Fix or Evict?
Loan Modifications Return More Value Than Foreclosures

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CENTER FOR RESPONSIBLE LENDING

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Executive Summary

As we enter 2011, the United States housing market remains in the grip of an intractable foreclosure crisis, yet the number of borrowers facing foreclosure continues to outpace loan modifications at a rate of twelve to one (Mortgage Bankers Association 2009-2010, Hope Now Alliance 2009-2010). Why are so few loans being modified? Is it because modifications do not return adequate value to the investor, or is it for other reasons?

Mortgage servicers, who make the decision of whether to modify mortgages, are supposed to maximize revenue to the investor. When the reason for a mortgage delinquency is that the borrower can no longer afford the mortgage, either because of wage reductions or job loss or due to a rate reset on the mortgage, the servicing contract generally provides for some tools that the servicers can use; primary among them is a modification of the mortgage. If a borrower has fallen behind temporarily too far to catch up immediately but can afford the mortgage going forward, a modification might consist simply of a capitalization of arrearages. For most borrowers, however, it will be necessary to reduce the monthly payment (by reducing the interest rate, extending the loan term, or forbearing or forgiving principal) if they are going to be able to stay in their home.

Of course, reducing the payments of mortgages results in payment streams to investors that are lower than what they expected when they entered into the investment. The cost of modifications is further complicated by the fact that some borrowers who are given loan modifications will re-default,. But foreclosures are also extremely costly to investors—the costs incurred as a result of foreclosure include not only legal and servicing fees, but also property maintenance, sales costs and the depressed values that properties usually receive at foreclosure auctions. The total foreclosure costs borne by investors as a proportion of the total unpaid principal on a mortgage,

known as the "loss severity" is quite high—estimates suggest that losses for prime, alt-a and subprime loans are 49%, 59% and 75%, respectively.[1] Therefore, a comparison of the relative costs of reducing payments versus foreclosure costs must be weighed when determining which course of action is the better option for the investor.

In considering whether and how to modify a mortgage, the servicer generally uses a tool known as a net present value (NPV) test. In the NPV test, using information both actual and projected about the particular loan and borrower's financial capacity, servicers compare the investor's expected cash flow from a modified loan against the expected cash flow without a modification (which, in most cases, would lead to foreclosure and its associated costs). If the test results show that a loan modification is more likely to be financially beneficial for the investor, the modification offer should be extended to the borrower.

In this paper, we explore the question of whether the NPV test generally, and re-default rates specifically, can explain the relatively low number of modifications or whether the low level of modifications must be due factors outside of the NPV analysis To do so, we simulate NPV outcomes under a variety of scenarios and compare these scenarios to the actual market conditions. Our results indicate that for almost all of the simulated scenarios covering a broad range of boundaries, payment-reducing modifications would return more value to the investor than a foreclosure, even at high modification re-default rates.

Background

While economists continue to debate the degree to which we have weathered the recession, the number of foreclosures continues to increase. Right now, residential mortgage foreclosures are on track to reach 13 million by the end of 2014 (Goodman, Ashworth, Landy, & Yang, 2010; Hatzius & Marchoun, 2009), resulting in about $1 trillion in direct financial losses to borrowers, local governments and financial institutions (Kingsley, Smith and Price, 2009).[2] In addition, the

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[1] "Higher Loss Severities on Foreclosures Will Push Servicers to Short Sales in 2011", http://www.housingwire.com/2010/12/16/higher-loss-severities-on-foreclosures-will-push-servicers-to-short-sales-in-2011-fitch.
[2] The Urban Institute estimates that a single foreclosure results in $76,427 direct costs to the homeowner, lender/servicer, and local government. (Kingsley, Smith, Price, 2009).

crisis has an enormous indirect cost on owners of surrounding homes, who lose value on their properties simply by virtue of their proximity to foreclosures. CRL has estimated that by 2012, the foreclosure crisis will have stripped $1.9 trillion in value from these neighboring homes alone (CRL 2009).

