due in 2010 due to the "robo-signing" revelations. The cost of delay, estimated by comparing today's time-related costs to those before the start of the financial crisis, is seven percentage points, with enormous variation among states. While costs are estimated to be three percentage points higher in statutory foreclosure states, they are estimated to be 14 percentage points higher in judicial foreclosure states and 20 percentage points higher in the highest-cost states, New Jersey and New York. We discuss the policy implications of these extraordinary increases in direct time-related costs, including recent actions by the GSEs to raise their guarantee fees 15-30 basis points in five high-cost judicial states. Combined with evidence that foreclosure delays do not improve outcomes for borrowers and that increased delays can have large negative externalities in neighborhoods, the weight of the evidence is that current foreclosure practices merit the urgent attention of policymakers as they craft future government-sponsored loan modification programs for the new mortgage-finance system.

1. Introduction

One of the consequences of the housing crisis, a crisis of massive proportions, has been an extraordinary extension of foreclosure timelines, resulting in significantly higher costs for resolving distressed properties. The cumulative effect of these interventions in mortgage servicing practices have huge implications for future government-sponsored loan modification programs and for the smooth functioning of the mortgage finance system going forward. Prior to 2007, the number of foreclosures was small and could be easily processed. As home prices began to fall and it became clear how large the number of displaced homeowners would be if extraordinary measures were not taken, public policy shifted to finding ways to keep borrowers in their homes. Measures included instituting foreclosure moratoria and rolling out a number of mortgage modification programs. Servicers, traditionally payment collectors for performing loans, were being asked to underwrite modifications, and it took time to build the infrastructure to do this. As servicers were building infrastructure, a freezing of foreclosures was imposed in response to improper foreclosure practices (the "robo-signing" crisis), followed by the National Mortgage Settlement, with the largest banks required to adapt new mortgage servicing practices. However, this set of circumstances did not hit all states equally. While foreclosure timelines are uniformly longer now, they have extended much more in states requiring judicial intervention (the judicial states) than in those not requiring such intervention (statutory states). Measuring only the direct costs, we will show timeline extensions are very costly to investors. So far, the consequence of this has been a wealth transfer from investors to borrowers. Ultimately, it could make new mortgage credit more expensive if borrowers in states with longer timelines are forced to pay more, as the Federal Housing Finance Agency (FHFA) has proposed. Moreover, we are understating the costs, as we do not consider any neighborhood externalities associated with a distressed sale.

Given this backdrop, the various government inventions in the mortgage market along with the freezing of foreclosures following robo-signing revelations give us a unique opportunity to measure the costs of various interventions in the mortgage market and to assess the cost of different practices going forward. In the past, what has proved most problematic with this work has been the availability of data and complications with measuring foreclosure-related costs. In this study, we make use of a massive database of some 3 million real estate owned (REO) liquidations and 1.3 million defaulted loans to estimate foreclosure timelines and the cost of delay. Our sample spans nearly 16 years, starting in 1998 and extending through September 2012. Using a loan-level database, we are able to compare liquidation performance across time and across different states; present analysis across all major types of mortgages and investors; and control for a large array of borrower, property, and loan characteristics to get estimates of direct time-related REO liquidation costs. The combination of data used in our study represents the most comprehensive database ever developed to empirically examine the cost of delay.

This paper is organized as follows. In Section 2 we review the literature. In Section 3 we describe our data and three samples we use to estimate REO liquidation timelines and the cost of delay. In Section 4 we describe our method for computing REO timelines for our large sample of uncensored observations from 1998 to September 2012. With this long sweep of history, we show how significantly timelines have been affected by the extraordinary government interventions in the foreclosure process, which included numerous foreclosure moratoria and very significant modification programs; the freezing of foreclosures after the improper practices at servicers had been uncovered (the "robo-signing" scandal); and, preliminarily, the aftermath of the attorneys general (AG) settlement and resulting actions at the major

servicers. In Section 5 we include in our sample the large number of loans defaulted in September 2012 but not yet liquidated and estimate a survival model to estimate timelines inclusive of the large number of uncensored loans that make up the "shadow inventory" of defaulted loans. What we show is that timelines in judicial foreclosure states have increased by 15 months pre-crisis to today, from an average of 25 months to 40 months. In statutory foreclosure states, timelines have increased by 3 months, from 19 months to 22 months. In Section 6 we describe our model used to estimate time-related costs and measure how much costs have risen. Comparisons of today's estimated costs to those pre-crisis represent the increased costs of delay. Pre-crisis, average time-related costs were estimated at 11% across the U.S.; today those costs are estimated at 18%, a seven-percentage-point increase. While costs have only gone up three percentage points in statutory states (from 9% to 12%), they have gone up 14 percentage points (from 14% to 28%) in judicial foreclosure states. In the highest-cost states, New Jersey and New York, costs have gone up by 20 percentage points. In Section 7, we discuss the policy implications of these extraordinary increases in the cost of delay, including recent actions by the GSEs to raise their guarantee fees in five judicial states with the largest increases in time-related costs.

2. Previous Literature

While the literature on mortgage default is extensive, the literature on foreclosure timelines is quite limited. This is unfortunate because the myriad of state foreclosure laws and recent experiments with different foreclosure alternative programs provide opportunities to empirically examine a broad array of different laws and programs. We believe a major impediment has been the lack of information on losses outside the private-label MBS market and the complexities of gathering, cleaning, and compiling large amounts of data, which we describe below. In some of the very first studies of variation of timelines by states, Clauretie (1989) and Clauretie and Herzog (1990) looked at losses to primary mortgage insurance (PMI) companies in the 1980s. They found that states with judicial foreclosure laws, laws that require judicial proceedings to execute foreclosure, lengthen the foreclosure process by some five months relative to statutory foreclosure states that do not require judicial intervention. Since they were using PMI data, they were limited largely to high loan to value (LTV) loans insured by Freddie Mac and Fannie Mae, the two government-sponsored enterprises (GSEs). Wood (1997) documented that states with judicial foreclosure proceedings took an average five months longer than the average foreclosure process in non-judicial states, and Wilson (1995) found that the judicial foreclosure process greatly increased costs to investors, implying the 5-month delay in judicial states raises time-dependent costs by 5% of the loan balance. Pennington-Cross (2003) found that houses in judicial foreclosure states sold for 4% less than those in statutory foreclosure states, driven in part by greater home price depreciation during the longer foreclosure process for judicial states. Pence (2006) investigated the costs of different state foreclosure laws on the availability of mortgage credit. She found that loan sizes are 3%-7% smaller in "defaulter-friendly" states, mainly judicial states, imposing material costs on borrowers at time of origination. These last two studies focused mainly on their effects on mortgage originations, not on the liquidation process.

More recently, the effects of the housing financial crisis have focused attention on timelines and costs of foreclosure. Hayre and Sharif (2008) used data on private-label securitizations to estimate differences in timelines and severities. They found that states that have a statutory, or "power-of-sale," foreclosure process take, on average, 11 months, while states requiring judicial foreclosure proceedings take, on average, 14 months. Their data are limited to the private-label mortgage-backed securities (MBS) market. Using data gathered at Freddie Mac, Cutts and Merrill (2008) find that the average foreclosure timeline

nationwide, from last interest paid date to foreclosure sale, is 355 days, with substantial variation across states. They are most interested in finding an optimal foreclosure timeline policy to institute nationwide. They conclude that an optimal foreclosure timeline is 270 days, composed of 120 days in foreclosure and 150 days for pre-foreclosure referral loss mitigation activities.

In all of the above-mentioned studies, researchers were limited to a particular sector of the mortgage market at a particular point in time. Our study will draw from a very large representative sample from the largest mortgage servicers over a very long time period. Most important, we can examine the effects of delays caused by moratoria instituted since the onset of the financial crisis in 2007 and delays caused by the "robo-signing" revelations.

Another line of research related to foreclosure timelines has examined the factors that lead borrowers to cure mortgage defaults rather than lose their properties to foreclosure, focusing as we do on measuring variations in state foreclosure laws.[1] Since one type of cure is a loan modification, some recent papers in this literature also address important policy questions about the effects of differences in foreclosure timelines on borrowers' ability to have their loans modified.[2] This line of research can be interpreted broadly as attempting to assess the potential *benefits* associated with delaying foreclosures due to varying state foreclosure laws and various post-crisis foreclosure prevention programs. This literature generally agrees that borrowers are more likely to default the longer they are delinquent, the less equity they have in their properties, or if their loans are less seasoned. However, the evidence is mixed on whether and how mortgage outcomes differ with different state foreclosure laws or moratoria. In all but the Gerardi, Lambie-Hanson, and Willen (2011) study (henceforth GLW (2011)), however, researchers were limited to investigating behavior in one sector of the mortgage market, often at a particular point in time. GLW (2011) draw from the same large sample we do and conclude that the longer timelines associated with judicial intervention in the foreclosure process or with one moratorium law implemented in Massachusetts did not lead to either more cures or more modifications. However, they did lead to more persistently delinquent borrowers, as we will also show.

In contrast to all of these studies, we use our large national panel of mortgage loan data to estimate the *direct costs* associated with delays in the foreclosure process across the entire U.S. In this area, empirical work in the academic and trade literature is especially limited. Calomiris and Higgins (2010) examine the macroeconomic effects of the cost of delay, citing four potential costs. But since they do not have the data to estimate these costs directly, they instead cite a number of studies that estimate various parts of these costs. They conclude that the sum total of these costs is substantial, but they do not attempt to estimate what they are. Our study is the first to directly estimate these time-related costs of foreclosures across the entire U.S. mortgage market pre- and post-crisis. In so doing, we are able to assess costs across all manner of state foreclosure practices and a wide range of interventions in the mortgage market.

If one accepts the proposition in GLW (2011) that the benefits of delay are negligible, then our study in combination with theirs constitutes a full cost-benefit analysis of differing state foreclosure laws and various crisis-related interventions in the foreclosure process. These interventions include the national moratorium first implemented by Freddie Mac and Fannie Mae in November 2008; the Home Affordable

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[1] See Phillips and Rosenblatt (1997) and Phillips and VanderHoff (2004).
[2] See Pennington-Cross (2010); Collins, Lam, and Herbert (2011); Mian, Sufi, and Trebbi (2011); and Gerardi, Lambie-Hanson, and Willen (2011).

Refinance Program (HAMP) in March 2009; delays caused by the "robo-signing" scandal; and, finally, the effects of the recent state attorneys general (AG) settlement that emanated from the flaws uncovered. Prospectively, we examine recent evidence to suggest what the cost of delay is likely to be with full implementation of new policies either in place or proposed.

3. Data and Sample Design

We use three samples of data from two sources in our analysis. For computing timelines for our first two samples, we use data from Lender Processor Services, Inc. (LPS), a loan-level database that covers approximately 60% of mortgages in the U.S. from the largest seller/servicers over a very long time period from 1992 to September 2012. This database contains over 140 million unique mortgage loans with around 4.9 billion records of monthly performance history through 2012. Since LPS includes the largest servicers, the database includes loans from all parts of the mortgage market, including those from Freddie Mac and Fannie Mae, the two government-sponsored enterprises (GSEs); government loans in, and out of, securities of the Government National Mortgage Association (GNMA); private label securities (including subprime, alt A, and prime jumbo loans); and portfolio loans.

