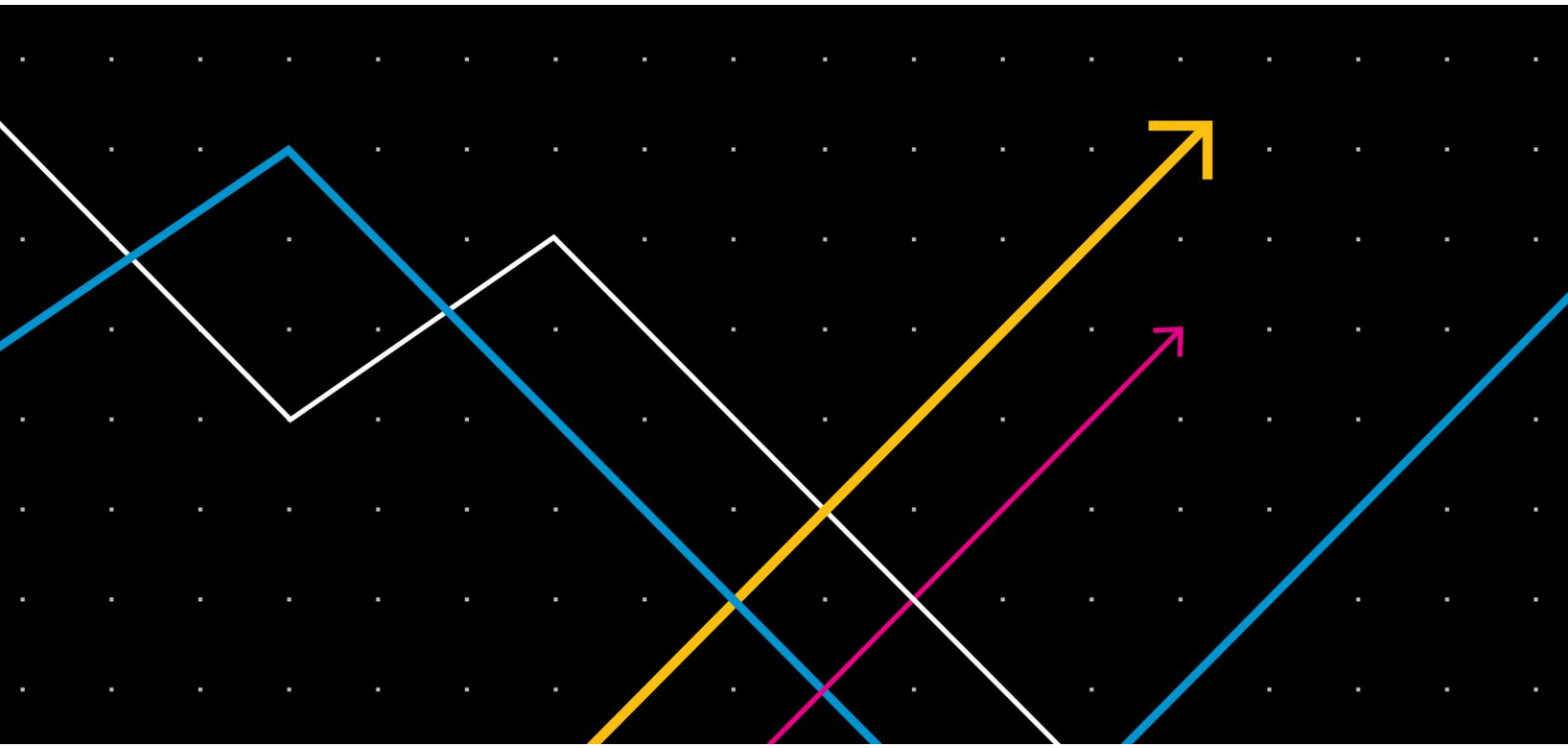


RESEARCH REPORT

How Beneficial Are Streamlined Modifications?

The Fannie Mae Experience

Laurie Goodman *Walt Scott* *Jun Zhu*

July 2018

URBAN INSTITUTE · ELEVATE · THE · DEBATE

ABOUT THE URBAN INSTITUTE

The nonprofit Urban Institute is a leading research organization dedicated to developing evidence-based insights that improve people's lives and strengthen communities. For 50 years, Urban has been the trusted source for rigorous analysis of complex social and economic issues; strategic advice to policymakers, philanthropists, and practitioners; and new, promising ideas that expand opportunities for all. Our work inspires effective decisions that advance fairness and enhance the well-being of people and places.

Contents

Acknowledgments

The Housing Finance Policy Center (HFPC) was launched with generous support at the leadership level from the Citi Foundation and John D. and Catherine T. MacArthur Foundation. Additional support was provided by The Ford Foundation and The Open Society Foundations.

Ongoing support for HFPC is also provided by the Housing Finance Innovation Forum, a group of organizations and individuals that support high-quality independent research that informs evidence-based policy development. Funds raised through the Forum provide flexible resources, allowing HFPC to anticipate and respond to emerging policy issues with timely analysis. This funding supports HFPC's research, outreach and engagement, and general operating activities.

This report was funded by Fannie Mae. We are grateful to them and to all our funders, who make it possible for Urban to advance its mission.

The views expressed are those of the authors and should not be attributed to the Urban Institute, its trustees, or its funders. Funders do not determine research findings or the insights and recommendations of Urban experts. Further information on the Urban Institute's funding principles is available at urban.org/fundingprinciples.

How Beneficial Are Streamlined Modifications?

Fannie Mae's streamlined modification program, formally introduced in 2013, allows delinquent borrowers to receive mortgage modifications without submitting any paperwork. Before this program was introduced, modifications done under the government-sponsored enterprises' Home Affordable Modification Program (the GSEs' HAMP) or Fannie Mae's Standard Modification program required income and hardship documentation. In 2017, these programs were replaced with the Flex Modification program, or Flex Mod, a direct outgrowth of the Fannie Mae Standard Modification and streamlined modification programs. Flex Mod includes both documented and streamlined versions, the latter of which is tied to delinquency status.

Even though the streamlined modification program forms the basis for the new modification programs, there has been little research on the effectiveness of the streamlined approach. If we understand how much higher the modification take-up rate is under a streamlined approach and how much lower the success rate will be relative to a standard modification, the most similar program to the streamlined program, we can determine the program's overall effectiveness.

The rollout of the streamlined modification program did not begin on the announcement date. Many servicers, including all the large servicers that account for close to 90 percent of loans by volume, had access to an earlier version of the program.[1] On the announcement date, all institutions had access to the improved version. To determine take-up rates, we focused on the servicers responsible for the overwhelming majority of the servicing volume who were eligible for the earlier version of the program, rather than smaller servicers who did not have access to the earlier version. We had to do the take-up analysis in two parts, as two natural experiments using difference-in-differences models. We first compared the modification take-up behavior on delinquent loans serviced by the Fannie Mae servicers that had access to the early version with a control group of Fannie Mae servicers that did not have access before and after the pilot program rollout. For the second part of the take-up analysis, we compared the behavior of delinquent Fannie Mae loans serviced by the servicers who had access to the early version with a control group of private-label security (PLS) loans before and after the formal introduction of the streamlined modification program. We added these effects together to find the total impact of the streamlined modification program.

We can establish the difference in the modification redefault rates between streamlined and standard modifications because the modification terms are identical in these two programs. We put the two parts of the exercise together and, after accounting for the share of loans that theoretically would have self-cured if they had not received a modification, we can determine the streamlined modification program's benefit.

The outline of this paper is as follows: Part 1 describes the modification options available to the borrower and when each is used. Part 2 describes the data we used and presents summary statistics. Part 3 discusses the methodology and empirical results for the take-up analysis. Part 4 discusses the methodology and empirical results for the redefault analysis on streamlined versus standard modifications. Part 5 discusses the methodology and empirical results for the nonmodification cure rate and possible modification program substitution effects. Part 6 puts the analysis together to determine how many loans are "saved" using a streamlined approach.

Based on our investigation of modification take-up, redefault for modifications, and self-cure for nonmodifications, using data from 2012 to 2015, we show the following:

- Fannie Mae's streamlined modification has increased modification take-up. Without streamlined modification, the modification take-up would have been 20.2 percent in the 36 months after the first occurrence of a 60-day delinquency, and with streamlined modification, the modification take-up is 29.2 percent, a 9.0 percentage-point increase.
- Streamlined modifications redefault more than standard modifications with identical payment relief. The redefault rate for streamlined modifications would be 35.9 percent 36 months after modification. The redefault rate would be 31.1 percent if the modification type is a standard modification, all else equal, resulting in a 4.8 percentage-point difference.

The streamlined option improved the effectiveness of Fannie Mae's modification program by 34 percent; if it had been available over the entire 2012–15 period, it would have prevented approximately 6,100 additional foreclosures each year. This provides compelling evidence that the streamlined approach is beneficial to loss mitigation.

1. Background: Fannie Mae's Streamlined Modification Program

In March 2013, Fannie Mae announced a formal streamlined modification program, making borrowers eligible for modifications without providing documentation (Fannie Mae 2013). This program has been controversial. Many lenders and some advocates extol its benefits, but others object that borrowers do not receive the most suitable modifications and that streamlined modifications have a higher failure rate than more carefully written modifications. Although this original streamlined program is no longer in use, it is the basis of the new streamlined Flex Mod, a program in which modifications are given with no document collection.[2] As noted above, a Flex Mod execution is also available to borrowers who submit appropriate documentation (e.g., an application and income and hardship documentation), known as a borrower response package.

In this section, we review the modification process for GSE loans, giving a detailed introduction to the streamlined modification program.

The GSE Loan Modification Process

Before the streamlined modification program, the GSE modification process involved a solicitation for either a HAMP or standard modification, both of which required income documentation. When a GSE borrower became 45 days delinquent, the servicer was required to solicit the borrower for a modification, inviting the borrower to submit paperwork, including a hardship declaration and proof of income. This is usually referred to as the borrower response package. If a borrower submitted the package, he or she was potentially eligible for either a HAMP modification or a standard modification. If the borrower qualified for a HAMP modification, the mortgage payment target was 31 percent of a borrower's gross monthly income. To meet this income-based payment target, the interest rate was reduced below the market rate, and the term was extended. The modification might have included forbearance, in which the borrower does not pay interest on part of the loan but owed the money at time of sale or loan maturity. In a standard modification, for loans with a mark-to-market loan-to-value (MTMLTV) ratio greater than 80 percent, the interest rate was set equal to the "standard modification rate" (an administered rate, usually close to the interest rate prevailing in the primary market), the term was extended, and forbearance was included for loans with loan-to-value (LTV) ratios above 115 percent.