Some analysts argue that all of these foreclosures will help the market reach its bottom, at which point recovery can ensue. This viewpoint, however, does not consider that many foreclosures are unnecessary and should not occur under a system where mortgage servicers are obligated to make changes to the mortgage if the changes would return a greater value to the investor. When unnecessary foreclosures take place, the market could overshoot what would otherwise be its bottom, and economic value is wasted. As Federal Reserve Chairman Ben Bernanke said in 2008, "To be sure, policy should not attempt to keep house prices from falling sufficiently to stabilize the demand for housing. But preventing avoidable foreclosures does not block necessary adjustments. Indeed, failing to prevent such foreclosures may heighten the risk that house prices will move lower than they would otherwise need to go."[3]

Affordable, sustainable loan modifications are the key tool for preventing unnecessary foreclosures.[4] Unfortunately, foreclosures are still outpacing the negotiation of affordable and sustainable loan modifications. This is true despite the Administration's Home Affordable Modification Program (HAMP), which offers monetary incentives to servicers and borrowers in an effort to encourage such modifications. While this program has had the positive effect of standardizing industry practices in conducting loss mitigation, it has only resulted in just over a half million permanent modifications so far. Most modifications are still being made outside of the HAMP program, and the public has very limited access to data concerning the details of those modifications. Moreover, even when HAMP and non-HAMP modification activities are combined, these efforts are still substantially lagging in relation to the number of borrowers in need of help (see Figure 1).

[3] Speech at the Federal Reserve System Conference on Housing and Mortgage Markets, Dec. 4, 2008.

[4] As noted previously, servicers do offer "loan modifications" that do not reduce monthly payments, but merely capitalize arrearages. These modifications often increase rather than decrease monthly payments and are not a broadly useful tool for preventing foreclosures.

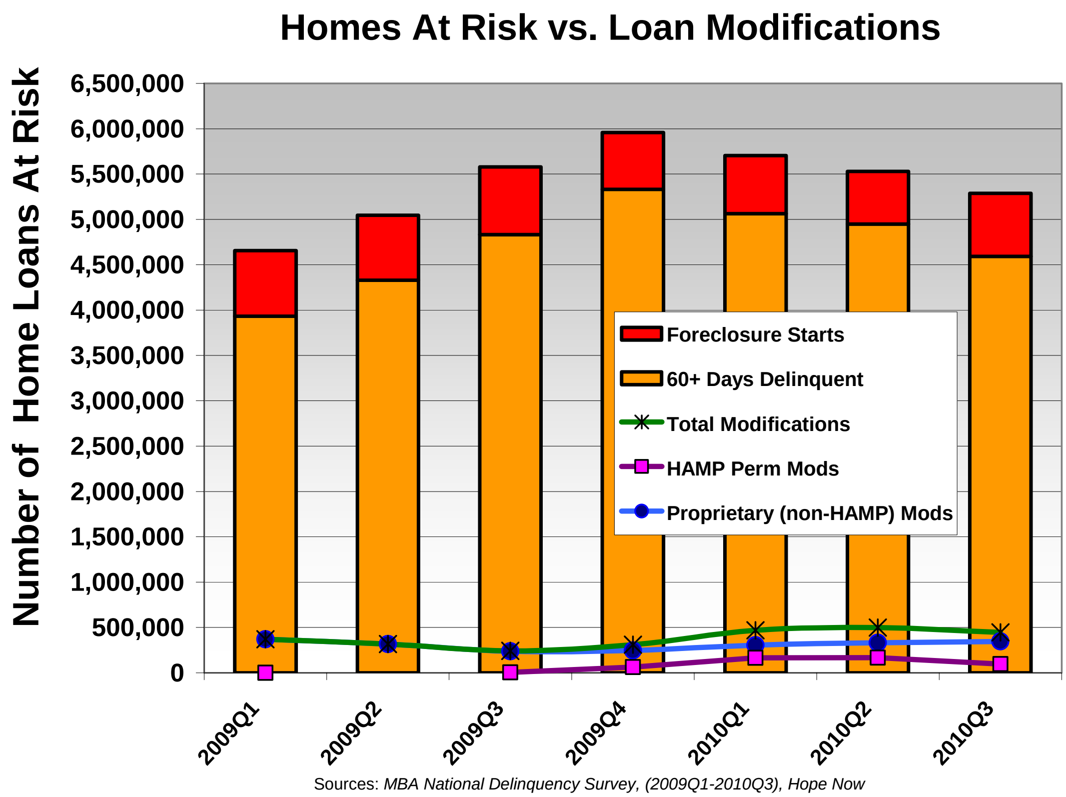

Figure 1: Homes at risk vs. loan modifications.