Our first sample covers the period 1998-September 2012, where we examine the long history of timelines in the U.S., but only for the loans that have gone through REO liquidation.[3] In part, this is done to illustrate just how extraordinary recent history is.

The main weakness of this part of the analysis done in Section 4 is that recent history suffers from severe *right censoring*—most of the observations that will reach REO liquidation are still delinquent and thus unobserved. To address this, our second LPS sample covers January 2005-September 2012, and we estimate a survival model to include censored observations in our database for loans that defaulted (i.e., were 180 or more days past due in September 2012).[4] We needed to use the shorter time series for our multivariate analysis due to data limitations with some of the independent variables used in our model.[5] Combining censored with uncensored observations accounts for the censoring of REO timelines through the survival model. This analysis is conducted in Section 5.

One weakness with the LPS data is that, outside of REO liquidations, it is impossible to determine either the type of involuntary terminations or whether the servicer simply stopped reporting. Thus, a loan that does not voluntarily pay off or does not go to REO could either be a short sale, a charge-off, or a third-party sale, or the servicer could have simply stopped reporting the loan at that point. Because we cannot positively determine these types of involuntary terminations or reporting issues, our analysis focuses on loans that go through REO liquidation, where we are confident of the type of involuntary termination.[6] We note that these will overstate timelines with a fuller reporting of all terminations, since short sales and other types of liquidations circumvent the REO liquidation process.

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[3] We did not go back even further only because sample sizes are much smaller before 1998. But results are still qualitatively similar for months with enough observations.
[4] The 180 DPD time frame is chosen because that is the period when banks charge off loans and first recognize losses. For this sample, better estimates are possible, since, by that point, most loans are expected to be liquidated.
[5] As in GLW (2011), we had to limit our sample to start with 2005 due to data limitations in the LPS database.
[6] We did thoroughly examine the data to determine that there were no systematic biases in the reporting of REOs. The lack of reporting is therefore driven by what servicers report rather than anything systematic.

Because the LPS data do not contain loss information, our third sample consists of liquidated loans from the CoreLogic (CL) database, which contains loss information from the private-label securities market so that we can estimate annualized timeline costs. While we do not believe severity rates from the CL database are representative of the entire market, we do believe that timeline costs, with adjustments, can be assumed to be representative, as we explain in Section 6. To estimate the annualized cost of delay, we use proprietary loss models developed by Amherst Group, LP (Amherst (2009, 2010)). Combining these costs with timeline estimates from the survival model using the second LPS sample gives us our loan-level cost estimates. Comparing pre-crisis costs against estimates of today's costs gives us our cost of delay.

All told, our first sample includes almost 3 million mortgage loans that went through the REO liquidation between 1998 and September 2012, by far the largest and most diverse set of REO liquidation data sample used in any study. Our second sample uses a subset of 1.8 million of these completed REO liquidations that occurred starting in 2005 and combines them with 1.3 million defaulted loans in September 2012. Our third sample using CL data includes 140,000 liquidations from private-label securitizations between June 2011 and November 2011.

Our final data sources are used to create additional variables to control for the economic and regulatory environment. First, we use the CL repeat sales index to compute mark-to-market LTVs for both the survival and severity models. We use the most granular level index available, zip-level indexes if available, county or state level if not. We compute a measure of house price growth the year before the loan defaults. We also collect county-level unemployment data by quarter from Haver Analytics to better capture market conditions in local areas.

4. Measuring Timelines in Judicial, Statutory and Redemption States

As explained in GLW (2011), two main types of foreclosure laws emerged in the U.S. over time, with a third type allowing for additional rights post-foreclosure. The first type is termed *judicial* foreclosure, in which the lender must petition the court, which then executes the foreclosure by auctioning the property. The alternative foreclosure law is a *statutory* foreclosure, where the borrower at origination signs over the right to the lender to carry out a foreclosure auction in the event of default, effectively eliminating judicial intervention. While differences exist within these classifications, most researchers agree that the judicial versus statutory designation is the most critical in explaining variation in timelines across states, as we will show. We believe the most authoritative list is the one developed by Cutts and Merrill (2008). As shown in Appendix 1, their classification yields 29 statutory states (including the District of Columbia) and 22 judicial states. The third type of legal right is that some states provide for post-foreclosure rights of redemption, giving borrowers rights for a period of time to repossess their properties after foreclosure proceedings have been completed.[7] In Appendix 1 we identify the nine *redemption* states with shaded rows. Note that redemption states have either judicial or statutory foreclosure laws.

While the focus of our study is on the full timeline through REO liquidation, it is important to understand which parts of the process are causing variation in timelines among states and across time. As shown in

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[7] In states with a post-foreclosure-sale redemption period, the borrower retains the right of occupancy but loses title. The investor gains the title but has no rights of possession. See Cutts and Merrill (2008) for further details.

Figure 1, timelines are split into several distinct events. The REO liquidation process begins the month borrowers stop paying on their mortgages as indicated by the due date. The next important date is the foreclosure (FC) referral date, starting the legal process by which the lender makes a claim on the mortgage collateral, continuing through foreclosure sale, when borrowers' rights of title are terminated. We also refer to this as the FC start date. The final timeline measured is from the REO start date (i.e., the month following the FC sale date or FC end date) to REO liquidation.

Before conducting our analysis, we needed to resolve significant issues with the data and devise a consistent methodology for computing timelines. The biggest challenge comes in developing a consistent methodology for assigning the foreclosure and REO start dates. A foreclosure event starts when a loan enters into foreclosure status, which, in practice, is the point at which the loan has been referred to foreclosure. The FC start date begins in the month a value of 'F' is recorded for the first time following a delinquency status other than "F."[8] We assign that month when this event occurs as the foreclosure start date. Once a loan enters foreclosure, we fix the date at that point until the foreclosure event ends when the loan proceeds to REO, liquidates, pays off, or becomes current. Loans that do not transition into one of these states do not move the foreclosure start month. This includes bankruptcy, which, in principle, should end the foreclosure (since loans in bankruptcy legally cannot be in foreclosure), but we keep the foreclosure date fixed until the loan is foreclosed, liquidates, pays off, or becomes current.[9] If the loan ends in a voluntary payoff, it is dropped from the sample. A foreclosure event could also end with the loan becoming current, in which case it is dropped from our sample. In our sample, the foreclosure process ends with the loan entering REO.

An REO event starts when a loan enters into an REO status ('R') from a status other than "R." We designate that month as the REO start date. A loan stays in REO as long as the loan does not become current (i.e., it is redeemed in a redemption state) or until it is liquidated. If a loan has been in REO and the servicer simply stops reporting it without the loan being liquidated or redeemed, we do not include it in the sample.

Very often, loan statuses change in ways that, if not accounted for, could significantly bias downward the foreclosure and REO timeline calculations. Some changes occur because of errors in reporting, where a loan is reported as being in FC or REO, then not in FC or REO for a month, then back in FC or REO the next month.[10] In these cases we maintain the original FC or REO start month. In other cases, borrowers file for bankruptcy while in foreclosure. Legally, borrowers in bankruptcy cannot be in foreclosure. LPS's coding rules do not allow this to occur. But if the loan eventually involuntarily terminates, the bankruptcy only delays the foreclosure; it does not end it. So we maintain the original FC start date. By footing the

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[8] In this case, these would come from values of current, 30, 60, or 90+ days past due.

[9] Per the LPS data, a loan cannot be in foreclosure and bankruptcy at the same time. If a loan in foreclosure also has a bankruptcy flag, then it no longer has "F" status but typically shows as non-foreclosure delinquency status. Making payments will also shorten the due date, but the foreclosure start date is not changed unless the payments result in a loan becoming current, at which point the loan is dropped from our database.

[10] This is because foreclosures and REOs are reported to LPS as flags, which are combined with delinquency or other information to determine the status. Sometimes, the delinquency won't change, but the FC or REO status is not reported. In these cases, we maintain the FC or REO start date.

foreclosure and REO start dates and only removing them if loans pay off or fully recover to a current status, we calculate a consistent timeline methodology without excluding valuable information.[11]

As shown in Table 1, timelines vary by state laws in ways we expect, confirming the efficacy of our methodology. Judicial states show higher timelines compared to statutory states. From due date to foreclosure end, judicial states average 19 months versus 13 months for statutory states, an average difference of six months. Five months was the difference calculated by Clauretie (1989), Wood (1997) and Cutts and Merrill (2008). The five-month difference we show in our Period 1 (discussed below) most closely matches the time period of these earlier studies. Note that the differences in the timelines is explained entirely (and then some) by the foreclosure timeline (foreclosure start to end), which averages 14 months in judicial states and seven months in statutory states, an average difference of seven months. REO timelines, from REO start to end, average seven months in judicial states and seven months in statutory states. As expected, REO timelines are substantially longer in the redemption states at nine months. All told, what we label the REO liquidation timeline, the time from due date to REO liquidation, averages 25 months, more than two years, in judicial states, 19 months in statutory states, and 21 months in redemption states.[12] In Appendix 1 we summarize timelines by state and show some revealing rank correlation statistics at the bottom of the table. The range among states over the entire REO liquidation timeline (from due date to REO end date) is a full year, from 17 months in Missouri to 29 months in New Jersey. The Spearman rank correlation statistic between judicial states and the REO liquidation timeline is 73%.[13] But rank correlations vary across different segments of the timelines. The foreclosure timeline (FC start to FC end) rank statistic is 77%, while the REO timeline (REO start to REO end) is a much smaller 29%. But the timeline from due date to foreclosure start is a *negative* 50%, meaning that this part of the process is higher in statutory states. One interpretation of this is that since statutory states have much shorter timelines between foreclosure start and end, they are more deliberative in referring loans to foreclosure as they attempt to work them out.

Even more important is to examine the variation over time, which we divide into five distinct periods and report in Table 1 and illustrate in Figures 2 and 3. Period 1, which covers 1998 to the month before the start of the financial crisis in February 2007, is characterized by relatively stable liquidation timelines, save for some volatility in REO timelines (driven mainly by small sample counts). As shown in Table 1, timelines from due date to REO liquidation averaged 23 months in judicial states and 17 months in statutory states.

Period 2 encompasses the onset of the financial crisis in February 2007 through October 2008. Period 2 is characterized by the shortest timelines on record. Some contend that this is due to improper practices at servicers, as burgeoning numbers of foreclosures induced some of the major servicers to speed up foreclosure proceedings by forgoing attaining proper foreclosure documentation. REO liquidation timelines reached a record low of 21 months in judicial states and 16 in statutory states (Table 1).

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[11] We thank Bill Merrill for corroborating this methodology with us. Cutts and Merrill (2008) developed comparable rules for their study while at Freddie Mac.

[12] Note that redemption states can be either judicial or statutory and are not mutually exclusive. In Appendixes 1 and 2 they are noted by shaded rows.