The income information was used to determine if a borrower qualified for a HAMP modification, and the terms of a HAMP modification depended on the borrower's income. Borrowers who did not qualify for a HAMP mod were considered for a standard modification, which required no income information to determine the payment level.[3] In both programs, borrowers did not learn the details of the modification offer until they submitted their paperwork. Once they received the offer details, they were placed in a trial modification. If the payments were current for the first three months of a trial modification, the modification was then made permanent upon the borrower's and servicer's execution of a signed loan modification agreement.

Under the streamlined modification program, introduced in 2013, borrowers who were at least 90 days delinquent, met the eligibility requirements for the program, and had not submitted a documentation package, received a notice informing them of their new trial modification payment. The servicer was required to solicit the borrower when they were 90 to 105 days delinquent. The terms of the modification package were identical to those of the Fannie Mae standard modification and did not depend on the borrower's current income. Borrowers who made the new trial payment for the first three months were considered to have completed a successful trial. The modification became complete once the borrower signed a form formally accepting the new loan terms. This was the same conversion form used for standard modifications that have completed their trial. The conversion form was the only communication from the borrower required to complete the modification.

Borrowers who failed to make the required trial modification payment within 45 days of their streamlined modification offer became ineligible for the streamlined option and received a resolicitation to submit their paperwork for a standard modification. Fannie Mae also recommended the servicer resolicit the borrower for a streamlined modification at 150 days (five months) delinquency.

The streamlined program assumes that some delinquent borrowers who would benefit from a modification fail to submit income documentation because of financial disorganization or psychological or other factors that are not necessarily indicative of whether they can make the new payments. The program takes advantage of a modification payment structure that does not depend on the borrower's income for its calculations and allows borrowers to complete a trial modification program with as few logistical hurdles as possible.

This streamlined program would not have changed the borrower's probability of default or altered the universe of loans we looked at. That is, borrowers who do not have a financial hardship (and would not qualify for a full-documentation modification) will generally not become seriously delinquent on their mortgage (strategically default), impairing their credit and risking foreclosure, just to obtain a

modification. Homeowners with high-cost loans who are current on their mortgage could have taken advantage of the Home Affordable Refinance Program to reduce their note rate to market levels without affecting their credit rating. The Home Affordable Refinance Program was applicable for all borrowers with loans sold to Fannie Mae or Freddie Mac before May 31, 2009, regardless of LTV ratio.[4]

Streamlined Modification Program Details

The formal streamlined modification program was announced on March 27, 2013; was effective on July 1, 2013; and was set to expire on August 1, 2015. But the program went into effect after several pilot programs, which makes the start date less concrete for many servicers. The program was extended several times, finally expiring in 2017. Today, Fannie Mae uses a Flex Mod program that replaced the formal streamlined modification program, the standard modification program, and HAMP, which expired at the end of 2016 (Fannie Mae 2016). Lenders could adopt the new Flex Mod program as early as March 2017 but were required to adopt it by October 1, 2017. The streamlined version of the Flex Mod program has many of the same features as the streamlined modification program, including the absence of income documentation requirements for most borrowers. This makes our study especially relevant.

In 2013, the streamlined modification program required that the mortgage loan be a Fannie Mae first lien with the following characteristics:

- The loan is more than 12 months old
- The loan is at least 90 but no more than 720 days (3 to 24 months) delinquent
- The premodified MTMLTV ratio must be greater than or equal to 80 percent (this was extended to loans with an MTMLTV ratio of less than 80 percent about nine months after the initial rollout)
- The monthly payment under the streamlined modification must be lower than the current monthly payment
- The loan could not have failed a trial period plan on a standard modification structure or have been modified under a standard modification and become 60 days or more delinquent within 12 months of the modification's effective date
- The loan could not have been modified more than once (this was later extended to twice)

Although the streamlined program formally began in 2013, its development was an evolutionary process, with roots as early as 2010. When HAMP was initiated in 2009, borrowers could begin a trial modification before providing documentation of their income. But many early HAMP participants never provided documentation or servicers lost their paperwork. The servicing problems from this era, which included improper cancellations and foreclosures on borrowers in trial modifications—as well as "robo signing," or improperly processing foreclosures—were among the issues that led to the 2012 National Mortgage Settlement.[5]

In reaction, the HAMP rules were updated so that for all trial modifications beginning after March 1, 2010, documentation was required before the trial period was initiated. But this reform did not address the many borrowers who remained in a HAMP trial for a year or more. Fannie Mae worked with some servicers and initiated the use of an alternative modification (Alt Mod) program to keep borrowers in their homes when they had been making their payments but had not qualified for a permanent HAMP modification. The Alt Mod program included reduced income documentation requirements. For example, a borrower with wage or salary income could submit recent pay stubs but would not have to provide a prior year's tax return.[6]

The truly streamlined (no-documentation) modification program developed as pilot evolutions of this program, starting with Alt Mod 2011 and continuing with an unannounced Alt Mod 3.0 program, which was implemented for select servicers beginning in May 2012. The Alt Mod 3.0 program allowed borrowers who were five months delinquent to be solicited for a modification without income or hardship documentation. The Alt Mod 3.0 program was nearly identical to the formal streamlined modification program but required that the mortgages be at least five months delinquent, rather than three months under the formal streamlined modification program. Many servicers and all the large servicers, approximately 90 percent of the market by dollar volume, had access to this program before the program's official rollout. This complicates our analysis, as we need to consider the impact of the rollout of Alt Mod 3.0 and then the further impact of the rollout of the formal streamlined modification program.

Although there has not been a study on the effectiveness of streamlined modifications, studies have shown that the postmodification front-end debt-to-income variable, the main variable obtained from modification documentation, is not a significant predictor of modification performance. The extent of payment reduction is a strong predictor of performance, but the debt-to-income ratio corresponding to the old or the new payment does not have an independent predictive effect. These results were obtained using data from Tier 2 HAMP modifications, a program similar to Fannie Mae's standard modification. This would suggest that not collecting income information that could be used to determine

the postmodification debt-to-income ratio adds little incremental default risk. (The standard modification relies on this information for determining borrower eligibility, not borrower relief, and the streamlined modification program does not collect it.)

2. Data

We include all loans owned or guaranteed by Fannie Mae that transitioned from current or 30 days delinquent (D30) to 60 days delinquent (D60) from 2012 through 2014 and tracked their performance through the end of 2015.[7] If a loan had more than one delinquency event, we used the earliest event. We used proprietary Fannie Mae data because the public data do not indicate the type of modification performed. Also, when the streamlined modification program was introduced, lenders could solicit highly delinquent borrowers who had not responded to earlier full-documentation modification offers. Because we are interested in the effectiveness of future, ongoing modification programs, we do not include this backlog population in our sample.

We constructed a sample of loans in the PLS market that had a current or D30-to-D60 transition in the same period and have the same variables we obtained in the Fannie Mae dataset.[8] The PLS dataset used to construct the sample is collected from the CoreLogic database, which contains detailed information on the characteristics of securitized mortgages and includes nearly 100 percent of the PLS market before 2012. The resulting combined sample is comparable between Fannie and PLS and allows us to look at the impact of loan characteristics on modification take-up.

Identifying Modifications in the PLS Dataset

The Fannie Mae dataset clearly identifies modifications and characteristics of modified loans. Our PLS sample does not include direct information regarding loan modifications. But the database provides monthly updates to loan terms, so we can infer when a loan has been modified.

TABLE 1

Examples of Modifications in the Private-Label Security Data

Month	Interest rate	Principal and interest	Loan term	Unpaid principal balance	Delinquency status
Example 1					
1	6.0%	$1,000	330 months	$150,000	30 days
2	6.0%	$1,000	330 months	$150,000	60 days
3	6.0%	$1,000	330 months	$150,000	90 days
4	4.0%	$600	400 months	$160,000	Current
5	4.0%	$600	399 months	$159,400	Current
Example 2					
1	6.5%	$1,500	330 months	$200,000	30 days
2	6.5%	$1,500	330 months	$200,000	60 days
3	6.5%	$1,600	327 months	$210,000	Current
4	6.5%	$1,600	326 months	$208,400	Current
5	6.5%	$1,600	325 months	$206,800	Current

Source: CoreLogic private-label security database.

This modification inference or identification procedure requires a close look at the changes in interest rates, payments, and term on a monthly basis. Table 1 shows two examples of modifications. In the first example, the interest rate drops because the servicer lowered payments by changing the note rate. The unpaid principal balance increases because the servicer has capitalized arrears and costs into the balance of the loan. The term increases because the loan term has been extended (which also reduces the monthly payment). Three options are used for this first loan: term extension, capitalization, and rate reduction. The second example is simpler: the servicer has capitalized arrears into the balance of the loan but has made no other changes to the loan terms. In both cases, the loan is reported as "current" after the modification, whereas before it was 60 or 90 days delinquent.

The reporting of modifications in the CoreLogic data is more complicated than these stylized examples. Changes in loan terms or a transition from delinquent to current can be reported over several months, with some events recorded at the start of a trial and others reported when a modification becomes permanent. Other changes in loan terms are associated with nonmodification events, such as a curtailment or an adjustable-rate mortgage interest rate reset. We screen out nonmodifications by requiring that the loan transition from 60 or more days delinquent to current within 60 days of a change in loan terms. We also employ tolerances to distinguish modification-related changes from normal amortization or from reporting errors. The following are modification-related changes: (1) term extensions, (2) interest rate changes by more than 10 basis points, (3) unpaid principal balance increases or decreases by more than 3 percent, and (4) principal and interest changes by more than 3 percent. Multiple modification-related changes within a six-month window are merged into a single imputed modification event.

TABLE 2

Robustness of the Modification Algorithm

Category	Inferred modification	Inferred nonmodification	Total
Actual nonmodification	315	9,276	9,591
Actual modification	3,928	375	4,303
Total	4,243	9,651	13,894
Match rate		91%	
False positive		7.4%	
False negative		3.9%	

Source: Fannie Mae.