Substantial research has focused on the role of investors in the loan modification decision. Some researchers argue that seriously delinquent loans are foreclosed at a higher rate if they are securitized compared to loans that are held directly by the lending institutions (Piskorski, Seru and Vig, 2009). Others have suggested that securitization does not play a significant role. For example, Adelino, Gerardi and Willen (2009) found similar modification rates among securitized loans and those held in portfolio and therefore concluded that the servicers' reluctance to modify based on a contractual or perceived obligation to the investors of a security instrument was not an impediment. Instead, they suggest that the cost-benefit analysis that servicers use to determine whether modification is in the best interest of investors favors foreclosure over modification.

As described above, the relevant cost-benefit analysis is made at the individual loan level using a tool known as a net present value (NPV) test, which is typically conducted by the servicer on the investor's behalf. Using specific information (both actual and projected) on the particular loan and borrower's financial capacity, servicers compare the investor's expected cash flow from a modified loan against the amount that would be expected to be recovered from an unmodified loan, with the expected cash flow of the unmodified loan.

Self-cure and re-default rates are two common parameters in NPV tests and, along with many other parameters, play important roles in loan modification decisions. The self-cure rate is the percentage of delinquent borrowers that catch up on their payments on their own, without any foreclosure prevention measures taken by the lender. The re-default rate refers to the percentage of borrowers who receive a loan modification and subsequently fail to make payments under the modified mortgage.

As self-cure and re-default rates climb, the net present value of loan modification decreases. Adelino et al. (2009) theorized that the anticipated number of borrowers who self-cure, or catch up on their past due mortgage payments on their own, along with the number of modifications that are expected to eventually re-default, are the two key factors that drive the cost-benefit analysis to favor foreclosure over renegotiation and therefore explain the current low rate of loan modifications They did not, however, provide calculations concerning at what level and under what scenarios these two rates cause foreclosure to be more attractive than modification.

Self-cure rates have decreased dramatically since the subprime mortgage foreclosure crisis. Without describing the distribution on the credit spectrum of the loans used for self-cure rate calculation, Adelino et al. (2009) show a 30% self-cure rate for all mortgages in their sample, which is very likely an average of prime and subprime markets and heavily weighted by performances before market deterioration. Given the fact that almost all loan modifications are made after 2006, the projected self-cure rates used at the time of making loan modification decisions are likely to be much lower than 30%. Moreover, Schloemer et al. (2006) have shown that many subprime "cures" in previous years were actually distressed refinances—an option rarely available in the present market due to widespread negative equity and other factors.

According to Fitch Ratings (2009), from 2000 to 2006, average self-cure rates were 45%, 30% and 19% for prime, Alt-A, and subprime loans, respectively. Since the onset of the subprime mortgage crisis, these self-cure rates have dropped to 6.6%, 4.3% and 5.3% for prime, Alt-A and subprime, respectively.

Table 1. Drop in Self-Cure Rates.

	200-2006	2009
Subprime	19%	5.3%
Alt-A	30%	4.3%
Prime	45%	6.6%

Source: Fitch Ratings (2009)

In our NPV simulations, we have used "conservative" self-cure rate assumptions of 10% and 20%.[5] In other words, we use higher cure rates than are projected by analysts at present, which means we understate the number of loans where modification returns the greatest value.