[13] The Spearman's rank correlation coefficient measures the correlation between judicial states and the REO liquidation timelines. A correlation of 1.0 means that timelines are always higher in judicial states than in statutory states.

Period 3 begins in November 2008, which marks the start of an extraordinary series of interventions in the housing markets. On November 26, 2008, both GSEs announced that they would suspend foreclosures of occupied homes until the newly elected Obama administration implemented its foreclosure alternative program.[14] The largest servicers announced moratoria in February 2009.[15] On March 4, 2009, the Home Affordable Modification Program (HAMP) was announced, and a major aim of the program was to delay foreclosures so borrowers could receive loan modifications as alternatives to foreclosure. What is clear from Table 1 and Figure 2 is that the effect of the moratoria and HAMP was to extend timelines significantly, to record highs by the end of the period. Part of the reason for these extended timelines was delays in instituting HAMP; other reasons include additional foreclosure moratoria instituted by state and local governments.[16] By the end of Period 3, timelines were 18 months in statutory states and 24 months in judicial (Figure 2). It is important to realize that we are only measuring loans that are liquidated from REO. Thus, if a loan receives a modification and eventually re-defaults, we are using the time from last payment to liquidation. We are ignoring any time spent in delinquency prior to the modification. Thus, we are actually placing a lower bound on the extension of the liquidation timeline.

Period 4 begins in September 2010 with a landmark series of announcements by the major servicers that they were suspending foreclosures after defects were uncovered in the foreclosure process. This period came to be characterized as the "robo-signing" scandal, so named because of the practice of signing off on foreclosures en masse before obtaining all of the appropriate documents.[17] These practices were likely driven by incentives at mortgage servicers to keep costs down for loans they don't own, especially the costs of foreclosures, which are large only during sporadic periods of mortgage downturns (Cordell, et al. 2009). These practices brought recriminations and lawsuits against the major servicers, and timelines have extended ever since. By the end of Period 4, timelines had extended to 34 months in judicial states and 29 months in statutory states (Figure 2).

Finally, Period 5 covers the time from the attorneys general (AG) settlement resulting from the robo-signing revelations, starting in February 2012 to the end of our sample in September 2012. Timelines for these uncensored loans extended further, to 24 months in statutory states and 33 months in judicial states.

In Figures 3a and 3b, we plot the component parts of the REO liquidation process to see where delays are occurring. As shown in Figure 3a, in judicial states, the extraordinary increases in delays were heavily driven by the foreclosure timelines, which rose to 23 months by the end of the period. REO timelines also increased during the "robo-signing" scandal, but they also declined during the GSEs' moratorium. Note that the pre-foreclosure timelines remained remarkably stable at around 5 months, rising only at the end of the period.

This contrasts with the pre-foreclosure timelines for statutory states in Figure 3b. Note that these timelines rose steadily to over 8 months by the end of the period. Foreclosure timelines rose as well, to around 11 months at the end of the period, but not nearly as much as in judicial states. As mentioned, one

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[14] See "Fannie Mae, Freddie Mac Suspend Some Foreclosures," Reuters.com, November 21, 2008: http://www.reuters.com/article/2008/11/21/us-fannie-freddie-idUSTRE4AJ90520081121.

[15] See "Banks Agree to Foreclosure Moratorium," *Wall Street Journal*, February 14, 2009.

[16] California, for example, instituted its own foreclosure moratorium in June 2009, as did several other states and even localities.

[17] See "Federal Agencies Dig Into Foreclosure Processing Problems, Suggest Servicing System is Flawed," *Inside Mortgage Finance*, October 28, 2010.

interpretation of this difference is that since the statutory process resolves loans much more quickly post-foreclosure referral, statutory states are more deliberative in the pre-foreclosure process. Judicial states refer borrowers more quickly to foreclosure, as they understand that delays are much longer with judicial proceedings.

5. Timelines after Including Censored Observations

Remarkable as these figures are, they *understate* timelines because they do not include large amounts of loans currently in the foreclosure pipeline but not yet liquidated. Simply using the observed REO timeline data will produce downward biases due to data censoring: Some of the defaulted loans have still not been liquidated, making their REO timelines unobservable; so the observed data will underestimate the true REO timelines for these loans. In this section we describe a standard survival analysis approach we use to adjust our timelines for censoring.

The extent of the censoring problem is made clear in Figure 4, which shows the rate of seriously delinquent loans from 1998-September 2012 along with the share of seriously delinquent loans greater than one and two years past due. During Period 1, loans more than one year past due hovered fairly steadily at around 19% of all seriously delinquent loans; loans more than two years past due averaged 4%. Even though the share of seriously delinquent loans rose sharply during Period 2, the share of seriously delinquent loans one and two years past due decreased to 14% and 2%, possibly partly due to the "robo-signing" scandal. Since the start of Period 3, these shares have extended to unprecedented highs, rising most sharply during the "robo-signing" scandal in Period 4. By the end of our sample period, the share of seriously delinquent loans more than one year past due surpassed 60% for the first time ever, more than three times the share pre-crisis. The share more than two years' delinquent reached 35%, almost nine times its pre-crisis share! When these loans are liquidated, they will substantially extend the timelines reported thus far.

In order to overcome the data censoring problem, we use an *Accelerated Failure Time (AFT)* model from the survival analysis literature to estimate the length of time (in months) that elapses between the date on which a loan defaults and the REO liquidation date.[18] The AFT model assumes that liquidation time follows a particular parametric probability distribution (lognormal in our case).[19] We regress the log of event time on covariates. The functional form of the AFT model is described by

$$\log(T) = \mu + \sum (x_i \beta_i) + \sigma \cdot \epsilon$$

where T is the event or censoring time, x_i is the value of the ith covariate, β_i is the coefficient to be estimated for the ith covariate, and μ and σ are unknown parameters to be estimated from the baseline distribution.

For our study, the AFT model has several advantages compared with the more commonly used proportional hazards model in survival analysis. First, unlike the proportional hazards model where the

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[18] The 180 DPD time frame is chosen because that is the period when banks charge off loans and first recognize losses. Better estimates of timing are possible with this sample, since most loans are expected to be liquidated.
[19] We chose a lognormal distribution because it fit the data well and made the implementation of the model straightforward.

hazard rate is modeled, our AFT specification models the liquidation time (in logarithm form) directly. It gives us the ability to compute time-dependent costs in the foreclosure process from the model outputs. Second, the AFT model coefficients are easy to interpret, as presented in Table 2. Third, the coefficient estimates are less sensitive to the assumption on the event time distribution and to omitted variable bias. Finally, the maximum likelihood (ML) estimation also enables the AFT model to incorporate censoring data that contain valuable information regarding the distribution of event time.[20]

The model is estimated using LPS data from 2005 to 2012.[21] The sample includes 1.8 million uncensored observations of loans that terminated with REO liquidations between 2005 and September 2012 (0.5 million in judicial states and 1.3 million in statutory states), and 1.3 million defaulted loans in September 2012 (0.7 million in judicial states and 0.6 million in statutory states). For a loan from the non-censored sample, T is calculated as the length of time (in months) from the default date to the REO liquidation date. For a loan from the censored sample, T is calculated as the length of time (in months) from the default date to September 2012.

Our preliminary analysis shows that the dominant characteristic is whether the loan is in a judicial state. After reviewing results, we concluded that it was best to assume loans in judicial states and statutory states are as from different populations and estimate models separately.[22] Model coefficients are listed in Table 2. All independent variables are dummy variables defining different cohorts. The combination of control categories constitutes the baseline case represented by estimates of the intercept term μ and scale factor σ. All covariates are significant at the 5% level or better except for two in the judicial model (MTM LTV 106-125 and rate and term refinance). To provide some intuition as to the economic meaning of the covariates, the last column of each model in Table 2 reports the marginal impact of covariates as percentage changes to timelines relative to the baseline.

The model results reported in Table 2 have expected signs for most all the covariates, offering important insights into the REO liquidation process. Some covariates have different impact in magnitude, others opposite impact for judicial states and statutory states. This further convinces us of the legitimacy of our separate models for judicial states and statutory states. The first set of covariates relates to the legal and regulatory environment. Redemption states have an estimated timeline 23% higher than that of non-redemption states in the judicial model, which reflects delays in redeeming properties post-foreclosure. However, it has virtually no impact on statutory state timelines (only 1% higher). This is likely driven by the two of the longest timeline states (NJ and NM) being redemption states.

Deficiency judgment laws have a great impact (42% higher) on timelines in judicial states. It has virtually no impact on statutory states (3% lower). One interpretation of this effect is that borrowers in judicial states tend to have relatively more hardship defaults where deficiency judgments can't be pursued and where timelines are expected to be longer than with people that are defaulting for reasons not related to hardship and where deficiency judgments are more likely to be pursued.

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[20] More details about the AFT model can be found in Allison (1995).

[21] As mentioned, we had to limit our sample to start with 2005 due to data limitations with the covariates needed to estimate the model. Due to the relative stability of Period 1, we do not believe we give up anything in terms of model results by truncating the starting period to 2005.

[22] The coefficient value of 0.819 on the judicial state dummy in the pooled regression shifted up the constant on the judicial state estimates and shifted down the statutory state estimates in ways that increased forecast errors on the uncensored observations. Separate regressions for judicial and statutory states reduced these forecast errors, leading to more sensible results.

The most profound finding is the magnitude of impacts from the default period dummies. Current (Period 5) timelines are 89% longer in judicial states and 68% longer in statutory states than the baseline pre-crisis timelines, reflecting the cumulative effects of moratoria, foreclosure prevention programs, and the suspensions of foreclosures following "robo-signing" revelations. Period 4 increases (104% in judicial states and 61% in statutory states) reflect the in-period effects of the "robo-signing" delays. Period 3 increases (73% in judicial states and 49% in statutory states) reflect the foreclosure moratoria and the HAMP implementation. Period 2 shows a small increase (17% in judicial states and 16% in statutory states) relative to the pre-crisis baseline.

One especially noteworthy difference is that in statutory states the default period dummies show a monotonically increasing impact on timelines while in judicial states the timelines peak in Period 4 and then decline in Period 5. This Period 4 dummy captures the direct effect of the freezing of foreclosures in the judicial states where falsified affidavits were uncovered.[23] Since such affidavits are generally not part of the statutory foreclosure process, increased timeline in statutory states reflect more the change in policies related to new foreclosure prevention programs.

We have in our model ten additional covariates (with subgroups reflected by dummy variables). In judicial states, portfolio loans have the shortest relative timelines, suggesting that in judicial states banks more aggressively move their own loans through the foreclosure process than other investors they service loans for, anywhere from 23%-28% faster. In statutory states, where the foreclosure process is more well-ordered, the differences are much smaller for government or private securitized loans. For GSE loans, timelines are relatively shorter than portfolio loans, reflecting more aggressive interventions in the foreclosure process by the GSEs. Why this effect is not also prevalent in judicial states is unclear.