We can make two potential mistakes in this exercise. We can falsely identify modifications (i.e., false positives) or miss modifications (i.e., false negatives). To test our algorithm, we used a test sample of loans from Fannie Mae consisting of all loans that transitioned to 60 days delinquent in January 2014. For those loans (table 2), we looked at actual modifications and found that 9,591 loans had not been modified while 4,303 were modified. Next, we used the imputation algorithm described above to infer the modification status for each loan. For all the 13,894 loans, we inferred that 9,651 loans are not modified and 4,243 are modified. Out of 9,651 inferred nonmodifications, 9,276 are actual nonmodifications while 375 are actual modifications. Out of 4,243 inferred modifications, 3,928 are actual modifications and 315 are actual nonmodifications. Thus, our algorithm performs well, with a 91 percent match rate, a 3.9 percent false negative rate, and a 7.4 percent false positive rate.

Summary Statistics from the Data Sample

The sample contains 1.2 million Fannie Mae and 1.2 million PLS loans, for a total of 2.4 million D60 loans.[9] Table 3 contains summary statistics regarding the characteristics at origination of both the sample of D60 Fannie Mae mortgages and the sample of all D60 loans in the PLS dataset. The average amount of a PLS loan in the sample is $149,000, and the average amount of a Fannie Mae loan in the sample is $140,000. The Fannie Mae borrowers have higher average FICO credit scores (685) than the PLS borrowers (639). About 84 percent of the Fannie Mae loans are full-documentation loans, while 58 percent of the PLS loans are full-documentation loans. The average origination LTV ratio for Fannie Mae loans is 82 percent, slightly lower than the 84 percent for PLS loans. The percentages of interest-only loans are similar in the sample: 5 percent for PLS loans and 6 percent for Fannie Mae loans. Over the entire period, refinance rates are about the same. For both PLS and Fannie Mae loans, about 62 percent of loans were refinances rather than purchases.

The Fannie Mae loans have slightly better credit characteristics (LTV ratios, FICO scores, and documentation) than the PLS loans. But the loan characteristics (loan amount, interest-only percentages) are comparable.

TABLE 3

Loan Characteristics of Sample Loans (60 Days Delinquent, by Investor Type)

	PLS loans	Fannie Mae loans	All loans
Loan count	1,193,485	1,270,780	2,464,265
Modification rate	29.00%	20.00%	24.00%
Loan amount	$149,035.70	$140,766.80	$144,712.60
LTV ratio at origination	84.38%	81.63%	82.96%
Owner occupied	90.39%	90.30%	90.35%
Average FICO credit score	639	685	663
Full documentation	58.24%	84.27%	71.67%
One unit	81.15%	96.66%	89.15%
Interest only	5.01%	6.37%	5.71%
Refinance	62.13%	61.61%	61.86%

Note: LTV = loan-to-value; PLS = private-label securities.

Modification Types

Culling from our original sample of 2.4 million delinquent loans, we had 685,112 modifications: 382,310 PLS modifications and 302,802 Fannie Mae modifications. We did not have the information to distinguish PLS modifications by type, but we divided Fannie Mae modifications into four separate categories: GSE HAMP, standard, streamlined (which includes both Alt Mod 3.0 and the formal streamlined modification program) and other modification types.

TABLE 4A

Modifications in the Sample, by Type

Modification quarter	PLS	HAMP	Standard	Streamlined	Other	All
Q1 2012	5,700	406	189		109	6,404
Q2 2012	13,060	1,932	1,304	3	460	16,759
Q3 2012	17,574	3,790	3,637	1,017	951	26,969
Q4 2012	25,513	4,721	6,115	4,062	1,525	41,936
Q1 2013	30,053	5,568	7,736	10,849	1,925	56,131
Q2 2013	30,648	4,838	9,040	12,220	1,717	58,463
Q3 2013	36,233	4,455	8,269	11,892	1,412	62,261
Q4 2013	32,306	4,096	8,748	15,922	1,224	62,296
Q1 2014	33,428	3,777	9,385	11,980	1,087	59,657
Q2 2014	28,127	2,663	8,684	12,619	864	52,957
Q3 2014	23,806	2,463	8,879	9,065	851	45,064
Q4 2014	28,124	2,282	8,487	9,433	747	49,073
Q1 2015	26,148	1,896	8,116	9,210	671	46,041
Q2 2015	20,980	1,657	7,532	9,717	543	40,429
Q3 2015	17,302	1,373	6,000	7,449	627	32,751
Q4 2015	13,308	1,017	5,491	7,266	839	27,921
All	**382,310**	**46,934**	**107,612**	**132,704**	**15,552**	**685,112**

TABLE 4B

Distribution of Fannie Mae Modifications, by Quarter (%)

Modification quarter	HAMP	Standard	Streamlined	Other
Q1 2012	57.7	26.8	0.0	15.5
Q2 2012	52.2	35.3	0.1	12.4
Q3 2012	40.3	38.7	10.8	10.1
Q4 2012	28.7	37.2	24.7	9.3
Q1 2013	21.4	29.7	41.6	7.4
Q2 2013	17.4	32.5	43.9	6.2
Q3 2013	17.1	31.8	45.7	5.4
Q4 2013	13.7	29.2	53.1	4.1
Q1 2014	14.4	35.8	45.7	4.1
Q2 2014	10.7	35.0	50.8	3.5
Q3 2014	11.6	41.8	42.6	4.0
Q4 2014	10.9	40.5	45.0	3.6
Q1 2015	9.5	40.8	46.3	3.4
Q2 2015	8.5	38.7	50.0	2.8
Q3 2015	8.9	38.8	48.2	4.1
Q4 2015	7.0	37.6	49.7	5.7
All	**15.5**	**35.5**	**43.8**	**5.1**

Note: HAMP = the government-sponsored enterprises' Home Affordable Modification Program; PLS = private-label security.

Table 4A shows the loan counts for different modification types, and table 4B gives the distribution of Fannie Mae modifications by quarters. Modification dates are determined as the modification becomes permanent—that is, at the end of the trial period.

Table 4B shows that in the first and second quarters of 2012 (Q1 and Q2 2012), 52 to 58 percent of Fannie Mae modifications are GSE HAMP modifications, and 42 to 48 percent are standard or other

modification types. After that, the share of standard modifications increased, and the share of GSE HAMP modifications decreased. Beginning in the first quarter of 2013 (Q1 2013), the share of streamlined modifications increased dramatically and became the most common modification type.

Although the formal streamlined modification program was officially implemented on July 1, 2013, the program does not show up in the data until Q4 2013—that is, if borrower solicitations were sent out in early July 2013 and borrowers began making trial payments in July and made the three trial payments, the earliest the modifications would become permanent is October 2013 (in Q4 2013). And in Q4 2013, more than 50 percent of the modifications were streamlined. But there was significant take-up of streamlined modifications before that. Streamlined modifications constituted 11 percent of Fannie Mae modifications in Q3 2012, 25 percent in Q4 2012, and more than 40 percent in the first three quarters of 2013, reflecting the widespread but unannounced use of Alt Mod 3.0 beginning in May 2012. If a servicer solicited for this program in May 2012, it would be possible for the modification to become permanent as early as August 2012 (Q3 2012). But the program was slowly rolled out to different institutions at different times, and not all servicers who had access to the program used it for all borrowers. In fact, most Fannie Mae loans were covered by the Alt Mod pilots before the program's official introduction.

Modification Take-Up Rates

From the sample of D60 loans, we created a monthly panel, starting with the month in which each loan becomes 60 days delinquent. If a loan is not modified in a given year and month, it stays in the eligible loan pool for the next month until it is modified, paid off, liquidated, "self-cures" (remains current for three months without a modification), or reaches the end of the sample period.

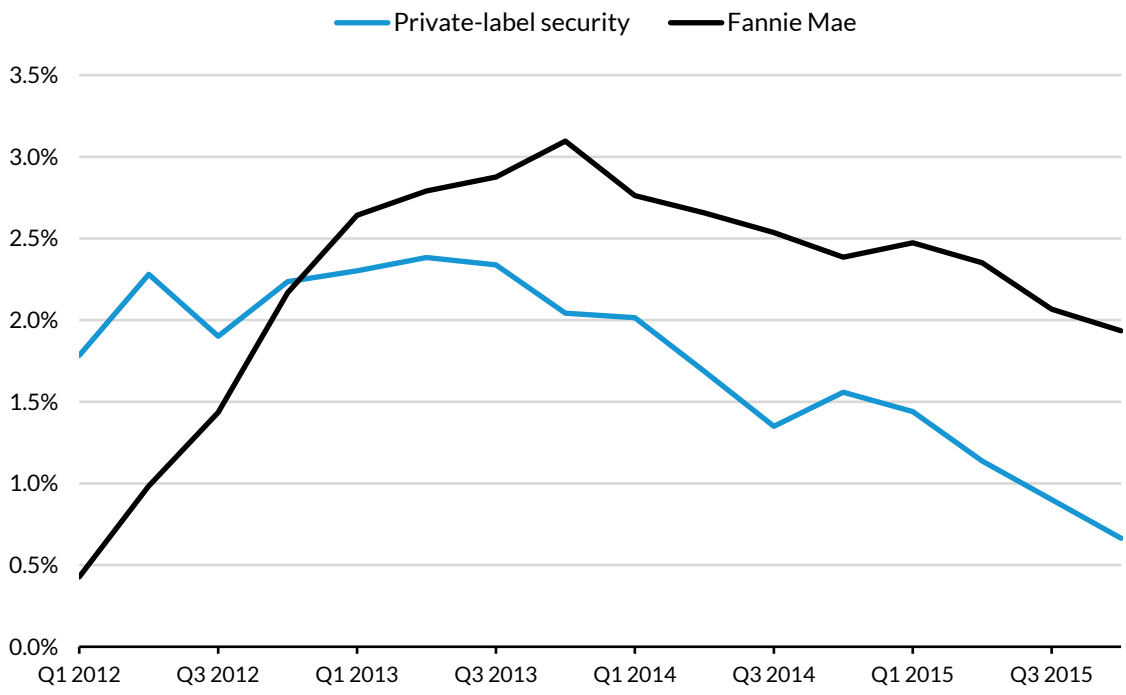
Figure 1 reports the empirical take-up hazard rate for modifications and was calculated based on our monthly panel of D60 loans from 2012 to 2015. Each quarter, the denominator reflects the pool of D60 loans that have not been modified or have left the sample, and the numerator is the number of loans modified in a quarter.