For re-default rates, as noted previously, not all loan modifications are the same. Historically, many loan modifications either raised the borrowers' monthly payment or left it unchanged by capitalizing the arrearage and re-amortizing the mortgage but leaving all other terms of the loan unchanged. Thus, re-default rates vary across different categories of modifications. Available data indicates that re-default rates decrease as the percentage of payment reduction increases. According to the OCC and OTS Mortgage Metrics Report (2010Q3), modifications that decreased monthly payments had consistently lower re-default rates. Twelve months after modification, 61-62% of loans with payments unchanged or increased were 60 or more days delinquent, while the proportion of loans 60 or more days delinquent for modifications that reduced payments by less than 10%, 10% to less than 20%, and by 20% or more had re-default rates are 48%, 44% and 32% respectively (see Table 2). It is not surprising, then, that researchers have found that although lower payments reduce monthly cash flows to investors, they also reduce re-default risk and make the mortgage payments more sustainable in the long term (Quercia and Ding, 2009).

Table 2. Actual Re-default Rates 12 Months After Loan Modification

payment decreased by 20% or more	32%
payment decreased by 10% to less than 20%	44%
payment decreased by less than 10%	48%

[5] We also ran a set at 30% to mirror the research of Adelino et al., and those values are included in Appendix B, but 30% is so far from the current situation that we have not included the results in the text of this paper.

NPV Simulations

A delinquent loan considered for modification has four possible outcomes: (1) modified by the servicer and ultimately paid off in full by the borrower; (2) modified by the servicer but borrower defaults prior to full repayment (3) not modified but self-cured and paid off by the borrower; (4) not modified and borrower defaults prior to full repayment. Each outcome will have a series of monthly payments or cash flows. Whether a net present value test is positive or negative depends on the values of a set of input parameters including:

- the original annual interest rate on the note;
- the discount rate;
- the property value as proportion of unpaid principal balance at foreclosure liquidation;
- expected annual housing price appreciation rates after loan modification;
- the discount-on-sale plus selling costs;
- the percent payments are reduced by modification;
- the self-cure rate of loans not modified.
- the re-default rate of modified loans.

By assigning values to these parameters, we have calculated re-default rates at which the net present value of the income stream of the modified loans equals the amount that would be recovered through foreclosure. If the actual re-default rate is at or below this calculated re-default rate, a loan should be determined to be a good candidate for modification since the value of the modified loan equals or exceeds what could be recovered for investors through foreclosure. We call this re-default rate the "break-even re-default rate" for a given self-cure rate (conditional on the scenarios defined by the set of parameters).

In order to determine the break-even re-default rates, we ran 1536 simulated net present value calculations using a variety of parameters (see methodology section for more details). A summary of the simulated outcomes is shown below in Table 1. The results are evenly grouped into three levels of monthly payment reductions from 10% to 30%. Assuming a 10% self-cure rate, for modifications with a 10% payment reduction, under all scenarios, modification is in the best interest of investors, provided the expected re-default rate is less than 86%. For modifications with 20% and 30% payment reductions, modification is always in the best interest of the investor if the actual re-default rate is under 79% and 66%, respectively. Under scenarios that assume a 20% self-cure rate, for modifications with 10%, 20% and 30% payment reductions, these figures become 73%, 62% and 43%. [6]

To answer the question whether high re-default and self-cure rates are the main factors preventing more loan modifications, we need to compare our simulated results with existing market data on re-default rates.

Table 3: Break-Even Re-Default Rates

Minimum break-even re-default rates under different simulated scenarios 12 months after modification[7]		
	10% self-cure rate	20% self-cure rate
30% payment decrease	66%	43%
20% payment decrease	79%	62%
10% payment decrease	86%	73%

When we compare our results with actual market conditions, we find that the NPV test should favor a much higher proportion of payment-reducing modifications than are currently occurring. For example, assuming a 10% self-cure rate, payment reductions of up to 20% will be in the investor's interest under all simulated scenarios until the modified loans reach a re-default rate of 79%, which is about twice the current, actual re-default rates on loan payments reduced by 10% to less than 20% according to the OCC and OTS Mortgage Metrics Report (2010Q3). Even

[6] For a 30% self-cure rate scenario, the break-even re-default rates for 10%-, 20%- and 30%- reductions are 60%, 46% and 20%, respectively.
[7] Table 3 *cannot* be used to compare the benefits of various levels of payment decreases. That is, it tells us nothing about whether investors benefit more from a10%, 20% or 30% payment decreases.

assuming a 20% self-cure rate, which is extremely conservative relative to current market conditions, payment reductions of up to 20% will still be in the investor's interest under all simulated scenarios until the modified loans reach a re-default rate of 62%, which is about eighteen percentage points higher than the current, actual re-default rates on loan payments reduced by 10% to less than 20% according to the OCC and OTS Mortgage Metrics Report (2010Q3) (see Table 3 and Figure 2).