The effect of house prices on timelines is quite different between judicial and statutory states. First, in judicial states, the mark-to-market LTV (MLTV) of the property as measured at the time of default has a very small effect on timelines. In statutory states, servicers are taking more time with borrowers with equity in their homes, 29% longer for borrowers with MLTVs of 85% or less. This could reflect the fact that servicers have relatively more discretion with respect to the way they foreclose on properties in statutory states. Second, substantial short-term house price depreciation, measured as the one-year price change the year before default, substantially lengthens the liquidation process in judicial states (by up to 44%), but has very modest effects in statutory states (only up to 9%). This certainly reflects the difficulty of disposing of properties in depressed markets, but it seems to not affect timelines in statutory states nearly as much.

As for loan and borrower attributes, loan size has an outsize effect: loans with balances over $400K get liquidated 72% slower in judicial states and 40% slower in statutory states than loans with balances of $100K or less. Fast liquidation timelines for very low balance loans reflects a tendency of servicers to write off small-balance loans quickly due to large fixed costs relative to loan size in foreclosing and liquidating properties. More recently, the REO-to-rental programs have absorbed distressed properties in the low price tier at a very fast pace. Large balance loans have the opposite effect; servicers are more

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[23] Typically, in a judicial foreclosure state, the lender proves the requisite facts of the foreclosure by submitting documents and a written statement signed under oath (called an affidavit) by a person (usually a bank employee) who has reviewed the documents and verifies the facts to be true. "Robo-signing" investigations uncovered falsified affidavits.

likely to attempt to work out larger balance loans due to their much larger total costs. In addition, the housing market has less liquidity to absorb properties in the high price tier. This effect is captured in the monotonic pattern of the loan balance categories in both judicial states and statutory states.

For loan product types, ARM loans tend to have shorter timelines, whereas option ARMs tend to have longer timelines relative to fixed-rate loans in both judicial states and statutory states. Relative to purchase loans, cash-out refinance loans tend to have REO timelines that are 15% higher in judicial states and 14% higher in statutory states. Relative to single-family properties, 2- to 4-unit properties have longer timelines (16% in judicial states and 12% in statutory states), while condos take a slightly shorter time to liquidate. Owner-occupied properties take longer to liquidate than second homes and investor properties, reflecting more difficulties in evicting borrowers from their own residences.

For our last two sets of regressors, borrowers with higher FICO credit scores tend to get liquidated sooner in both judicial states and statutory states. Perhaps these borrowers suffer more from some "trigger event" such as loss of a job, while lower FICO borrowers tend to be slow payers, which extend REO timelines. We do include dummies reflecting different levels of the one-year change in unemployment in the model, but we found no discernible pattern in this.

These results show many interesting patterns, but our main objective for developing this model is to account for the effects of censored on expected timelines. Table 3 summarizes the sample data and compares the projected total timelines to the observed timelines from the uncensored data. In the tables and figures reported previously for the uncensored data, we had to foot our timelines to the liquidation date to reflect the upward trend. Now that we have included the censored observations, we switch to foot all of our timelines to the default date, prior to or at September 2012, to get an idea of when we expect loans to be liquidated. To get the total timelines, we add six months to each estimate to reflect the 180 days past due (DPD) default period.

When we present the same data by the time the loans defaulted in Table 3, the censoring issue becomes obvious. For example, liquidation timelines for uncensored loans that defaulted most recently (Period 5) only averaged nine months for judicial states and ten months for statutory states due to their short histories, reflecting positive selection for these loans. But 99% of the loans in judicial states and 95% in statutory states are censored and have not yet been liquidated. Including the censored loans via our survival model enables us to get a clearer picture as to how recent legal and regulatory policies will likely affect liquidation timelines.

The most relevant times are Periods 4 and 5, reflecting mainly defaults since the "robo-signing" revelations. When censored observations are included, the estimated liquidation timeline for statutory states increases to 22 months, a 3-month increase compared with its 19-month pre-crisis average (see the average of 19 months on the uncensored column in Period 1). For judicial states, the model estimated liquidation timelines increase to 40 months, an astounding 15-month increase over its 25-month pre-crisis historical average. This means that for the average borrower in a judicial foreclosure state, from the time he stops paying on his mortgage, it will take 3.33 years before the loan is liquidated.

An important qualification here is that censored loans account for a dominant share of loans in the later periods. So the model makes predictions on very limited information given the short history of the loans defaulted in this period, suggesting that there is a lot of uncertainty with the prediction. Note that the

model shortens the timelines in Period 1 for both judicial states and statutory states, even though all observations are uncensored. So Period 1 timelines for uncensored loans are calculated at 19 months actual for statutory states and 17 months estimated; judicial is 25 months actual and 23 months estimated. Over this long period (2005-2012), the extension of timelines was more significant for judicial states. Due to this more significant extension, the estimated timeline incorporates more of the increase for judicial states, creating an upward bias compared with statutory states. Given these limitations, the most appropriate way to interpret the estimates is to say that, given what we have observed so far, *if there are no changes in regulatory policies*, the average liquidation timeline would likely be 40 months in judicial states and 22 months in statutory states for recent defaults. The direct costs of these timeline extensions are considered next.

6. The Cost of Delay

Now that we have accounted for censoring through the survival model, we complete our analysis by estimating direct time-related costs as a share of the loan balance and compare this to pre-crisis costs to estimate the cost of delay. As mentioned, since the LPS database does not have loss information, we use the CoreLogic (CL) private-label MBS loan database, the only publicly available database with a large sample of loss data. While we do not believe severity rates from the CL data are representative of the entire market, we do believe that the timeline costs, with adjustments, can be assumed to be representative, as we explain below.

There are actually three sets of costs incorporated in the delay: property taxes, insurance, and excess depreciation. We consider each in turn. First, if the borrower is not paying, the servicer must continue to make tax payments. These can be quite sizeable. For California, we estimate property taxes at 2.01% per annum on appraisal value. Nationwide, property taxes average 1.54%, ranging from a high of just over 3.0% per annum in New Jersey to a low of 0.54% in Arizona.[24] Property taxes for all states are summarized in Appendix 2.

Second, the lender must also continue to make insurance payments; if force-placed insurance is used, the insurance payments can be quite large. Finally, there is an additional cost, one that we call "excess depreciation." Each day the home is occupied by a borrower not making his mortgage payments, that borrower is likely not taking care of the home, and it is likely the home will be sold for less at liquidation. Servicers pay for property maintenance costs after a property is in REO and the property is vacant (e.g., mowing the lawn, fixing the roof). In addition, there are servicer foreclosure costs that are time dependent.

How do we estimate insurance payments and excess depreciation? We cannot observe either of these costs directly. As shown in Figure 5, we see that the actual loss amount upon liquidation increases by the number of months in delinquency before the loan is liquidated. To estimate the timeline costs for each loan, we use the severity model developed by Amherst (2009, 2010) and apply it to loans from our LPS sample. The increase over time essentially represents the *carry cost*, which consists of:

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[24]Property tax information is summarized from various publicly available sources such as taxfoundation.org.

(1) Principal and interest on the mortgage. For private-label securities, the servicer has to advance the principal and interest as long as it deems the advances recoverable. Amherst (2010) describes its method for estimating the percentage of principal and interest payments that are being advanced, which are then backed out of the costs.
(2) Property tax payments. As described above, we estimate the rates on the state level.
(3) Hazard insurance premiums; and
(4) Excess depreciation, encompassing the factors discussed above.

In the severity model estimation process, we first look to explain the increase in severity with the factors we can estimate: principal and interest payments and property tax payments. To the extent that we have an unexplained amount, and we will, we attribute this to insurance and excess depreciation.

Note that for this particular study, we are not including the advancing of principal and interest payments in the cost of delay. If those costs are advanced (as in private-label securitized loans), the servicer is able to recover these monies when the loan is liquidated. Stated differently, when proceeds from liquidation are being distributed, the recovery of monies advanced by the servicer are at the top of the cash flow waterfall. Thus, the principal and interest advances, neglecting interest costs, are a zero sum event and are excluded from the costs. For our analysis, we ignore the cost to financing a non-performing mortgage.

Based on this analysis, we report in Table 4 a summary of our timeline costs for our full LPS sample. Overall, total timeline costs are estimated to be 11% of loan balance in Period 1, rising to 18% in Period 5, showing a seven-percentage-point increase in REO liquidation costs. By Period 5, timeline-related REO liquidation costs are estimated at 28% in judicial states, 12% in statutory states, and 28% in the subset of 9 redemption states (which can be either judicial or statutory states).

We also show an extraordinary variation of total estimated timelines among states in Period 5, from a low of 10% in Arkansas to a high of 42% in New Jersey (see Appendix 2). While one can argue that these figures are inflated by loans stuck in foreclosure due to extraordinary events, we can safely conclude that the costs of delay are expected to be substantially higher in the future. These costs can, and will, get passed on to ALL homeowners, in the form of higher rates on their new mortgages. In fact, this is already starting to happen, as we explain in the next section.

As a final point, it is important to realize that we have measured only the *direct* costs of timeline extension to the lender. We have ignored the externalities that result from borrower displacement. Gerardi, Rosenblatt, Willen and Yao (2012) show that a property in distress lowers the value of neighboring properties from the time when the borrower becomes seriously delinquent until well after the bank sells the property to a new owner. Work by Lambie-Hanson (2013) corroborates this result, showing that foreclosure delays of a year or longer in Boston generated significant negative externalities: crime, constituent complaints, and property distress associated with deferred maintenance and abandoned homes.

7. Conclusions and Policy Implications

What few people recall is that when the GSEs implemented their foreclosure alternative programs in the 1990s, their goal was to substantially <u>shorten</u> what was viewed as excessively long liquidation timelines in judicial states and even some statutory states (Cutts and Merrill, 2008). Today, the public policy perspective is that longer timelines are good. If you can save one more borrower from defaulting, the

additional delay is just an inevitable by-product. This essentially assumes that additional delay does not generate an additional cost that will get passed on to borrowers, either because they will be absorbed by investors or the costs are offset by saved defaults. We have shown in this paper that additional delay does generate substantial additional costs and, as we discuss below, these costs are starting to get passed on to borrowers.

GLW (2011) show that borrowers in judicial states are no more likely to cure and no more likely to renegotiate their loans, but the delays in these states lead to a build-up of persistently delinquent borrowers, the vast majority of whom eventually lose their homes. They also analyzed the right-to-cure law instituted in Massachusetts on May 1, 2008. By comparing Massachusetts with neighboring states, they found that the right-to-cure law lengthens the foreclosure timeline but does not lead to better outcomes for borrowers. And, as work by Gerardi, Rosenblatt, Willen and Yao (2012) and Lambie-Hanson (2013) indicate, the negative externalities can be sizeable. The extension of the liquidation timelines are simply a wealth transfer from current investors to current borrowers. That is, the borrower lives rent-free for a longer period of time, at the expense of investors. Ultimately, the implication of this increased cost of delay should be to manifest itself in a higher cost for new loans in areas with long timelines. This is beginning to happen. The GSEs have announced that they plan to charge an additional premium in five states because of their long foreclosure timelines. On September 20, 2012, the FHFA announced that it had sent a notice to the *Federal Register* to adjust the guarantee fees that Fannie Mae and Freddie Mac charge on single-family mortgages in states where costs related to foreclosure practices are statistically higher than the average. The FHFA expects to make a final determination on this in 2013.