In early 2012, the rate of modifications for PLS loans was higher than for Fannie Mae loans. The low Fannie Mae take-up rate in Q1 2012 compared with PLS may be an artifact of our sample design, as Fannie Mae modifications involve a trial period but some PLS mods may not. But Fannie Mae modification rates continued to climb into 2013 as different types of streamlined modification programs were introduced. PLS modification take-up in early 2012 may have been elevated because of lenders

performing modifications to satisfy terms of the National Mortgage Settlement. Over this general time period, the average modification take-up rate was about 1.9 percent for Fannie Mae and 1.5 percent for PLS, a 0.4 percentage-point difference. The modification take-up rates for both investor types declined after the 2013 peak.[10] A part of this observed decline can be attributed to our study design, as loans that are modified in 2012 or later, and then redefault, are removed from the sample.

FIGURE 1

Quarterly Modification Take-Up Hazard for Fannie Mae and Private-Label Security Loans



URBAN INSTITUTE

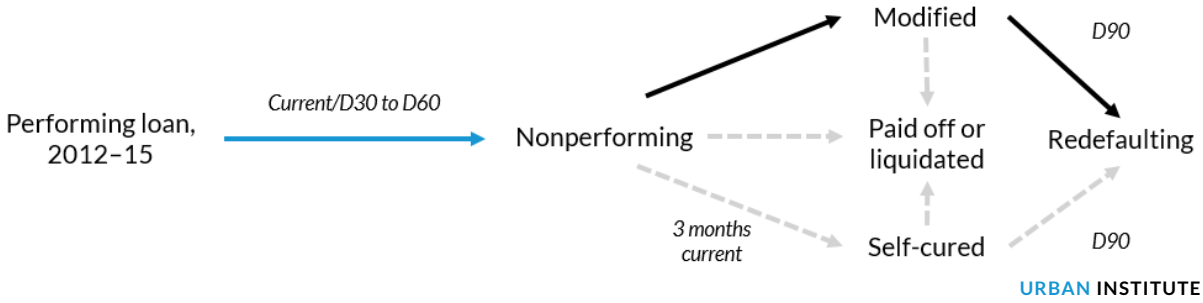
3. Modification Take-Up Effect

We need to consider four effects to calculate the impact of the streamlined modification program: the modification take-up rate, the redefault rate after modification, the self-cure rate among unmodified loans, and the substitution rate from full-documentation modifications to streamlined modifications. We then aggregate these results to determine the overall effect.

Figure 2 shows the state transitions for a loan, starting when it enters our study population by becoming 60 days delinquent. If the loan is not modified, it can either be paid off or liquidated or be remediated through a self-cure. Loans that are modified or self-cured can redefault later.

FIGURE 2

State Transition Graph for D60 Loans



Note: D30 = 30 days delinquent.

In this section, we describe the methodology for analyzing program effects on modification take-up (the nonperforming-to-modified transition in figure 2), and in the following section, we consider the modified-to-redefaulting transition. Both events (marked with solid arrows) are modeled using a multivariate regression. The other transitions—self-cures and their subsequent redefaults and pay-off or liquidation events—are analyzed with a simple univariate model.

Modification Take-Up Effect: Methodology

We want to estimate the net increase in Fannie Mae modification take-up because of the streamlined modification program. This program was officially introduced in July 2013, so the earliest modifications could become permanent was in Q4 2013.

In a world set up for this analysis, we would compare the difference in the behavior of Fannie Mae loans to PLS loans for a "before" and an "after" period. But this is not a clean analysis for two reasons.

First, there were many streamlined modifications during the Alt Mod 3.0 pilot period, before the official adoption of the program (table 4). Approximately 90 percent of the market by loan volume were serviced by servicers with access to the Alt Mod 3.0 program. Second, if we use PLS as the control group, we cannot allow the "before" period to include 2012 because the large number of PLS loan modifications in 2012 could have been influenced by the National Mortgage Settlement, which went into effect early that year and gave "bonus" credit to qualifying modifications made in the first year (figure 1).

But we could transform this into a clean analysis by dividing it into two phases with a different control group for each phase. We define April 2012 to March 2013 as the first phase and April 2013 to September 2014 as the second phase (table 5).

TABLE 5

Two Phases of Take-Up Effect Estimation

	Phase 1		**Phase 2**	
	Before: April 2012–July 2012	After: August 2012–March 2013	Before: April 2013–September 2013	After: October 2013–September 2014
Control group	Loans serviced by Fannie Mae servicers ineligible for Alt Mod 3.0		Private-label security loans	
Treatment group	Loans serviced by Fannie Mae servicers eligible for Alt Mod 3.0		Loans serviced by Fannie Mae servicers eligible for Alt Mod 3.0	

We disregard Fannie Mae modification take-up rates for the first quarter of 2012 because our sample requires loans to be 60 or more days delinquent on or after January 2012, and each modification is preceded by a three month trial period. Because the Alt Mod 3.0 program was rolled out in May 2012, the earliest a modification could become permanent under this program was August 2012. Thus, for the first phase, we defined our "before" period to be April to July 2012. Not all servicers that received access to the pilot program received it at inception. To allow for this, our "after" period runs from August 2012 through March 2013.

For the first phase, we compared the modification take-up behavior on delinquent loans serviced by the Fannie Mae servicers that had access to the early version of the program (Alt Mod 3.0 eligible, our treatment group) with Fannie Mae servicers that did not have access before and after pilot program rollout (Alt Mod 3.0 ineligible, our control group). We did not use PLS loans for the control group for this exercise, as the time period was mostly set in 2012, and the PLS market was experiencing the effect of the National Mortgage Settlement.

For the second phase, April to September 2013 is the "before" period, and October 2013 to September 2014, the months after the program's formal introduction, is the "after" period. For this phase, we compared the behavior of delinquent loans serviced by the Alt Mod 3.0–eligible servicers (treatment group) with PLS loans before and after the formal introduction of the streamlined modification program (control group). We could not use Alt Mod 3.0–ineligible borrowers, as they had access to the formal streamlined modification program in the second phase. The setup for both phases of the analysis is virtually identical. The existence of multiple and complex selection effects in the modification take-up process, which might be driven by a borrower's unobservable characteristics, motivate us to look for natural experiments in which these effects can be controlled for. We take advantage of the time-based discontinuity and use the difference-in-differences method to study the take-up effect. Several recent studies use this method and claim that it is preferable to a simple multivariate analysis because it avoids this endogeneity issue (Agarwal et al. 2017; Chiu, Wang, and Peña 2017; Kahle and Stulz 2013).

Equation 1A summarizes the specification of the first-phase take-up model, and equation 1B summarizes the specification of the second-phase take-up model.

$$1(A)\ Mod_i(t) = \alpha_A(t) + \beta_A * After_i(t) \quad + \gamma_A * Altmod_i(t) + \theta_A * After_i(t) * Altmod_i(t) + X_i(t)'\tau_A + \varepsilon_{Ai}(t)$$

$$1(B)\ Mod_i(t) = \alpha_B(t) + \beta_B * After_i(t) \quad + \gamma_B * Altmod_i(t) + \theta_B * After_i(t) * Altmod_i(t) + X_i(t)'\tau_B + \varepsilon_{Bi}(t)$$

where an observation is loan *i* in month *t*.[11] In equation 1A, Alt Mod takes a value of 1 for loan *i* if the loan is in the Alt Mod 3.0–eligible group and takes a value of 0 if it is in the Alt Mod 3.0–ineligible group. After is an indicator, equaling 1 if month *t* is between August 2012 and March 2013 and 0 if month *t* is between April 2012 and July 2012. In equation 1B, Alt Mod takes a value of 1 loan *i* in the group of Alt Mod 3.0–eligible group and takes the value of 0 if it is in the PLS group. After takes a value of 1 if month *t* is between October 2013 and September 2014 and equals 0 if month *t* is between April 2013 and September 2013.

For both equations, *X(t)* is a vector of control variables, some of which might not vary with time. We include logarithm of loan amount, loan-to-value ratio at origination,[12] an indicator if the property is owner occupied, FICO score, an indicator if the borrower has full documentation, an indicator if the

property is a one-unit property, an indicator if the loan has mortgage insurance, an indicator if the loan uses fixed-rate terms, an indicator if the loan is an interest-only loan, and an indicator if the loan is refinanced.[13]

X(t) include time-varying covariates, such as MTMLTV ratios and four indicators measuring the months since 60 days delinquent: 1–3 months, 4–6 months, 7–12 months, and 12–24 months. We also employ origination year and state fixed effects to absorb time effects and to capture idiosyncratic geographical effects. $Mod_i(t)$ equals 1 if loan *i* is modified in month *t* and equals 0 otherwise. If loan *i* is paid off, liquidated, or self-cured in month *t*, we consider the loan right-censored, and we assign 0 to that loan in month *t*.

We use logistic regression to estimate the models.[14] For equations 1A and 1B, we used a discrete time logit model functional form—that is, the left hand of equations 1A and 1B should be log(Mod/(1-Mod)). The functional form is suppressed for ease of exposition. With the regression results for equations 1A and 1B, we can forecast the modification take-up hazard each month. We do each phase separately. We first simulate how many Alt Mod 3.0–eligible loans would be modified in the first phase because of the introduction of the Alt Mod 3.0 program. We then simulate how many additional loans serviced by the Alt Mod 3.0–eligible servicers would be modified because of the formal rollout of the streamlined refinance program. For both phases, we consider the take-up hazard and competing hazards (e.g., if a loan is liquidated, it is no longer at risk of being modified).