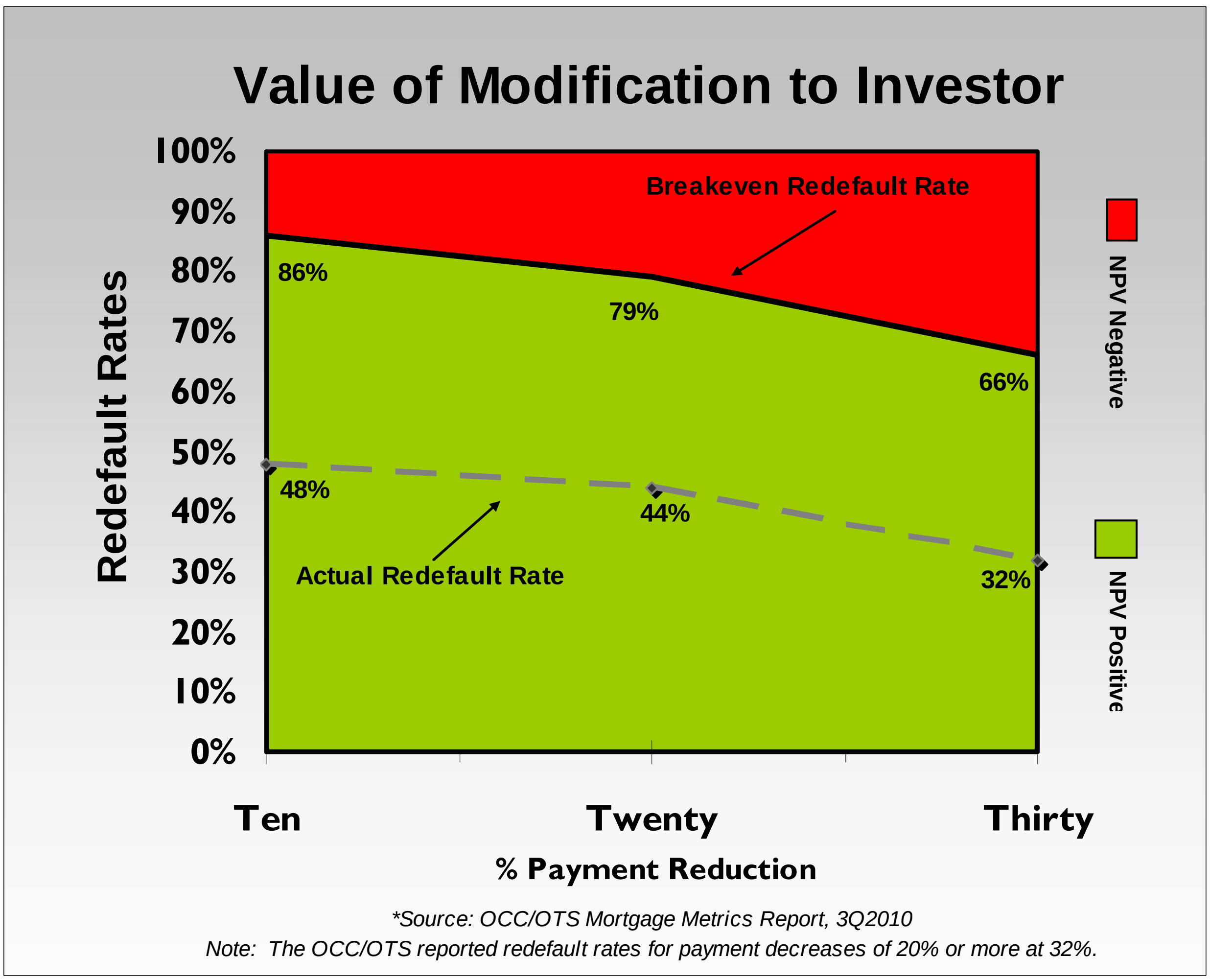

Figure 2: Minimum breakeven re-default rates for 10% self-cure rate under different scenarios vs. actual re-default rates. [8]

[8] As mentioned before, results from simulations do not allow for comparisons of the relative benefit of 10, 20 and 30% payment reductions.