The FHFA considered factors very similar to those we have discussed in this article: (1) The length of time needed to secure marketable title to the property, and (2) property taxes and legal and operational costs during that period. Their approach was to focus on the small number of states that have average carrying costs that significantly exceed the national average and, hence, impose the greatest liquidation costs on the GSEs. Mortgages originated in these states would have a one-time upfront fee between 15 and 30 basis points (bps): New York would face a 30 bps upfront fee (820 days to obtain marketable title, with a cost per day that is 112% of the national average); New Jersey, Connecticut, and Florida would face a 20 bps fee, and Illinois would face a 15 bps fee. Note that their list of high-cost states correlates very highly with ours in Appendix 2, where New Jersey, New York, Connecticut, Illinois, and Florida rank first, second, fourth, fifth, and eighth, respectively, on our list. This certainly validates the methodology for our cost and timeline estimates.

One recommendation proposed by Cutts and Merrill (2008) is a national foreclosure process that incorporates best practices but minimizes the time necessary to foreclose. Their proposed standard is 270 days, composed of 120 days in foreclosure and 150 days for pre-foreclosure referral loss mitigation activities. This offers the advantages of lower foreclosure costs and more consistency in the foreclosure process. However, this does not appear to be in the cards. There are two channels through which this could conceptually occur: the Consumer Financial Protection Bureau (CFPB) and national banking laws. Let's look at each and see why neither is feasible:

- The CFPB is expressly not preemptive of state provisions. The CFPB serves as a floor on protections, but states are free to have additional protections. Section 1041 of Dodd-Frank provides that the CFPB provisions only preempt inconsistent state laws and expressly provides

that state laws that offer stronger consumer protections are not inconsistent. So the CFPB does not have the power to establish a preemptive national standard on foreclosure laws.

- Most mortgage servicing is done through national banks or through state banks that have state parity laws that give them the same authority as national banks. Could the OCC mandate uniform servicing standards using its authority under the National Bank Act? Under legal precedents, national banks generally have to comply with state of general construction laws, in contrast to state laws that target specific banking activities. While the OCC has historically been very aggressive in its preemption claims, it has never claimed preemption of state foreclosure laws. Dodd-Frank has subsequently made it harder for the OCC to preempt state law, tightening both the standards that applies and the procedure the OCC has to follow to assert preemptions. Thus, it is very doubtful that the OCC would exert preemption over existing state foreclosure laws.

Given this, states would need to address these issues directly. For example, a look at redemption provisions would be useful. A redemption provision allows the borrower to redeem the house after foreclosure for a preset period of time by paying the full loan amount plus accrued interest. Very few borrowers do this, but, as we show, the provision ties up the resale of the house during that period, extending timelines. Some of the very long timeline states (New York, New Jersey) could add judicial capacity to process foreclosures more quickly, which could convince the GSEs to lower their guarantee fees on new loans.

There is one piece of good news: while timelines from delinquency to REO are extending, recent policy actions have made it easier to do short sales and deeds-in-lieu of foreclosure. The Home Affordable Foreclosure Alternatives (HAFA) program was introduced in 2010 and has been revised several times since to streamline the short sale process. Similarly, in mid-2012, the GSEs announced that they have implemented new short sale guidelines as part of the FHFA's Servicers Alignment Initiative. Under the new guidelines, servicers will be permitted to approve a short sale for borrowers who have certain hardships but have not yet gone into default. The FHFA also reduced the amount of documentation required to complete a short sale. More recently, in early 2013, Fannie Mae introduced a new short sale escalation process. It is designed for issues such as valuation disputes, servicer delay, or uncooperative second lien lenders. While we cannot document this directly in the LPS data, short sale figures have reportedly increased and have been helpful in allowing many borrowers, lenders, and investors to circumvent the cumbersome foreclosure/ REO liquidation process. While these help in shortening timelines, large numbers of loans are still affected by the current REO liquidation process.

Assuming there is no public policy action to address the long delays and the attendant costs, here are the consequences:

- Timelines in judicial states will continue to stretch out as the adverse selection continues.
- The long timelines plus the recent moves to disallow dual tracking, under both the AG settlement and the new CFPB servicing standards, will make late-stage modifications less likely. Our discussions with servicers indicate that the combination of delays and the inability to dual track has made it less attractive in many cases to pursue late-stage modifications. That is, in the best case, without dual tracking, the borrower is frozen at the current state in the delinquency process, and the late-stage modification, which has a low probability of success, stretches out the process by many months.

Worst case, in many states, the borrower is reset to the beginning of the process when the borrower re-defaults after a modification.

What state legislators in the five above-mentioned judicial states need to consider is whether their judicial foreclosure practices are worth imposing a cost of 15-30 bps on the average mortgagee. The weight of the evidence thus far is that longer timelines do not result in better outcomes for borrowers; we plausibly argue that they make late-stage modifications less likely. We show that the cost of delay has become extraordinarily high in all states and exceptionally high in certain judicial foreclosure states. Combined with evidence that foreclosure delays do not improve outcomes for borrowers and that increased delays can have large negative externalities in neighborhoods, the weight of the evidence is that current foreclosure practices merit the urgent attention of policymakers as they craft future government-sponsored loan modification programs for the new mortgage-finance system.

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Table 1. Average Foreclosure and REO Timelines by Foreclosure Laws and REO Liquidation Time Periods

State Foreclosure Laws	Counts	Due Date to FC Start	FC Start to FC End	REO Start to REO Liquidation	Due Date to FC End	Due Date to REO Liquidation
Overall (All States)	2,995,480	6	9	7	15	21
Judicial States	867,635	5	14	7	19	25
Period 1 (1998 -Jan07)	158,747	5	11	8	16	23
Period 2 (Feb07-Oct08)	93,195	5	9	8	14	21
Period 3 (Nov08-Aug10)	278,483	5	12	6	17	22
Period 4 (Sep10-Jan12)	235,658	6	15	8	21	29
Period 5 (Feb12-Sep12)	101,552	6	22	5	28	33
Statutory States	2,127,845	6	7	7	13	19
Period 1 (1998 -Jan07)	314,660	5	6	7	11	17
Period 2 (Feb07-Oct08)	241,849	5	4	8	9	16
Period 3 (Nov08-Aug10)	765,146	5	6	6	11	17
Period 4 (Sep10-Jan12)	590,969	6	9	7	15	22
Period 5 (Feb12-Sep12)	215,221	8	11	6	19	24
Redemption States	402,619	5	7	9	12	21

Note: This table presents the average number of months of various timeline components associated with the foreclosure process for loans that involuntarily terminated in the LPS data sample by the state foreclosure laws and by time period when the loans went to REO liquidation. Timelines are described in Figure 1. FC = Foreclosure, REO = real estate owned. Redemption states represent a subset of 9 states that can be either judicial or statutory states, as identified in Appendix 1.

Table 2. Estimation of Impacts of Various Drivers on REO Timelines from Survival Model

| Drivers | Dummy Variables | Judicial States | | | Statutory States | | |
		Coefficient Estimates	P-Value	Marginal Impacts on Timeline	Coefficient Estimates	P-Value	Marginal Impacts on Timeline
	Intercept	1.8885	<.0001		1.8285	<.0001	
Redemption States	Yes	0.2019	<.0001	23%	0.0066	0.0007	1%
Redemption States	No	(Control Category)			(Control Category)		
Deficiency Judgment	Yes	0.3503	<.0001	42%	-0.0321	<.0001	-3%
Deficiency Judgment	No	(Control Category)			(Control Category)		
Default Period	Period 5 (Feb12-Sep12)	0.6375	<.0001	89%	0.5212	<.0001	68%
Default Period	Period 4 (Sep10-Jan12)	0.7150	<.0001	104%	0.4777	<.0001	61%
Default Period	Period 3 (Nov08-Aug10)	0.5497	<.0001	73%	0.4016	<.0001	49%
Default Period	Period 2 (Feb07-Oct08)	0.1534	<.0001	17%	0.1451	<.0001	16%
Default Period	Period 1 (2005 -Jan07)	(Control Category)			(Control Category)		
Investor	Gov't	0.2091	<.0001	23%	0.0352	<.0001	4%
Investor	GSEs	0.2309	<.0001	26%	-0.1116	<.0001	-11%
Investor	Private Securitization	0.2503	<.0001	28%	0.0510	<.0001	5%
Investor	Portfolio Loans	(Control Category)			(Control Category)		
Current LTV	<=85	0.0812	<.0001	8%	0.2556	<.0001	29%
Current LTV	86 - 95	-0.0248	<.0001	-2%	0.1475	<.0001	16%
Current LTV	96 -105	-0.0369	<.0001	-4%	0.1154	<.0001	12%
Current LTV	106 -125	-0.0041	0.1842	0%	0.0898	<.0001	9%
Current LTV	>125	(Control Category)			(Control Category)		
1-Yr HPI Chg.	<= -20%	0.3666	<.0001	44%	0.0611	<.0001	6%
1-Yr HPI Chg.	<= -10%	0.2408	<.0001	27%	0.0770	<.0001	8%
1-Yr HPI Chg.	<= -5%	0.1697	<.0001	18%	0.0834	<.0001	9%
1-Yr HPI Chg.	<= 0%	0.0617	<.0001	6%	0.0482	<.0001	5%
1-Yr HPI Chg.	> 0%	(Control Category)			(Control Category)		
Loan Balance	> 400k	0.5438	<.0001	72%	0.3333	<.0001	40%
Loan Balance	<= 400k	0.3703	<.0001	45%	0.2488	<.0001	28%
Loan Balance	<= 250k	0.1679	<.0001	18%	0.1131	<.0001	12%
Loan Balance	<= 100k	(Control Category)			(Control Category)		
Product Type	ARM	-0.0404	<.0001	-4%	-0.0585	<.0001	-6%
Product Type	Option ARM	0.1140	<.0001	12%	0.1071	<.0001	11%
Product Type	Fixed Rate	(Control Category)			(Control Category)		
Loan Purpose	Refcash	0.1406	<.0001	15%	0.1311	<.0001	14%
Loan Purpose	Refother	-0.0044	0.0798	0%	0.0294	<.0001	3%
Loan Purpose	Other	0.0929	<.0001	10%	0.1910	<.0001	21%
Loan Purpose	Purchase	(Control Category)			(Control Category)		
Property Type	2-4 units	0.1522	<.0001	16%	0.1174	<.0001	12%
Property Type	Condo	-0.0326	<.0001	-3%	-0.0440	<.0001	-4%
Property Type	Unknwn	0.0896	<.0001	9%	-0.0273	<.0001	-3%
Property Type	Single	(Control Category)			(Control Category)		
Occupancy	Second	-0.2431	<.0001	-22%	-0.2401	<.0001	-21%
Occupancy	Investment	-0.122	<.0001	-11%	-0.164	<.0001	-15%
Occupancy	Other	-0.4832	<.0001	-38%	-0.3891	<.0001	-32%
Occupancy	Primary	(Control Category)			(Control Category)		
Original FICO	<=680	0.1629	<.0001	18%	0.2120	<.0001	24%
Original FICO	681-720	0.0847	<.0001	9%	0.0996	<.0001	10%
Original FICO	Missing	0.0672	<.0001	7%	0.1102	<.0001	12%
Original FICO	>720	(Control Category)			(Control Category)		
1-Yr Unempl Change	> 50%	-0.0520	<.0001	-5%	-0.0487	<.0001	-5%
1-Yr Unempl Change	< 50%	0.0265	<.0001	3%	-0.0133	<.0001	-1%
1-Yr Unempl Change	< 20%	0.1219	<.0001	13%	0.0219	<.0001	2%
1-Yr Unempl Change	<= 0	(Control Category)			(Control Category)		
Scale		0.7846			0.8172		

Note: This table presents the results of the survival model to estimate the length of time (in months) that elapses between the date a loan defaults (180DPD) and the date of REO liquidation, as described in Section 5. The model is estimated on LPS data, including 1.8 million uncensored observations of loans that terminated with REO liquidations between 2005 and September 2012 and 1.3 million defaulted loans (180+DPD) in September 2012. The combination of control categories constitutes the baseline case as represented by the shaded covariates. The last column reports the marginal impacts of covariates as percentage changes to timelines relative to the baseline.