We use equations 2 through 5 to calculate the cumulative modification take-up rates for the loan *i*. Note that for equations 2A, 3A, 4A, and 5A, the calculation is for Alt Mod 3.0 period—that is, *t*=1 to T_1. For equations 2B, 3B, 4B, and 5B, the calculation is for the formal streamline modification period—that is, *t*=T_1 to T_2.

$$2(A)\widehat{S_i}(t) = \widehat{S_i}(t-1) * \left(1 - \widehat{Mod}(t) - Z(t)\right), t = 1, \ldots . T_1$$

$$3(\text{A})\ \widehat{Cum\_Mod_i} = \sum_{s=1}^{t} \widehat{S_i}(t) * \widehat{Mod}(t), t = 1, \ldots . T_1$$

$$4(\text{A})\ \widehat{Cum\_Mod}_{After} = \{E\left(\widehat{Cum\_Mod_i} | \ After_i^{\ *} = 1, Altmod = 1\right)\}, t = 1, \ldots . T_1$$

$$5(\text{A})\ \widehat{Cum\_Mod}_{before} = \{E\left(\widehat{Cum\_Mod_i}\ After_i^{\ *} = 0, Altmod = 1\right)\}, t = 1, \ldots . T_1$$

$$2(\text{B})\ \widehat{S_i}(t) = \widehat{S_i}(t-1) * \left(1 - \widehat{Mod}(t) - Z(t)\right), t = T_1, \ldots . T_2$$

$$3(\text{B})\ \widehat{Cum\_Mod_i} = \sum_{s=1}^{t} \widehat{S_i}(t) * \widehat{Mod}(t), t = T_1, \ldots . T_2$$

4(B) $\widehat{Cum\_Mod}_{After} = \{E(\widehat{Cum_{Mod_i}} | \ After_i^* = 1, Fannie = 1)\}, t = T_1, \ldots . T_2$

5(B) $\widehat{Cum\_Mod}_{before} = \{E(\widehat{Cum_{Mod_i}} \ After_i^* = 0, Fannie = 1)\}, t = T_1, \ldots . T_2$

6 Total streamlined Modification Effect $= [\widehat{Cum\_Mod(Altmod)}_{After}, -\widehat{Cum\_Mod(Altmod)}_{before}]$

$+[\widehat{Cum\_Mod(Formal)}_{After}, -\widehat{Cum\_Mod(Formal)}_{before}]$

$\widehat{S}_i(t)$ is the predicted survival rate for loan *i* in month *t*. $\widehat{S}_i(t) * \widehat{Mod}(t)$ is the predicted conditional modification rate in month *t*. $\widehat{Cum\_Mod}_i$ is the predicted cumulative modification take-up rate for loan *i* in the sample period. *Z(t)* is a vector of monthly hazards in month *t* for other competing risk, including self-cure, liquidation, and prepayment. For each phase, we use a life table method to calculate the conditional probability for all the other risks besides modification at the state level. Using paid-off loans as an example, we calculate how many loans paid off in month *t* (i.e., the months since the loan became 60 days delinquent) and how many loans are survived until month *t*–1 to get the conditional probability of paid-off loans for month *t*. For each state, we expressed the conditional probability of payoff at month *t* as a share of loans paid off in month *t* out of the number of loans survived at the beginning of that month.

Using equations 2 and 3, we can infer the take-up effect difference between the before and after periods of the Alt Mod 3.0 modification program and the before and after periods of the formal streamlined modification program by simulating the hypothetical take-up rates for all Fannie Mae loans (equations 4 and 5).

In more detail, we run the before and after simulation for both phases on all delinquent Fannie Mae loans (both Alt Mod–eligible and not) for the entire period. The loan characteristics in the regression and simulation models will pick up any differences between these populations. Both simulations begin in month *t* = 1, just after the loan becomes 60 days delinquent, and proceeds for up to 36 months, to the end of 2015, or to the date the loan left the sample, whichever comes first.[15] We then add the pickup from the first and second phases together. There is no double counting because the "before" from the second phase, which is subtracted, already includes the Alt Mod 3.0 effect.

The program effect for the introduction of the Alt Mod 3.0 program is calculated as the difference in cumulative take-up between two simulated environments: one in which Alt Mod 3.0 is never introduced (equation 5A) and one in which Alt Mod 3.0 is always in effect (equation 4A), as indicated by the first bracket in equation 6. Similarly, the program effect of going from Alt Mod 3.0 to the formal streamlined

modification program is measured as the difference in cumulative take-up between a world in which Alt Mod 3.0 is in effect but the formal streamlined modification program is never introduced (equation 5B) and one in which the formal streamlined modification program always exists (equation 4B). The difference is indicated by the second bracket in equation 6. The simulated environments for equations 4A (Alt mod is in effect) and 5B (Alt mod is effect but formal streamlined modification program is not introduced) are logically equivalent, so that the combined take-up differences for both phases (equation 6) measure the total benefit of the Federal Housing Finance Agency streamlined modifications over no low-documentation modification program at all.

Modification Take-Up Effect: Empirical Results

Table 6 displays the estimated effect from the hazard models. The dependent variable is 1 if a D60 loan is modified in a specific quarter. We show both the estimate and the hazard rate from the estimation results for both phases of the take-up.[16] We include both the state indicators (to account for the fact that loans in the same geographical area are likely to be correlated) and origination year indicators (to account for the fact that loans originated in the same year might suffer correlated shocks).

The upper part of table 6A shows the take-up summary for the first phase, the introduction of the Alt Mod 3.0 program. The results demonstrate that both Alt Mod 3.0–eligible and Alt Mod 3.0–ineligible Fannie Mae loans are 33.2 percent more likely to receive modifications after the cutoff date than before the cutoff date. Alt Mod 3.0–eligible loans (the treatment group) had a lower take-up rate before the program was introduced, when they were 25.6 percent less likely to the receive a modification. But the interaction term indicates that after the Alt Mod 3.0 program was introduced, Alt Mod–eligible loans were 44 percent more likely to be modified than was the case without the program.

The lower part of table 6A summarizes the take-up summary for the second phase, the program's formal rollout. Alt Mod 3.0–eligible Fannie Mae loans (the treatment group) have higher take-up hazard than PLS loans, indicated by the significant coefficient before the Alt Mod indicator. Alt Mod 3.0–eligible loans are 37.8 percent more likely to be modified than PLS loans. Moreover, Alt Mod 3.0–eligible loans and PLS loans are marginally less likely to receive modifications after the cutoff date than before the cutoff date, a 2.7 percent difference. But the interaction variable indicates that Fannie Mae loans were 17.3 percent more likely to be modified than before the streamlined modification program's full rollout. Thus, both phases of the program increased the take-up rate substantially.

TABLE 6A

Take-Up Hazard Estimation Results for Sample Loans (60 Days Delinquent)

	Estimate	*T*-value	Hazard rate
Phase 1			
After	0.29	5.71	33.2%
Alt Mod	-0.30	-6.09	-25.6%
After*Alt Mod	**0.36**	6.96	44.0%
Phase 2			
After	-0.03	-5.28	-2.7%
Alt Mod	0.32	46.68	37.8%
After*Alt Mod	**0.16**	19.88	17.3%

TABLE 6B

Take-Up Hazard Estimation Results for Sample Loans (60 Days Delinquent)

Loan characteristics, phase 2

Variable	Estimate	*T*-value	Hazard rate
1–3 months since becoming 60 days delinquent	-0.25	-44.15	-22%
4–6 months since becoming 60 days delinquent	0.24	45.32	28%
7–12 months since becoming 60 days delinquent	0.47	92.37	59%
12–24 months since becoming 60 days delinquent	0.28	54.89	32%
Mark-to-market loan-to-value ratio	0.25	43.57	29%
Log loan amount	0.18	74.84	19%
Loan-to-value ratio at origination	0.09	8.17	9%
Owner occupied	0.43	77.06	54%
FICO score	-0.10	-45.28	-10%
Full documentation	0.02	5.27	2%
One unit	-0.18	-43.69	-16%
Has mortgage insurance	0.05	10.92	5%
Fixed rate	-0.02	-6.24	-2%
Interest-only loan	-0.21	-34.37	-19%
Refinance	0.12	40.03	13%

Table 6B shows several additional loan characteristics that play an important role in modifications.[17] We report only the results for the second phase. The coefficients are similar for both phases. We include five time indicators after a loan becomes 60 days delinquent: 1 to 3 months, 4 to 6 months, 7 to 12 months, 12 to 24 months, and more than 24 months (the reference category). Loans are most likely to receive modifications 7 to 12 months after becoming 60 days delinquent. Owner-occupied homes were more likely to get modifications than other types of loans. The results also imply that loans to borrowers with higher credit scores were modified less often. Larger loans were more likely to receive modifications, and loans with higher MTMLTV ratios were modified more often. These results are consistent with what can be observed in the literature. Adelino, Gerardi, and Willen (2013) also found that LTV ratios, FICO scores, and loan amounts have impacts on modification take-up.

We want to use these results to simulate the increased take-up rates for Fannie Mae loans. We then take the universe of delinquent Fannie Mae loans, assume they were all Alt Mod 3.0 eligible, and forecast the take-up hazards in several scenarios. We first use the coefficients that applied if the delinquency occurred before the first phase cutoff date (i.e., without the Alt Mod program). We then simulate the take-up rates for all the Fannie Mae loans assuming the delinquency happened after the first phase cutoff date, holding everything else constant (i.e., with the Alt Mod 3.0 program in place). The take-up differential would be the treatment effect of the Alt Mod 3.0 introduction. The results in table 7 indicate the take-up improves with the introduction of the Alt Mod 3.0 program from 20.2 percent to 26.3 percent, a 30.1 percent relative improvement.

We repeat this analysis for the second phase, the full streamlined rollout. That is, we simulate the take-up rate for all delinquent Fannie Mae loans assuming they are all Alt Mod 3.0 eligible. We forecast the take-up rate assuming the delinquency happened in the before period and compare it with the take-up rate assuming the delinquency happened in the after period, when the formal streamlined modification program was in effect. Table 7 indicates the take-up with the Alt Mod 3.0 streamlined program is 27.4 percent and the take-up with the full streamlined program is 30.5 percent, an 11.3 percent improvement.[18] Adding the two effects together, we obtain a 44.8 percent relative improvement.

TABLE 7

Simulated Take-Up Rates for Fannie Mae Loans

Description	Take-up rate
Phase I with Alt Mod 3.0 streamlined program	26.3%
Phase I with no streamlined program	20.2%
Phase I take-up improvement, relative	30.1%
Phase II with full formal streamlined modification program	30.5%
Phase II with Alt Mod 3.0 streamlined program	27.4%
Phase II take-up improvement, relative	11.3%
Total estimated take-up improvement	**44.8%**

Note: *N* = 1,216,320 loans.

4. Modification Redefault Analysis

In the previous sections, we showed that the streamlined modification program increased the number of delinquent Fannie Mae loans being modified. In this section, we identify how much less successful streamlined modifications are than standard modifications from a loan performance perspective. We track the likelihood of redefault, by loan type, after receiving a modification.