Given this context, our results clearly show that current self-cure rates and re-default rates are within ranges that should lead to far more loan modifications. Future research addressing borrower eligibility, servicer capacity and their relative impact on the low incidence of modifications would provide greater context for the degree to which loan modifications have been underutilized.

Conclusion

In this paper we examined the reasons for the surprisingly low number of loan modifications completed during the foreclosure crisis to date. Our findings showed that under most scenarios, modification resulted in a more favorable outcome for investors than non-modification. As a result, we conclude that the failure to make more loan modifications is not due to high re-default rates or, for that matter, any of the other factors that enter the NPV analyses. That is, the low levels of modifications are not the result of servicers acting in the financial interest of the investor but something else entirely. Some other potential reasons for this failure could be the lack of capacity in mortgage servicing companies, misalignment of incentives due to the servicer compensation structure, lack of investor involvement, borrower confusion, and/or poorly designed program eligibility criteria.

While all those factors require additional research, it is clear that under the current system, a great deal of economic waste is taking place. For that reason, we recommend that all servicers be required to conduct a loss mitigation analysis prior to foreclosure sale and to share the results of that analysis with borrowers and investors. Disclosure of all the inputs and calculations used in the determination will enable homeowners to verify the information used in making the determination and will give investors a true picture of how much money they are losing from foreclosures.

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Appendix A: Methods

At the time servicers make a modification decision (T_1), we assume the loan is 60 days past due (according to MBA definitions). From T_1 to the end of the loan's full term, it has n months of remaining term. Let R_1 be the original monthly interest rate on the note, U_1 be the unpaid principal balance at T_1, and X be the original monthly principal and interest payment. The loan has four possible outcomes: (1) modified by the servicer and paid off eventually by the borrower (outcome A); (2) modified by the servicer but later defaulted (outcome B); (3) not modified but self-cured and paid off by the borrower (outcome C); and (4) not modified and defaulted (outcome D). Let P_1 be the probability of outcome B conditional on the loan being modified, P_2 be the probability of outcome C conditional on the loan not being modified. P_1 and P_2 are sometimes called re-default rate and self-cure rate, respectively. Consequently, the conditional probability of outcomes A and D are given by (1-P_1) and (1-P_2) respectively.

Table A1. Cash flows for the four outcomes after a loan is 60 days delinquent.

A. Mod: No Default	Month	T_1	…								T_n
	Payments	$X*w$	$X*w$								$X*a$
B. Mod: Default	Month	T_1	…	T_a	$T_{(a+1)}$	…	$T_{(a+b)}$	$T_{(a+b+1)}$	$T_{(a+b+2)}$	…	T_n
	Payments	$X*w$	$X*w$	$X*w$	0	0	0	Y_1	0	0	0
C. No Mod: No Default	Month	T_1	…	T_c	$T_{(c+1)}$	…					T_n
	Payments	$X*(1+2/c)$	$X*(1+2/c)$	$X*(1+2/c)$	X	X					X
D. No Mod: Default	Month	T_1	…	T_b	$T_{(b+1)}$	$T_{(b+2)}$	…				T_n
	Payments	0	0	0	Y_2	0	0				0