Table 3. Actual and Modeled Total REO Liquidation Timelines by Time of Default

Judicial States	Uncensored Data		Censored Data		Combined Data	
Default Period	Counts	Avg REO Timeline (in months)	Loan Counts	Avg Duration as of 201209 (in months)	% Of Censored Loan	Estimated Timelines (in months)
Period 1 (2005 - Jan07)	18,920	25			0%	23
Period 2 (Feb07-Oct08)	195,924	27	34,683	57	15%	30
Period 3 (Nov08-Aug10)	248,347	26	240,756	40	49%	41
Period 4 (Sep10-Jan12)	44,647	18	280,660	21	86%	45
Period 5 (Feb12-Sep12)	1,238	9	165,820	10	99%	40

| Statutory States	Uncensored Data		Censored Data		Combined Data	
Default Period	Counts	Avg REO Timeline (in months)	Loan Counts	Avg Duration as of 201209 (in months)	% Of Censored Loan	Estimated Timelines (in months)
Period 1 (2005 -Jan07)	31,533	19			0%	17
Period 2 (Feb07-Oct08)	387,017	20	10,610	57	3%	19
Period 3 (Nov08-Aug10)	672,782	20	116,308	39	15%	20
Period 4 (Sep10-Jan12)	210,083	15	245,636	21	54%	22
Period 5 (Feb12-Sep12)	12,040	10	217,672	10	95%	22

Note: For uncensored data, the REO timeline is defined as the number of months from last due date to REO liquidation; for censored data, duration is defined as the number of months from last due date to September 2012. The numbers listed in the last column are full timelines from last due date to REO liquidation by adding 6 months to the model estimated numbers. Defaulted loans are all those 180 or more days past due as of September 2012.

Table 4. Summary of Timeline Costs for Loans Defaulted in Different Time Periods

Foreclosure Law	Period 1 (2005 - 2007/01)			Period 2 (2007/02-2008/10)			Period 3 (2008/11-2010/08)			Period 4 (2010/09-2012/01)			Period 5 (2012/02-2012/09)			Total Change Periods 1 to 5
	Tax	Ins. & Excess Dep.	Total Timeline Cost	Tax	Ins. & Excess Dep.	Total Timeline Cost	Tax	Ins. & Excess Dep.	Total Timeline Cost	Tax	Ins. & Excess Dep.	Total Timeline Cost	Tax	Ins. & Excess Dep.	Total Timeline Cost	
Judicial States	5%	9%	15%	6%	13%	20%	9%	18%	28%	11%	20%	31%	10%	18%	28%	14%
Statutory States	3%	5%	9%	4%	5%	9%	4%	6%	10%	4%	7%	11%	4%	7%	12%	3%
Redemption States	5%	8%	12%	6%	10%	16%	9%	13%	23%	12%	16%	28%	12%	16%	28%	16%
Highest - NJ	10%	12%	22%	13%	16%	29%	18%	22%	40%	20%	25%	45%	19%	23%	42%	20%
Lowest - AR	1%	6%	7%	1%	7%	8%	1%	8%	9%	1%	8%	9%	1%	9%	10%	3%
All States	4%	7%	11%	4%	8%	12%	6%	10%	16%	7%	12%	19%	6%	11%	18%	7%

Note: This table presents the calculated timeline costs as percentage of unpaid balance (UPB) from full sample of the survival model described in Section 6, for loans defaulted in different time periods. Default periods are based on the date the loan enters default at 180 days past due. The numbers listed in the last column are the differences between the total timeline costs between period 5 and period 1. The highest state (NY) and the lowest state (AR) are based on the ranks of total timeline costs in period 5 (see Appendix 2 for the full list). Redemption states represent a subset of 9 states that can be either judicial or statutory, as identified in Appendix 2.

Figure 1. Illustration of Events and Timelines Along the Foreclosure and REO Processes
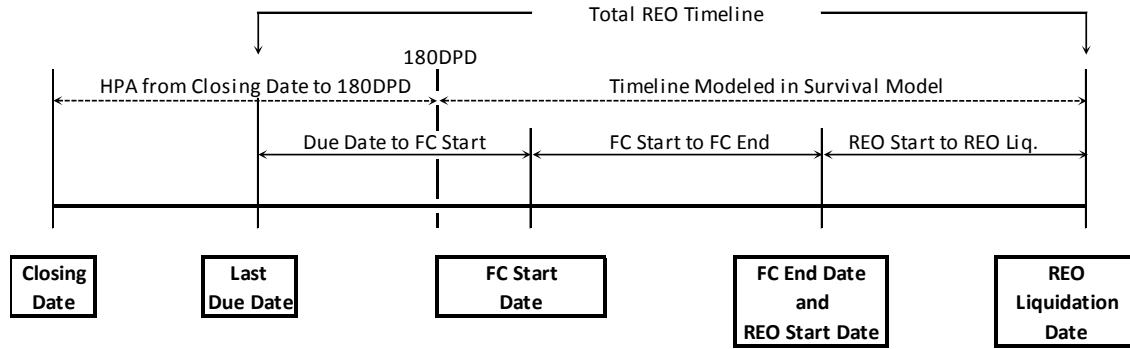
Note: This figure displays the various event dates as loans go through the foreclosure and REO process. It also displays various timeline measures during the foreclosure and REO process. The closing date is when the loan terms are finalized between borrowers and lenders. The last due date is the latest monthly due date of the mortgage and reflects the start date of the delinquency. The FC start date is the foreclosure referral date when the lender starts the legal process by making a claim on the mortgage collateral. FC end date is when borrowers' right of title is terminated by either foreclosure sale or liquidation. The REO start date is when the property becomes REO and the REO liquidation date is when the property is finally disposed of. The timeline modeled in our survival model is the length of time measured in months from the 180 DPD date to REO liquidation date, as discussed in Section 5. House price appreciation (HPA) from the closing date to the date of delinquency is used to compute our current loan to value ratios (LTVs) on the loans for our empirical analysis.

Figure 2. Average REO Timelines by REO Liquidation Dates
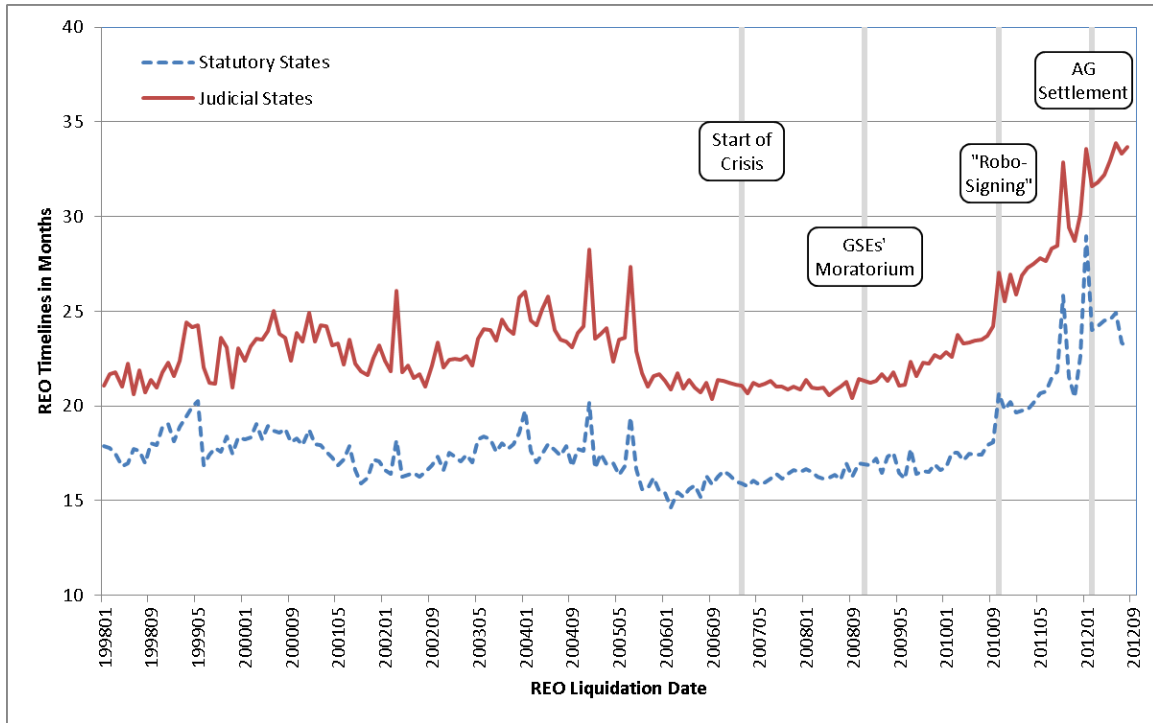
Note: This figure shows the average REO timelines by REO liquidation date for loans terminated with REO liquidation from 1998 to September 2012. The REO timeline is the length of time measured in months from last due date to REO liquidation date as described in Figure 1. Loans are grouped by the time period when loans went to REO liquidation as presented in Table 1. Period 1 (1998 –Jan 07) is the pre-crisis period; Period 2 (Feb 07-Oct 08) is the start of financial crisis up to the GSEs' moratorium; Period 3 (Nov 08-Aug 10) covers the GSEs' moratorium to "Robo-signing" scandal; Period 4 (Sep 10-Jan 12) covers the "robo-signing to the attorneys general (AG) settlement; Period 5 (Feb 12-Sep 12) follows the AG settlement to the end of the sample period in September 2012.