Modification Redefault Effect: Methodology

We employ a regression similar to what we used in the previous subsection, estimating a default hazard model on the modification sample with Fannie Mae streamlined modifications, Fannie Mae standard modifications, and PLS modifications (the control group). We define a redefault as the borrower becoming 90 days delinquent on a modified mortgage. Following the literature (Haughwout, Okah, and Tracy 2016), we define the hazard rate for redefault at month *t* is defined to be the probability that a modified mortgage first reaches 90 days delinquent at month *t* given that the mortgage had not prepaid or reached this level of delinquency by month *t* – 1 (equation 7). We model this using a hazard framework, where the hazard rate for loan *i* at month *t* is

$$(7)\ h_i(t) = \rho(t) + M' * \mu \quad + Y_i(t)'\sigma + \epsilon_i(t)$$

where *M* is vector of modification types.[19] We use standard modifications as reference. Y is a vector of control variables, such as FICO score. It also includes time-varying covariates, such as MTMLTV ratio. *h* equals 1 if a modification on loan *i* defaults in month *t* and equals 0 otherwise.[20]

We use a logistic regression to estimate the hazard model on the loan-month panel.[21] All things equal, the coefficient in front of the streamlined modifications represents the impact of streamlined modifications on default hazard rates compared with standard modifications. We do not include payment reduction in the regressions, as it would be captured by the modification type parameter.

With the regression results, we can forecast the redefault hazard each month. To simulate the cumulative redefault rate, we need to know the other competing risk hazard. We use the same method as described in the take-up methodology section to calculate the monthly hazard for each event (paid off and adverse liquidation).

With all the competing hazards at hand, we can use equations 8 through 10 to calculate the cumulative modification take-up rates for the loan *i*.

(8) $\widehat{S_i}(t) = \widehat{S_i}(t-1) * \left(1 - \widehat{h_i}(t) - U(t)\right), t = 1, \ldots . T$

(9) $\widehat{D_i}(t) = \sum_{s=1}^{t} \widehat{S_i}(t) * \widehat{h_i}(t)$

(10) $Dif = E(D_i^*(36)|M = Streamline, Y_i) - E(D_i^*(36)|M = Standard, Y_i)$

$\widehat{S_i}(t)$ is the predicted survival rate for a modification on loan *i* in month *t*. *U(t)* is a vector of monthly hazards in month *t* for other competing risks, including adverse liquidation and prepayment. $D_i^*(t)$ is the cumulative default rate for a modification on loan *i* in month *t*.

To further infer the redefault rates, we use all Fannie Mae modified loans and compute the average hypothetical default rates 36 months after modification, assuming they were standard modifications. We then repeat the procedure and compute the 36-month redefault rate had they become streamlined modifications. With the predicted default hazard and survival rates calculated, we calculate the difference based on the cumulative default rates in equation 10.

Modification Redefault Effect: Empirical Results

We begin the empirical redefault analysis by examining the unconditional redefault rates across modification types and time periods. We define redefault as a loan that is ever 90 or more days delinquent after modification. Table 8 presents the unconditional modification redefault probability by modification quarters and types.

TABLE 8

Unconditional Redefault Rates by Modification Type (%)

Modification quarter	PLS	HAMP	Others	Standard	Streamlined	All
Q1 2012	54.3	47.3	48.6	37.0		53.3
Q2 2012	48.7	35.2	46.3	41.8		46.6
Q3 2012	43.4	33.6	45.3	40.4	44.3	41.7
Q4 2012	41.5	29.3	45.2	41.4	47.7	40.9
Q1 2013	43.2	29.3	44.7	41.0	43.9	41.7
Q2 2013	39.4	26.3	41.7	39.3	43.2	39.2
Q3 2013	35.9	25.3	42.7	36.0	39.9	36.1
Q4 2013	34.3	24.1	37.2	34.0	40.2	35.1
Q1 2014	32.1	26.6	36.2	36.1	38.7	33.8
Q2 2014	29.0	26.4	36.3	37.6	39.6	32.9
Q3 2014	26.3	23.2	32.3	30.3	37.6	29.3
Q4 2014	22.4	25.4	38.4	31.1	37.8	27.3
Q1 2015	19.4	22.0	29.8	26.4	30.3	23.1
Q2 2015	15.3	19.5	25.8	22.7	25.9	19.5
Q3 2015	7.6	15.2	20.7	16.4	17.6	12.1
Q4 2015	1.0	8.0	11.7	8.2	9.7[a]	5.3
All	**30.9**	**26.5**	**37.7**	**32.1**	**35.8**	**31.9**

Notes: HAMP = the government-sponsored enterprises' Home Affordable Modification Program; PLS = private-label security; Q = quarter. The performance is modification time through Q4 2015.

[a] If a streamlined modification is modified in the beginning of Q4 2015, and it does not pay monthly payment (delinquent) for three months, this modification would end up as redefault.

Forty percent of loans modified through the streamlined program in 2013 redefaulted before December 2015, the end of our performance period. In contrast, the redefault rate for streamlined modifications in 2015 was only 20 percent. There are several reasons for this, including an improving economic environment and increasing home prices. There is also a measurement issue: loans modified in the later period have a shorter performance window, so we do not fully observe their default behavior. To control the unbalanced performance window issue, we include months since modification in the regression to allow for the time dependence of the hazard rate.

The two largest Fannie Mae modification programs from 2012 to 2015, the standard modification and the streamlined modification programs, have identical modification terms. But the average redefault rate for streamlined modifications is about 35.8 percent, about 4 percentage points higher than that of standard modifications (32.1 percent). This pattern is consistent over time. For example, for loans modified in Q3 2013, streamlined modifications have an average redefault rate of 40 percent, while standard modifications have an average redefault rate of 36 percent.

Table 9 presents statistics for streamlined and standard modifications. Streamlined modifications have weaker characteristics. The origination date for loans that eventually received the streamlined modification was more apt to be during the financial crisis (2007–08); 22.6 versus 20.1 percent for 2007

and 9.2 versus 8.3 percent for 2008. Vintage year has a large impact on modification redefault (Mayer, Morrison, and Piskarski 2014), and loans originated during crisis are more likely to default. FICO scores for borrowers receiving streamlined modifications are similar to those for borrowers receiving standard modifications (675 versus 677), as are LTV ratios (81 versus 80 percent).

TABLE 9

Loan Characteristics of Modified Loans

Variables	Standard	Streamlined
LTV ratio at origination	80.8%	79.7%
FICO credit score	675	677
Full documentation	88.1%	82.7%
Loan amount	$158,063	$152,610
Refinance	65.4%	62.3%
Owner occupied	95.3%	90.8%
One unit	97.1%	95.6%
Has mortgage insurance	1.7%	1.9%
Originated in 2007	20.1%	22.6%
Originated in 2008	8.3%	9.2%
Redefault rate	32.1%	35.8%

Note: LTV = loan-to-value.

To better understand redefault rates and their impacts, we estimate a redefault model to study the probability that a modification ever becomes 90 days delinquent in our sample period. Besides the modification types, we include loan characteristics from origination, including an indicator for whether the loan was used for a refinance, the borrower's FICO score, and whether the home was owner occupied. The hazard analysis framework allows us to take advantage of time-varying characteristics such as MTMLTV ratios and months since modification. Geographic fixed effects, origination year fixed effects, and delinquency status at modification trial period are also included.

TABLE 10

Redefault Hazard Estimation Results for Modified Loans

Variables	Estimate	*T*-value	Hazard ratio
Intercept	0.08	1.5	8.1%
Streamlined	0.21	13.0	23.7%
7 to 12 months after modification	0.09	4.9	9.2%
More than 12 months after modification	-0.33	-18.5	-28.0%
Streamlined and 7 to 12 months after modification	0.01	0.5	1.2%
Streamlined and more than 12 months after modification	-0.06	-2.5	-5.5%
Mark-to-market loan-to-value ratio	0.12	13.4	12.9%
Log of loan amount	-0.19	-48.0	-17.0%
Owner occupied	0.00	-0.1	0.0%
FICO score	-0.32	-77.8	-27.0%
Full documentation	0.15	24.9	16.1%
One unit	-0.05	-6.7	-4.6%
Has mortgage insurance	0.03	3.6	2.8%
Fixed rate	-0.19	-30.6	-17.3%
Interest-only loan	-0.06	-4.3	-5.6%
Refinance	-0.20	-38.0	-18.2%
State fixed effect		Yes	
Modification year fixed effect		Yes	
Status at trial		Yes	
Other modification types		Yes	
Observations		10,556,146	
Likelihood ratio		1,724,553	

Table 10 presents the results of our redefault analysis, highlighting the effect of streamlined modifications on the probability of redefault compared with standard modifications. Other Fannie Mae modification types are included in the regression, with the same specification as streamlined modifications.

All else equal, in every month the loan is outstanding, loans with streamlined modifications are more likely to redefault than loans with standard modifications. But the gap would be smaller over time, indicated by the negative significant coefficients before the interaction terms between months since modification (both 7 to 12 months and more than 12 months) and the streamlined indicator.[22]

Other characteristics appear to determine the probability of redefault, and the findings are consistent with the previous literature. For example, the MTMLTV ratio and loan amount are positively correlated with the probability of default. As expected, origination FICO score is negatively associated with default probability. Higher FICO scores tend to mean better credit history and lower likelihood of default.

Based on these results, we can calculate the effect of streamlined modifications on the redefault rate. To do that, we take all Fannie Mae loans and simulate their default hazards each month, assuming

they receive a standard modification. With the predicted monthly default hazard at hand, we then calculate the 36-month hypothetical cumulative default rate for this sample. We repeat the procedure and change the modification type from standard modification to streamlined modification and keep all the characteristics constant. In this case, we have consistent loan characteristics and a comparable performance window for the counterfactual (no streamlined modification program) and the treated group.

Table 11 compares the simulated redefault rates of standard modifications and redefault rates if the modifications are treated as streamlined modifications. The 36-month redefault rate would be 31.1 percent with a standard modification, and the average hypothetical default rate for streamlined modifications is 35.9 percent. Thus, using the loan characteristics and performance window for the modified loans in our sample, streamlined modifications perform 4.8 percentage points worse than standard modifications.

TABLE 11

36-Month Redefault Rates for Standard and Streamlined Modifications

Description	Redefault rate
Hypothetical default rate if standard modification	31.1%
Hypothetical default rate if streamlined modification	35.9%
Default rate increase	4.8%

5. Nonmodification Cure Probabilities and Substitution Probabilities

In this section, we make two additional estimates to determine the impact of the streamlined modification program. First, we estimate how many loans that obtained streamlined modifications would have self-cured if the streamlined modification program had not been available and the loans had not been modified. We also need to temper our take-up rate to account for the streamlined program capturing some loans that would have had other modifications (e.g., a standard modification).