Each outcome will have a series of monthly payments or cash flows, as shown in Table A1. In outcome C, the loan self-cured from 60 days delinquent by the end of T_c by paying $(X*2/c)$ in addition to the regular monthly payments of X. From $T_{(c+1)}$ to T_n, the cash flow is uninterrupted monthly payments in the amount of X. In outcome D, the borrower stops making payments until the loan is foreclosed and liquidated at $T_{(b+1)}$. Let Y_2 be the expected REO disposition value for outcome D. Then Y_2 equals to (U_2*d*f), where U_2 is the unpaid principal balance at $T_{(b+1)}$. 'd' is the property value as a percentage of U_2, and *'f'* is the discount-on-sale associated with foreclosed homes plus selling costs. The rationale for this setup follows: first, the property value at $T_{(b+1)}$ essentially must be less than the unpaid principal balance of the loan assuming no selling cost. Otherwise, the equity position of the loan would allow the borrower to pay off the loan and avoid negative consequences of foreclosure. As a result, we can simplify the calculation by assigning the property value in terms of percentage of the unpaid principal balance at $T_{(b+1)}$, which is (U_2*d). Second, in addition to selling cost, there is another cost: the discount-on-sale. In outcome A, the cash flow is uninterrupted monthly payments in the amount of $(X*w)$ from T_1 to T_n. *'w'* is the portion of monthly principal and interest payment reduced by modification. For outcome B, from T_1 to T_a, the servicer keeps receiving monthly payments in the amount of $(X*w)$ each. From $T_{(a+1)}$, the borrower misses payments. Eventually the loan is foreclosed and liquidated at $T_{(a+b+1)}$. Similarly, the expected REO disposition value Y_1 at $T_{(a+b+1)}$ equals to $(U_2*d*(e*a/12)*f)$, where '*e*' is the change in housing prices over time '*a*'.

Table A2. Parameters and values for NPV test simulation.

Parameter	Definition	Values
R_1	Original monthly interest rate on the note	0.5%, 0.75%
R_2	Monthly discount rate for NPV calculation. The maximum allowed annual rate under HAMP is given by a Freddie Mac weekly survey rate plus 0.025	0.7017%
a	Months from modification to re-default (60 days delinquent)	12
b	Months from 60 days delinquent to foreclosure liquidation	6, 12
c	Months from 60 days delinquent to self cured	6, 12
d	Property value as % of U_2 at foreclosure liquidation	50%, 70%
e	Annual housing price appreciation during the period of '*a*'	-10%, -5%, 0%, 5%
f	Discount-on-sale plus selling costs	40%, 60%
n	Remaining loan term in months at modification decision point	330
w	% monthly principal and interest payment reduced by modification	10%, 20%, 30%, 40%
P_1	% re-defaulted '*a*' months after loan modification	Allowed to vary
P_2	% cured '*c*' months after 60 days delinquent	Allowed to vary

Given the above cash flows, assuming an annual discount rate of R_2, then the net present value for modified loans at time T_1 is given by

$$NPV_m = (1-P_1)\times\left[-U_1 + w\times\sum_{i=1}^{n}\frac{X}{(1+R_2)^{i/n}}\right] + P_1\times\left[-U_1 + w\times\sum_{i=1}^{a}\frac{X}{(1+R_2)^{i/n}} + \frac{Y_1}{(1+R_2)^{(1+a+b)/n}}\right] \quad (1)$$

Similarly, the NPV for loans not modified at time T_1 is given by

$$NPV_u = P_2\times\left[-U_1 + \sum_{i=1}^{c}\frac{X\times(1+2/c)}{(1+R_2)^{i/n}} + \sum_{i=1+c}^{n}\frac{X}{(1+R_2)^{i/n}}\right] + (1-P_2)\times\left[-U_1 + \frac{Y_2}{(1+R_2)^{(1+b)/n}}\right] \quad (2)$$

Since $X=U_1*V$, $Y_1=U_1*d*e*f$, and $Y_2=U_1*d*f$, for $NPV_m>=NPV_u$, P_1 and P_2 must meet the following condition:

$$P_1 \le \frac{G_4 - G_1}{G_2 - G_1} + \frac{G_3 - G_4}{G_2 - G_1}\times P_2\,, \quad (3)$$