Figure 3a. Average Timelines of Component Parts of the REO Liquidation Process for Judicial States
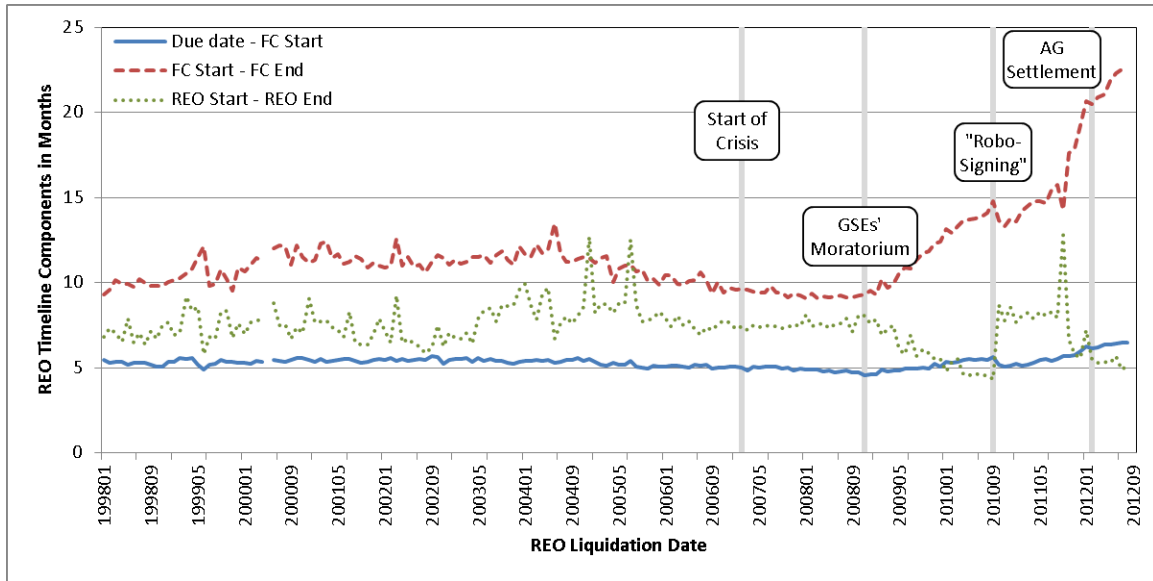
Figure 3b. Average Timelines of Component Parts of the REO Liquidation Process for Statutory States
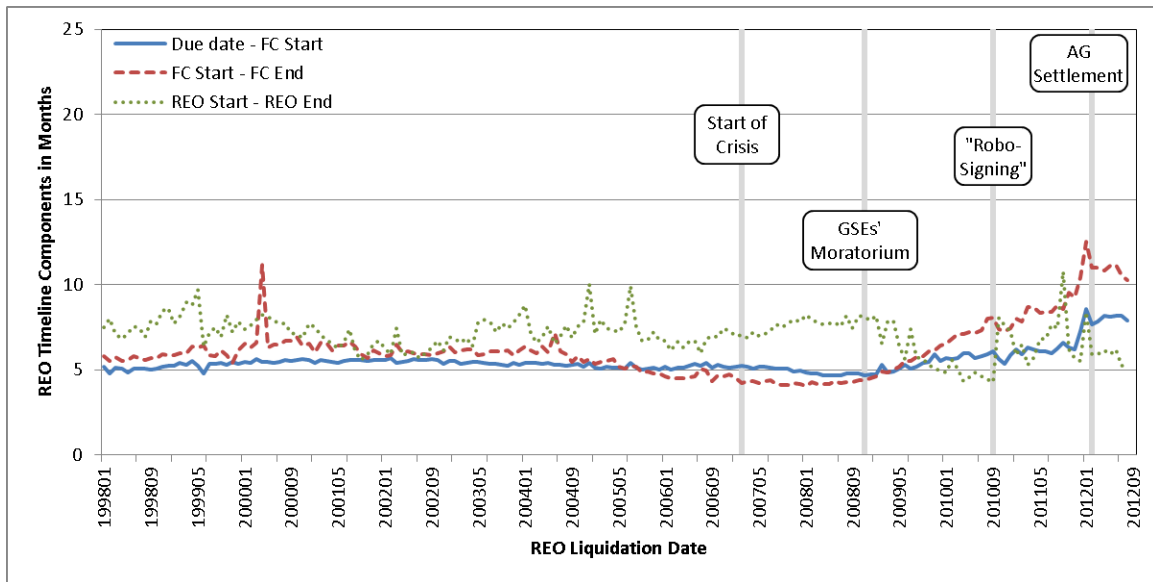
Note: These two figures show the component parts of the REO liquidation process for judicial and statutory states for loans that went through REO liquidation from 1998 to September 2012. The three REO timeline components are the length of time measured in months between different event dates along the REO liquidation process as described in Figure 1. Loans are grouped by the time period when loans went to REO liquidation as presented in Table 1. Period 1 (1998 –Jan 07) is the pre-crisis period; Period 2 (Feb 07-Oct 08) is the start of financial crisis up to the GSEs' moratorium; Period 3 (Nov 08-Aug 10) covers the GSEs' moratorium to "Robo-signing" scandal; Period 4 (Sep 10-Jan 12) covers the "robo-signing to the attorneys general (AG) settlement; Period 5 (Feb 12-Sep 12) follows the AG settlement to the end of the sample period in September 2012.

Figure 4. Seriously Delinquent Rates and 1 Yr. Past Due and 2 Yr. Past Due Shares Within Seriously Delinquent Loans
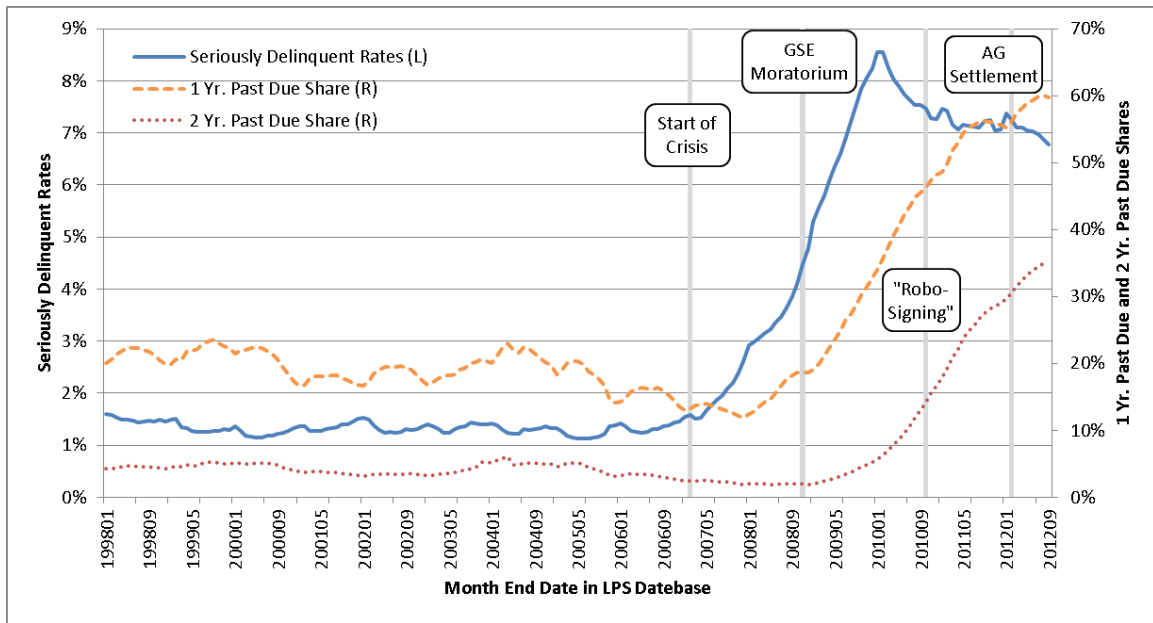
Note: This figure shows the 90+/foreclosure serious delinquency rates (left scale) for active loans in the LPS first lien mortgage database over the period 1998 to September 2012. The figure also shows the share of seriously delinquent loans one- and two-years past due (right scale).

Figure 5. Severity Rates by Number of Months Delinquent
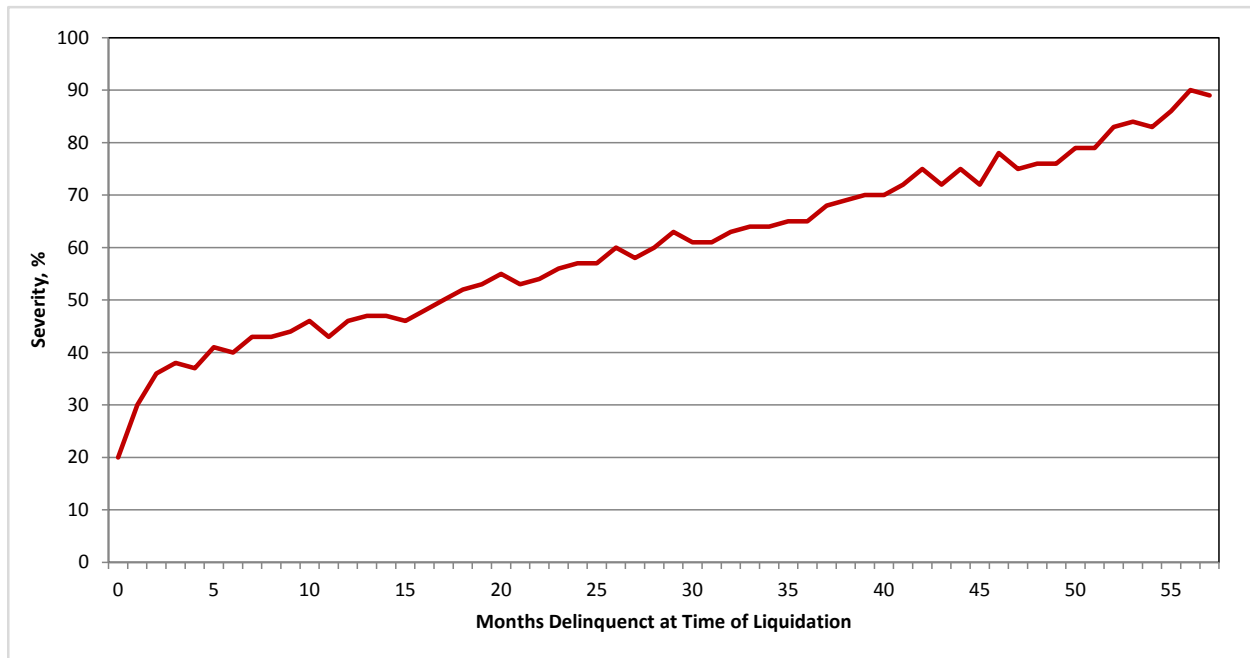
Note: This figure computes the severity rate as a function of the number of months between delinquency and liquidation. The data are taken from CoreLogic databases of private-label securities.