Nonmodification Cure Probabilities

It is challenging to calculate the number of modified loans that would have otherwise self-cured. We run a simulation similar to the ones used to calculate modification take-up rates in table 7. That is, we calculate the monthly hazard rate for loans that have become 60 days delinquent and have been modified, terminated, or self-cured. In this report, a loan "self-cures" if it becomes current for at least three months. Modified loans are dropped from the sample, and the loan performance is simulated using these monthly hazard rates to determine the cumulative share of loans that would have been liquidated, paid off, or self-cured. The resulting state distribution after 36 months is that about 47 percent of the loans will have self-cured (table 12). This is high because many 60-days-delinquent loans self-cure rather than become 90 days delinquent. But we also observe in our loan performance data that 30 percent of loans that self-cure will redefault within another 36 months, bringing the self-cure rate without redefault down to 32.8 percent.

TABLE 12

Self-Cure Rate Analysis

	Share
Current for three months	46.8%
Paid off	6.7%
liquidation	32.2%
Persistent delinquent	14.3%
All	100.0%
Self-cure without redefault	**46.8*0.7[a] = 32.8%**

[a] Assumes 30 percent of loans that self-cure would redefault in 36 months based on Fannie Mae data.

Substitution Probabilities from Other Modification Types to Streamlined Modifications

We also need to consider that without streamlined modification, some loans would be modified through other modification programs. Borrowers who chose a streamlined modification did so at the expense of another modification type. Because other modifications (e.g., standard modifications) have a lower default rate than streamlined modifications, we need to lower our total benefit to account for the effect of this substitution.

More precisely, the pool of streamlined modifications from which we estimate this higher redefault rate contains two groups: borrowers who would not have taken any modification absent a streamlined program (new modifications), and borrowers who would have taken a standard modification (substituted modifications). Although we cannot separate these two groups, it is likely the case that new modifications, if we could isolate them, would default at a higher rate than what we observe in the mixed pool, while the substituted modifications would default at a lower rate, likely similar to the default rates on standard mods. Because we cannot identify which borrowers would have otherwise applied for a standard modification, we obtained the net substitution effect by comparing the redefault rates for standard modifications and streamlined modifications. If we are underestimating the default rate on the new mods, this correction compensates for it.

Table 13 shows how we calculate how many of the other modification types were "cannibalized" by the streamlined product. In the before period of the first phase, only 0.1 percent of the modifications were low-documentation loans. Our simulated results from the take-up section indicated we should have seen a 30.1 percent improvement. In a world without substitution, we can easily calculate the number of loans we would have expected to be streamlined by adding the old streamlined amount plus

the entire improvement. We can then compare this with the actual share of streamlined modifications to calculate the substitution effect.

More precisely, if we arbitrarily assign the volume of modifications in the before period a value of 100 percent, the total modifications in the after period of the first phase would be 130.1 (100+30.1) percent. Out of this, if there was no substitution, the share of loans with streamlined modifications should be the 30.1 percent improvement plus the share of low-documentation loans in the before period (0.1 percent). Thus, this analysis suggests that for the first phase, the expected share of low-documentation modifications was 23.2 ([0.1+30.1]/[100+30.1])percent. The actual streamlined share was 33.9 percent, a 10.7 percent difference.

Similarly, in the second phase of the take-up, with an 11.3 percent simulated improvement, we would have expected the low-documentation loan share to be 46.6 percent, but it was actually 50.6 percent, a 4 percent difference.

We can add these effects together to obtain the share of loans that otherwise would have been full documentation that went the streamlined route: 14.7 (10.7+4.0) percent.[23]

TABLE 13

Implied Share of Loans Transferred from Other Modification Programs to the Streamlined Modification Program

	Phase I: Alt Mod 3.0 take-up		Phase II: Streamlined modification take-up	
Step 1: Empirical change in low-documentation share	Before	After	Before	After
Other modifications	5,064	31,773	39,166	34,655
Low-documentation modifications	5	16,271	26,746	35,481
Total	5,069	48,044	65,912	70,136
Share of low-documentation loans	0.1	33.9	40.6	50.6
Step 2: Expected change in low-documentation share				
Simulation-based take-up improvement		30.1		11.3
Expected low-documentation share with no conversions		23.2		46.6
Actual low-documentation share		33.9		50.6
Implied full- to low-documentation conversions		10.7		4.0

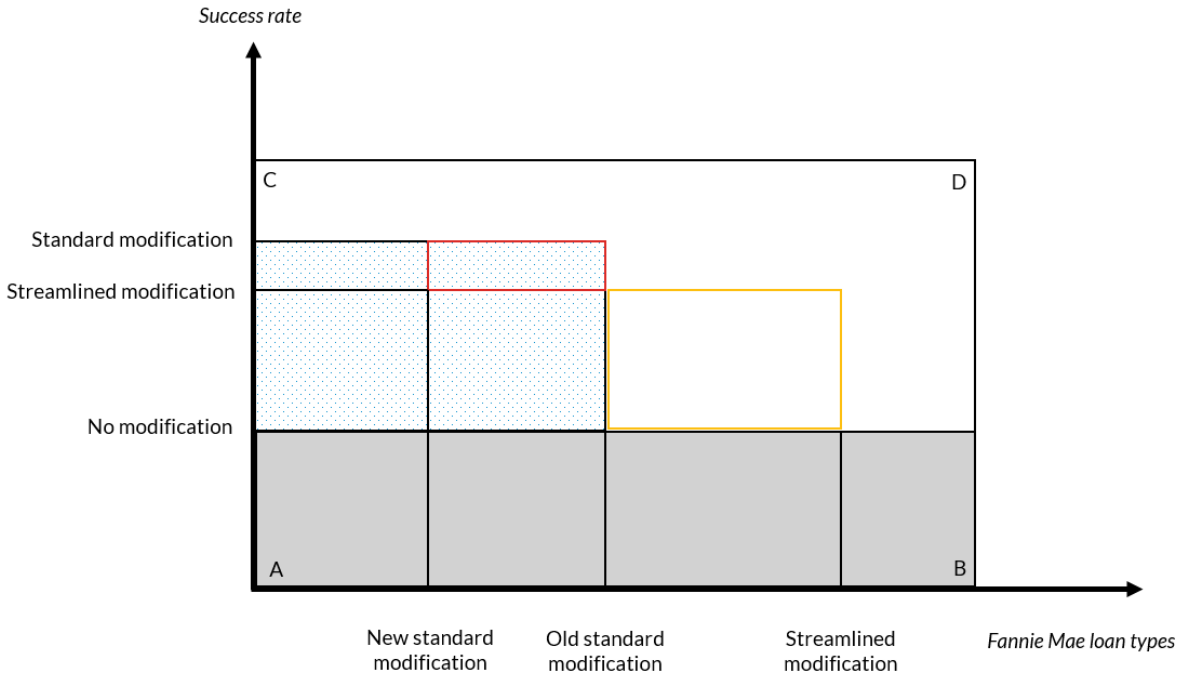
6. Understanding the Total Effect

Figure 3 shows the total effect of the streamlined modification program (including Alt Mod 3.0). Let us assume the rectangle ABCD is the total number of delinquent Fannie Mae loans. Without any modification program, the total saved loans are the shaded area with the horizontal line to the no modification success line. With only standard modification (i.e., before the streamlined modification program was implemented), the saved loans would be the shaded area plus the dotted area, where the dotted area measures the total number of loans saved through the standard modification program. We use the standard modification as the comparison in this analysis because it is most similar to a streamlined modification.

Now, consider the case of implementing the streamlined modification program. The first effect is that the total take-up for Fannie Mae increased, from the old standard modification rate to the streamlined modification rate. Second, streamlined modifications have a lower success rate than standard modifications, indicated by a lower horizontal line for success rate. If we compare the number of loans saved because of these two effects, we see that the yellow-outlined area represents the additional loans saved because of the streamlined modification. But the streamlined modification program also introduced a negative effect. That is, a portion of loans that would have been modified through a standard modification were instead modified through a streamlined modification. Because streamlined modifications have lower success rates, the streamlined modification program may also cause a substitution effect, measured by the red-outlined area.

FIGURE 3

Total Streamlined Modification Effect



URBAN INSTITUTE

Thus, the absolute impact of implementing the streamlined modification program would be the yellow-outlined area minus the red-outlined area. We will also compare this impact to the counterfactual (i.e., without the streamlined modification), measured by the dotted area, to get the relevant net benefit.

Table 14 summarizes the total effect of Fannie Mae's streamlined modification program. Using all the estimation results discussed in the previous sections, we calculate the total effect of the streamlined modification program. The first step is to estimate the counterfactual (the dotted area).

Without the streamlined modification program, we estimate that the modification take-up rate is 20.2 percent. The average redefault rate for those modifications is 31.1 percent (i.e., a 68.9 percent success rate). If those loans are not modified, 32.8 percent will be self-cured without redefault, and 6.7 percent will be paid off, resulting in a 39.5 percent success rate without modification. In this case, the treatment effect for each modification would be 29.4 (68.9–39.5) percent. Note that 20.2 percent of D60 loans are modified, resulting in a total modification effect for the counterfactual as 5.9 percent, or (20.2/100)*29.4.

Next, we consider the positive effect (the yellow-outlined area). That is, the streamlined modification program results in a higher take-up rate for Fannie Mae. Many loans that are 60 days

delinquent that would not have been modified take advantage of the streamlined modification program. We estimate that with the program, the modification take-up increased to 29.2 percent, a 9.0 percentage-point increase. The success rate for the streamlined modification is 64.1 percent. If those loans are not modified, the success rate is 39.5 percent, resulting in a 24.6 percent modification benefit. Thus, the net benefit because of increased take-up is 2.2 (24.6*9.0) percent.

We also estimate the negative effect (the red-outlined area). With the introduction of the streamlined program, we also estimate that 14.7 percent of the modifications would switch from other modification types to a streamlined modification. Expanding by the streamlined modification take-up, we find 4.3 percent of the loans would have received a streamlined modification instead of a standard modification. Such a switch would result in a 4.8 percent drop in the modification success rate. This lowers the total benefit by 0.21 (4.3*4.8) percent.