Where

$$G_1 = w\times\sum_{i=1}^{n}\frac{V}{(1+R_2)^{i/n}}\,, \quad (4)$$

$$G_2 = w\times\sum_{i=1}^{a}\frac{V}{(1+R_2)^{i/n}} + \frac{d\times e\times(\frac{a}{12})\times f}{(1+R_2)^{(1+a+b)/n}}\,, \quad (5)$$

$$G_3 = \sum_{i=1}^{c}\frac{V\times(1+2/c)}{(1+R_2)^{i/n}} + \sum_{i=1+c}^{n}\frac{V}{(1+R_2)^{i/n}}\,, \quad (6)$$

$$G_4 = \frac{d\times f}{(1+R_2)^{(1+b)/n}}\text{, and} \quad (7)$$

$$V = \frac{R_1 \times (1 + R_1)^n}{(1 + R_1)^n - 1} \quad (8)$$

The fundamental purpose of this paper is to understand how the various parameters affect whether the NPV analysis will yield a positive or negative result. As has been shown above, any loan that satisfies Equation 3 will yield a positive net present value. Equations 4 through 8 map the effect of the underlying parameters on Equation 3. By varying these parameters systematically over a range of reasonable values, their ultimate influence on the outcome of Equation 3 can be understood. In the systematic variation, we change all of the values of the parameters iteratively, altering one value at a time until all combinations have been exhausted. Each iteration is one simulation. In all, we conducted 1536 simulations.

For the original annual interest rate on the note we use two values: 6% and 9%, which represent rates for prime and subprime loans, respectively. For a discount rate, we use the average contract interest rate on commitments for conventional 30 year fixed-rate first mortgages obtained from the weekly Primary Mortgage Market Survey® data provided by Freddie Mac plus 2.5 percentage points. The average period is from the first week of 2007 to the week of August 13, 2009. For the property value as proportion of U_2 at foreclosure liquidation, we take two values: 50% and 70%, which represent properties with negative equities deeply and mildly underwater, respectively. For expected annual housing price appreciation rates after loan modification, we take three values: -10%, -5%, 0%, and 5%. For discount-on-sale plus selling costs, we assume two values: 40% and 60%. For percent payments are reduced by modification, we create simulations based on four values ranging from 10% to 40%. According to the OCC and OTS Mortgage Metrics Report (2009-2010), although modifications that decrease monthly payments have increased significantly in recent quarters, the majority of modifications have payment reductions of less than 20%.

By assigning values to the parameters that appeared on the right side of Equation 3, we calculated re-default rates at which the net present value of the expected income stream of the modified loans will equal the amount that would be recovered from an unmodified loan, with the expected cash flow of the unmodified loan taking into account the likelihood of self-cure versus foreclosure and the cash flows that emanate from each of those possibilities. In other words, when the actual re-default rate is lower than this “break-even” re-default rate, a loan should be determined to be a good candidate for modification since the value of the modified loan equals or exceeds what could be recovered for investors through foreclosure.

We call this re-default rate the break-even re-default rate for a given self-cure rate, conditional on a set of parameters defined by Equation 3.

Appendix B: Full Results

Table B1. Breakeven re-default rates for 10%, 20% and 30% self-cure rates under 1536 scenarios which are defined by 1536 sets of parameters as appeared on the left side of Equation 3.

						Zero-NPV Re-default rate											
						Self-cure rate=10%				Self-cure rate=20%				Self-cure rate=30%			
						% Payment reduced				% Payment reduced				% Payment reduced			
R_1	b	c	d	e	f	10%	20%	30%	40%	10%	20%	30%	40%	10%	20%	30%	40%
6	6	6	50	5	40	99	97	94	90	86	82	75	65	73	66	56	41
6	6	6	50	5	60	100	98	95	88	87	81	72	55	73	64	50	22
6	6	6	50	0	40	97	95	92	87	84	80	73	63	71	64	55	39
6	6	6	50	0	60	97	94	90	81	84	78	68	51	70	61	47	20
6	6	6	50	-5	40	96	93	89	84	83	78	71	61	70	63	53	38
6	6	6	50	-5	60	94	90	85	75	81	75	65	47	68	59	44	19
6	6	6	50	-10	40	94	91	87	81	81	76	70	59	69	62	52	37
6	6	6	50	-10	60	91	87	81	70	78	72	62	44	66	57	42	18
6	6	6	70	5	40	100	98	95	88	86	81	73	58	73	64	51	27
6	6	6	70	5	60	100	100	96	75	88	80	62	0	73	59	29	0
6	6	6	70	0	40	97	94	90	83	84	78	69	54	71	62	49	25
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