Source: CoreLogic 1010data, Amherst Securities as of January 2013

Appendix 1. Foreclosure and REO Timelines by State

State	Counts	Foreclosure Type	Due Date to FC Start	FC Start to FC End	REO Start to REO Liquidation	Due Date to FC End	Due Date to REO Liquidation
MO	66,120	S	6	5	6	11	17
AZ	169,896	S	6	7	5	12	17
TX	196,726	S	6	6	6	12	17
VA	75,790	S	6	6	7	12	18
AK	3,233	S	5	7	6	12	18
AR	16,213	S	6	6	7	12	18
TN	59,140	S	6	6	6	13	18
AL	38,757	S	6	6	6	12	18
UT	27,215	S	6	8	5	14	18
NE	10,273	J	5	7	6	13	18
CO	78,137	S	5	7	6	12	18
GA	158,591	S	6	7	6	13	18
WY	2,758	S	6	6	7	12	19
NH	9,517	S	6	7	7	12	19
WV	6,879	S	6	7	7	13	19
NC	72,050	S	6	7	6	13	19
MS	16,309	S	7	7	6	14	19
ID	19,664	S	5	9	5	14	19
NV	101,515	S	6	9	5	14	19
OR	32,665	S	6	9	5	15	20
MI	190,587	S	6	5	9	11	20
CA	567,047	S	6	8	7	14	20
MT	4,986	S	6	9	6	15	20
WA	49,410	S	6	9	6	15	20
KS	19,570	J	6	8	7	14	20
RI	7,898	S	5	8	8	13	21
MN	69,397	S	5	7	9	12	21
OK	23,855	J	5	10	6	16	21
SC	32,625	J	5	10	7	16	22
ND	1,148	J	5	10	8	15	22
DC	3,384	S	5	7	10	12	22
IN	69,300	J	6	12	6	18	23
MA	29,169	S	6	10	8	16	23
SD	2,697	J	5	9	10	14	24
IA	15,608	J	5	13	6	18	24
MD	48,451	S	6	9	10	14	24
NM	10,483	J	5	12	7	17	24
KY	22,802	J	6	12	7	17	24
HI	6,341	S	5	12	8	17	24
LA	17,877	J	7	12	6	18	24
WI	33,297	J	5	13	6	19	24
CT	14,919	J	5	11	8	16	24
OH	102,062	J	5	13	8	18	25
IL	101,422	J	5	13	8	19	26
PA	48,167	J	6	14	8	19	26
FL	269,033	J	5	16	6	21	27
DE	4,505	J	5	15	7	21	27
ME	4,118	J	5	16	7	21	28
VT	971	J	5	16	7	21	28
NY	35,061	J	5	15	9	20	28
NJ	27,842	J	5	17	8	22	29
Total	**2,995,480**		**6**	**9**	**7**	**15**	**21**
Spearman Correlation			**-50%**	**77%**	**29%**		**73%**

Note: This table computes various average timelines for each state associated with the foreclosure process for loans that involuntarily terminated with REO liquidation between 1998 and September 2012 in the LPS data sample. Timelines are described in Figure 1 and are measured in number of months. FC = Foreclosure; REO = real estate owned; J= judicial foreclosure state, where a foreclosure sale needs be approved by a judicial proceeding; and S =

statutory foreclosure state, where it does not. Shaded areas are redemption states, where post-foreclosure-sale redemptions are allowed.

Appendix 2. Timeline Costs for Loans Defaulted in Different Time Periods by State

State	FC Type	Counts	Period 1 (2005 - 2007/01)			Period 2 (2007/02-2008/10)			Period 3 (2008/11-2010/08)			Period 4 (2010/09-2012/01)			Period 5 (2012/02-2012/09)			Total Change Periods 1 to 5
			Tax	Ins. & Excess Dep.	Total Timeline Cost	Tax	Ins. & Excess Dep.	Total Timeline Cost	Tax	Ins. & Excess Dep.	Total Timeline Cost	Tax	Ins. & Excess Dep.	Total Timeline Cost	Tax	Ins. & Excess Dep.	Total Timeline Cost	
AR	S	16,168	1%	6%	7%	1%	7%	8%	1%	8%	9%	1%	8%	9%	1%	9%	10%	3%
CA	S	519,594	4%	3%	7%	4%	3%	8%	5%	4%	9%	6%	4%	10%	6%	4%	10%	3%
AZ	S	149,777	1%	7%	8%	1%	7%	8%	1%	8%	9%	1%	9%	10%	1%	9%	10%	2%
MS	S	16,882	1%	6%	7%	2%	7%	8%	2%	8%	10%	2%	9%	10%	2%	9%	11%	3%
WV	S	6,398	1%	7%	8%	2%	7%	9%	2%	8%	10%	2%	9%	10%	2%	9%	11%	3%
UT	S	24,336	1%	6%	7%	2%	8%	10%	2%	8%	10%	2%	9%	11%	2%	9%	11%	4%
GA	S	130,245	2%	6%	8%	2%	7%	9%	2%	8%	10%	2%	8%	11%	2%	9%	11%	3%
ID	S	18,921	2%	6%	8%	2%	7%	10%	2%	8%	11%	3%	9%	12%	3%	9%	12%	4%
WA	S	70,124	2%	6%	8%	2%	8%	10%	3%	9%	11%	3%	9%	12%	3%	9%	12%	3%
NC	S	68,476	2%	6%	8%	2%	7%	9%	3%	9%	11%	3%	9%	12%	3%	9%	12%	4%
TX	S	143,202	2%	6%	8%	3%	7%	10%	3%	8%	11%	3%	8%	12%	3%	9%	12%	4%
TN	S	48,222	2%	6%	8%	3%	7%	10%	3%	8%	11%	3%	9%	12%	4%	9%	12%	4%
AL	S	35,367	2%	6%	8%	3%	7%	10%	3%	8%	11%	3%	8%	12%	4%	9%	12%	4%
VA	S	70,974	2%	7%	9%	2%	8%	10%	3%	9%	11%	3%	9%	12%	3%	10%	12%	3%
WY	S	2,388	2%	7%	9%	2%	7%	9%	3%	8%	11%	3%	9%	12%	3%	10%	13%	4%
HI	S	9,875	2%	7%	8%	2%	8%	10%	2%	9%	11%	2%	10%	13%	2%	11%	13%	5%
MD	S	68,590	3%	7%	10%	3%	8%	11%	3%	9%	12%	3%	9%	13%	4%	9%	13%	3%
OR	S	39,639	3%	6%	9%	4%	8%	11%	4%	8%	12%	4%	9%	13%	4%	9%	13%	4%
MO	S	51,057	3%	6%	9%	4%	7%	11%	4%	8%	12%	4%	8%	13%	4%	9%	13%	4%
MI	S	141,645	3%	7%	10%	4%	7%	11%	4%	8%	12%	4%	8%	13%	5%	9%	13%	3%
DC	S	4,639	2%	7%	9%	2%	8%	10%	2%	10%	12%	2%	11%	13%	2%	11%	13%	4%
AK	S	2,690	3%	6%	10%	4%	7%	11%	4%	8%	13%	4%	9%	13%	5%	9%	14%	4%
MN	S	56,083	3%	7%	10%	4%	8%	12%	4%	9%	13%	5%	9%	14%	5%	9%	14%	4%
MA	S	39,379	3%	7%	10%	3%	8%	11%	4%	9%	13%	4%	10%	14%	4%	10%	14%	4%
CO	S	54,378	3%	7%	10%	4%	7%	11%	5%	9%	13%	5%	9%	14%	5%	10%	15%	5%
MT	S	4,589	4%	7%	11%	4%	8%	13%	5%	10%	15%	5%	9%	14%	5%	10%	15%	5%
RI	S	10,067	4%	7%	11%	4%	7%	12%	5%	9%	14%	5%	10%	15%	6%	10%	16%	4%
NV	S	90,178	5%	7%	12%	5%	7%	12%	5%	8%	13%	6%	9%	15%	6%	9%	16%	4%
ND	J	903	2%	7%	9%	3%	8%	11%	4%	11%	15%	4%	13%	17%	4%	12%	16%	7%
NH	S	9,798	5%	7%	12%	6%	8%	14%	7%	9%	16%	7%	10%	17%	7%	10%	17%	5%
IN	J	55,479	2%	7%	10%	3%	10%	13%	4%	13%	17%	4%	14%	19%	4%	13%	18%	8%
NE	J	8,222	3%	7%	10%	3%	10%	13%	4%	13%	17%	5%	14%	19%	5%	13%	18%	8%
KY	J	23,407	2%	8%	10%	3%	10%	13%	4%	13%	17%	5%	15%	20%	4%	14%	18%	8%
SC	J	37,057	2%	8%	10%	3%	11%	14%	4%	15%	19%	4%	18%	22%	4%	15%	19%	9%
LA	J	21,579	3%	8%	11%	3%	10%	13%	4%	14%	18%	5%	16%	21%	5%	15%	19%	8%
OK	J	22,319	4%	8%	11%	4%	9%	13%	6%	12%	18%	7%	15%	21%	6%	13%	19%	8%
WI	J	38,403	3%	8%	11%	3%	10%	14%	4%	14%	19%	5%	16%	21%	5%	15%	19%	9%
DE	J	8,329	2%	9%	11%	3%	11%	14%	3%	15%	19%	4%	18%	22%	4%	16%	20%	9%
OH	J	94,837	4%	8%	12%	5%	11%	15%	6%	13%	20%	7%	16%	23%	6%	14%	20%	8%
SD	J	2,208	2%	8%	10%	3%	11%	14%	4%	15%	19%	4%	18%	22%	4%	17%	21%	10%
KS	J	16,117	3%	9%	12%	4%	12%	15%	5%	16%	21%	6%	18%	23%	5%	16%	21%	9%
IA	J	14,970	5%	7%	12%	6%	9%	15%	8%	12%	20%	9%	15%	24%	8%	13%	21%	10%
VT	J	2,267	3%	9%	12%	4%	13%	17%	5%	16%	22%	6%	18%	24%	5%	17%	22%	9%
FL	J	434,191	4%	10%	14%	5%	14%	19%	7%	19%	26%	8%	21%	29%	6%	17%	24%	9%
ME	J	7,851	4%	9%	14%	6%	12%	17%	8%	16%	23%	8%	17%	26%	8%	17%	25%	11%
PA	J	63,101	5%	8%	13%	6%	11%	17%	9%	15%	24%	10%	17%	28%	9%	16%	25%	12%
IL	J	146,754	6%	9%	15%	7%	12%	20%	10%	16%	27%	12%	19%	31%	10%	17%	27%	12%
CT	J	26,955	5%	10%	15%	7%	13%	20%	10%	18%	28%	11%	20%	31%	10%	19%	29%	14%
NM	J	13,356	7%	10%	17%	10%	14%	24%	13%	18%	32%	15%	21%	35%	13%	18%	31%	14%
NY	J	99,101	7%	10%	18%	10%	14%	24%	15%	20%	35%	16%	22%	38%	16%	22%	38%	20%
NJ	J	93,589	10%	12%	22%	13%	16%	29%	18%	22%	40%	20%	25%	45%	19%	23%	42%	20%
All States		3,134,676	4%	7%	11%	4%	8%	12%	6%	10%	16%	7%	12%	19%	6%	11%	18%	7%

Note: This table presents the calculated timeline costs as percentage of unpaid balance (UPB) from full sample of the survival model as described in Section 6, by states for loans defaulted in different time periods. Default periods are based on 180 DPD dates. The numbers listed in the last column are the differences between the total timeline costs in period 5 and those in period 1. The table is ranked by the total timeline costs in period 5. Shaded areas are redemption states, where post-foreclosure-sale redemptions are allowed.