TABLE 14

Total Impact of Introduction of Streamlined Modification Program (Percentages, 36 Months)

Category	Label	Formula	Estimate
Share of modifications without streamlined program	A		20.2%
Redefault modifications for standard program	B		31.1%
Modification success rate	C	100–B	68.9%
Nonmodification self-cures without redefault	D	46.8*(100–29.9)/100	32.8%
Nomodification payoffs	E		6.7%
Success rate without modification	F	D+E	39.5%
Modification treatment effect	G	C–F	29.4%
Baseline modification benefit	H	A*G/100	**5.9%**
Share of modifications with introduction of streamlined modifications	I	A*(1+Take-up est.)	29.2%
Redefault modifications for streamlined program	J		35.9%
Modification success rate	K	100–J	64.1%
Modification treatment effect	L	K–F	24.6%
Share of loans modified because of the streamlined program	M	I–A	9.0%
Gross modification benefit	N	L*M/100	**2.2%**
Estimated share of nonstreamlined modifications that became streamlined	O		14.7%
Share of loans receiving streamlined instead of standard modifications	P	I*O	4.3%
Lowered success rate because of default difference between standard and streamlined	Q	C–K	4.8%
Lowering benefit	R	P*Q/100	**0.21**
Percentage net program benefit	S	(N–R)*100/H	**34%**
Number of loans 60 days delinquent per year	T		302,434
Saved loans per year	U	(N–R)*T/100	**6,107**

The simulation results show that the net benefit with the introduction of the streamlined modification program is 34 percent (the additional gross modification benefit of the streamlined modification program of 2.2 percent less the negative effect of 0.02 percent divided by the baseline modification benefit of 5.9 percent). To put this in perspective, we calculate that 302,434 Fannie Mae loans went 60 days delinquent each year during the period analyzed, and with the addition of the streamlined modification program, the number of successful modifications would have increased by 6,107 per year.

Conclusion

In this report, we studied the impact of the streamlined modification program on Fannie Mae's loss-mitigation efforts. This is the first publicly available study on this topic, based on proprietary Fannie Mae data. Our results indicate that the streamlined modification option, which does not require documentation, significantly increased the take-up rates on loan modifications. Although streamlined modifications do have higher failure rates than standard modifications, the differences are small. Our calculations, which fully take into account the fact that the streamlined modification program has shifted loans away from both standard and GSE HAMP modifications, indicate that the streamlined option increased the number of successful modifications by 34 percent, a substantial increase.

Notes

[1] In this report, we use "streamlined modification program" to indicate all the formal streamlined modification programs and Alt Mod 3.0. We use "formal streamlined modification program" to indicate the official streamlined modification implemented in mid-2013.

[2] Malloy Evans, "Lender Letter LL-2016-06," letter to all Fannie Mae single-family servicers, December 14, 2016, https://www.fanniemae.com/content/announcement/ll1606.pdf.

[3] Income was used to ensure that the housing expense–to-income ratio fit within the permissible 10 to 55 percent band.

[4] See the website for the Home Affordable Refinance Program at https://www.harp.gov/.

[5] "About the Settlement," Joint State-Federal National Mortgage Servicing Settlement," accessed April 11, 2018, http://www.nationalmortgagesettlement.com/about.

[6] Marianne E. Sullivan, "Fannie Mae's Alternative Modification to the Home Affordable Modification Program," lender letter 2010-04 to all Fannie Mae single-family servicers, March 18, 2010, https://www.fanniemae.com/content/announcement/ll1004.pdf.

[7] There is no origination date window for the Fannie Mae sample, and the PLS sample follows the same rule. When creating the delinquency sample, we used 60 days delinquent as the delinquency cutoff because those D60 loans are eligible for modification. To consider modification redefault, we used 90 days delinquent as the delinquency (or redefault) cutoff. That is, for all D90 modifications, we consider these modifications as redefault.

[8] Mortgage Bankers Association status is used to define the delinquency status.

[9] The dataset used for this report reflects only loans that transitioned from current or 30 days delinquent to 60 days delinquent from 2012 through 2014. It does not reflect all loans.

[10] We do not track loans that redefault after a modification or self-cure event within our time window; thus, it is possible that part of the decline in the modification rate shown is an artifact of our sample.

[11] *t* is the months between a loan's first D60 month and the current month. For example, if a loan is D60 in January 2014, month equals 2 for the performance month of March 2014.

[12] We use LTV instead of combined LTV in the paper.

[13] Because debt-to-income ratio is not well populated in the PLS database, we did not include this variable in the regression.

[14] With logistic estimation, we assume ties are discrete.

[15] The simulation can continue past the date on which the loan actually received a modification. That is, we consider only consider the simulated probability of modification and ignore the actual modification status.

[16] Hazard rates are calculated by subtracting 1 from the hazard ratio—that is, exp(estimate)—and multiplying by 100. It gives the estimated percentage in the hazard for each one-unit increase in the covariate.

[17] We include origination year and state fixed effects in the regressions, but the results are not shown. These fixed effects are captured in the other regressions in the report as well.

[18] The phase 1 after (with the AltMod 3.0 streamlined program) and the phase 2 before (with the AltMod 3.0 streamlined program) are close but not identical (26.3 percent versus 27.4 percent). The periods we used for the estimation was slightly different, explaining the small difference.

[19] The left hand of equation 7 should be log(h/(1-h)), the discrete-time logit form. The function form is suppressed for ease of exposition.

[20] If a modification is right censored in month *t*, it equals 0 for month *t*.

[21] It has a similar form of the discrete-time proportional odds model used in the take-up regression estimation. We assume that tie is discrete. Because we include both time indicators and geographic indicators, the heterogeneity would not be a big concern. We use basic standard errors instead of the robust standard errors. It is not proportional hazards model because we include time-dependent covariates that will change at different rates for different loans.

[22] We include a categorical variable for time since modification, splitting into 1 to 6 months (left out), 7 to 12 months, and more than 12 months. This captures the fact that redefault hazard spikes in months 7 to 12 and then declines. In the simulation, the appropriate category is assigned for each month.

[23] Some standard modifications that moved into streamlined might have been successful modifications regardless of the selection, but it is also possible that there are some unsuccessful standard modifications that moved into streamlined modification. Thus, in this report, we obtained the net substitution effect by comparing the redefault rates for standard modifications and streamlined modifications, as seen in the Understanding the Total Effect section.

References

Adelino, Manuel, Kristopher Gerardi, and Paul S. Willen. 2013. "Why Don't Lenders Renegotiate More Home Mortgages? Redefaults, Self-Cures, and Securitization." *Journal of Monetary Economics* 60 (7): 835–53.

Agarwal, Sumit, Gene Amromin, Itzhak Ben-David, Souphala Chomsisengphet, Tomasz Piskorski, and Amit Seru. 2017. "Policy Intervention in Debt Renegotiation: Evidence from the Home Affordable Modification Program." *Journal of Political Economy* 125 (3): 654–712.

Chiu, Wan-Chien, Chih-Wei Wang, and Juan Ignacio Peña. 2017. "Does the Source of Debt Financing Affect Default Risk?" *Review of Financial Economics*.

Fannie Mae. 2013. "Servicing Guide Announcement SVC-2013-05." Washington, DC: Fannie Mae.

———. 2016. "The Fannie Mae Flex Modification Program." Washington, DC: Fannie Mae.

Haughwout, Andrew, Ebiere Okah, and Joseph Tracy. 2016. "Second Chances: Subprime Mortgage Modification and Redefault." *Journal of Money, Credit, and Banking* 48 (4): 771–93.

Kahle, Kathleen M., and René M. Stulz. 2013. "Access to Capital, Investment, and the Financial Crisis." *Journal of Financial Economics* 110 (2): 280–99.

Mayer, Christopher, Edward Morrison, and Tomasz Piskorski. 2014. "Mortgage Modification and Strategic Behavior: Evidence from a Legal Settlement with Countrywide." *American Economic Review* 104 (9): 2830–57.

US Treasury. 2016. "MHA Lessons Learned Series: Importance of Debt-to-Income Ratios (DTI) for Modified Loan Performance." Washington, DC: US Treasury.

About the Authors

Laurie Goodman is vice president for housing policy and codirects the Housing Finance Policy Center at the Urban Institute. The center provides policymakers with data-driven analyses of housing finance policy issues that they can depend on for relevance, accuracy, and independence. Before joining Urban, Goodman spent 30 years as an analyst and research department manager at several Wall Street firms. From 2008 to 2013, she was a senior managing director at Amherst Securities Group LP, a boutique broker-dealer specializing in securitized products, where her strategy effort became known for its analysis of housing policy issues. From 1993 to 2008, Goodman was head of global fixed income research and manager of US securitized products research at UBS and predecessor firms, which were ranked first by *Institutional Investor* for 11 straight years. Before that, she held research and portfolio management positions at several Wall Street firms, and she began her career as a senior economist at the Federal Reserve Bank of New York. Goodman was inducted into the Fixed Income Analysts Hall of Fame in 2009. Goodman serves on the board of directors of MFA Financial, is an adviser to Amherst Capital Management, and is a member of Morningstar Credit Ratings Regulatory Governance Board and the Federal Reserve Bank of New York's Financial Advisory Roundtable. She has published more than 200 journal articles and has coauthored and coedited five books. Goodman has a BA in mathematics from the University of Pennsylvania and an AM and PhD in economics from Stanford University.

Walt Scott is a senior economist at Fannie Mae in Washington, DC, where he leads the research team that produces the company's flagship Desktop Underwriter risk model. He is the author of two US Treasury research studies on mortgage modifications and a Fannie Mae working paper on lending to extended family households. Scott joined Fannie Mae in 1996 as an information technology specialist and later entered the economics graduate program at American University. His recently completed PhD dissertation examines a nationwide mortgage crisis that occurred in the 1890s.

Jun Zhu is a senior research associate in the Housing Finance Policy Center. She designs and conducts quantitative studies of housing finance trends, challenges, and policy issues. Before joining Urban, Zhu worked as a senior economist in the Office of the Chief Economist at Freddie Mac, where she conducted research on the mortgage and housing markets, including default and prepayment modeling. She was also a consultant to the Treasury Department on housing and mortgage modification issues. Zhu received her PhD in real estate from the University of Wisconsin–Madison.

Statement of Independence

The Urban Institute strives to meet the highest standards of integrity and quality in its research and analyses and in the evidence-based policy recommendations offered by its researchers and experts. We believe that operating consistent with the values of independence, rigor, and transparency is essential to maintaining those standards. As an organization, the Urban Institute does not take positions on issues, but it does empower and support its experts in sharing their own evidence-based views and policy recommendations that have been shaped by scholarship. Funders do not determine our research findings or the insights and recommendations of our experts. Urban scholars and experts are expected to be objective and follow the evidence wherever it may lead.

URBAN
INSTITUTE · ELEVATE · THE · DEBATE

2100 M Street NW
Washington, DC 20037

www.urban.org