

Bipartisan Policy Center
Housing Commission

**Modeling the Impact of Housing Finance
Reform on Mortgage Rates**

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January 2013



INTRODUCTION

We have been asked by the Bipartisan Policy Center to estimate the cost for private capital to provide insurance against losses on loans similar to those originated by the Government Sponsored Enterprises (GSEs), Fannie Mae and Freddie Mac. A range of estimates will be presented. In addition to the first loss (or predominate loss) being absorbed by the private sector, the public sector is likely to assume some limited catastrophic risk. Those potential costs would be additive to the private credit costs. Moreover, there will also be costs associated with public guarantor operations that will be required in a new system.

In order to evaluate this question, we created a pool of Freddie Mac conforming loans. The pool consisted of 4882 loans that were originated in 2012. This pool is not representative of the actual composition of Freddie Mac's loans and contains more high risk loans than their current origination. This selection allows us to look more broadly at the risk of different loans. Details on the pool and the stratification reports can be found in Appendix A.

In order to calculate the annual credit charge (ACC) on the pool and loan groups (cohorts) within it, two approaches were adopted. The first method utilizes a non-agency RMBS senior/subordinated securitization structure (Sr/Sub). In the agency market, the GSEs provide credit support for a securitization. In the non-agency market, the most common form of credit enhancement is the Sr/Sub structure. The second ACC calculation was derived from a capital charge (CC) model. This approach is driven by expected principal losses in the pool and a return on equity to the private entity. For both methodologies, we looked at the sample pool with and without Mortgage Insurance (MI) on the high loan-to-value (LTV) loans. Details of these methodologies are discussed below.

For loans with MI, the two methods produce a range of ACC of 31 to 46 basis points. Assuming operating costs of 6 basis points and an additional 8 basis point charge for the government wrap of the senior bonds, the required annual credit cost would be 45 to 60 basis points. If the high LTV loans did not have MI, the ACC would be 45 to 67 basis points and the associated annual credit cost would be 59 to 81 basis points. A pool with a mix of loans comparable to those originated in 2012 would likely have a lower credit charge.

Credit costs vary significantly based on borrower credit scores (FICO) and LTV ratios. For example, the credit cost for loans with FICO greater than 750 and LTV below 80% would be less than 25 basis points a year, while the credit cost for loans with FICO below 700 and LTV greater than 90% would be more than 10 times higher and exceed 250 basis points a year. Policy decisions to widen or narrow the "credit box" could have a great impact on the required ACC. The results here assume modest home price appreciation in the base case, consistent with long term income growth. However, during periods of falling home prices or greater market uncertainty, the market price for credit guarantees would be higher.

The Methodology

Note: A glossary of terms is provided in Appendix B.

THE POOL

The pool consists of Freddie Mac eligible loans that were originated in 2012. It is not a representative sample, but was constructed to show a range of loan characteristics. The majority of the coupons were in the 3.00-3.50% range (54.6%). The other primary coupon buckets were 2.50-3.00% (20.1%) and 3.50-4.00% (23.2%). The weighted average FICO of the pool was 762, and the weighted average LTV was 80%. With respect to MI coverage, 55.5% of the loans were at 80% LTV or lower and do not require MI. Note that this is a much higher percentage than current originations. The purpose was to be able to show the volatility in ACC over a range of FICO/LTV buckets. Over 95% of the loans were for owner-occupied properties. All of the loans were 30-year fixed-rate mortgages. The pool was geographically diversified. CA accounted for 17.9% of the pool balance, and IL was next at 6.2%. Detailed pool data are provided in Appendix A.

SCENARIO DETERMINATION

To analyze the loans we constructed 20 scenarios. These scenarios reflect favorable to stressed economic conditions relative to a base case, or most likely scenario. The stressed economic conditions are primarily interest rates and housing prices. These scenarios are then fed into AD&Co's credit risk model—LoanDynamicsTM (LDM). The output from LDM profiles the credit performance of each loan given its characteristics.

A base case housing price growth rate of 3.05% per annum was assumed. In the most favorable scenario, Scenario 1, the two-year housing price growth rate is 31.1%. In the extreme stress scenario, Scenario 20, the two-year growth rate is -24.5%. Interest rates vary -125 bps in Scenario 1 to 225 bps in Scenario 20. Note that the 20 scenarios include model error assumptions as well. The following parameters are shocked: the default rate, the prepayment rate, and loss severity. Therefore the stress and extreme stress scenarios have both adverse economic trends and model error.

The housing price assumptions are provided in Table 1, below. A detailed matrix of the scenarios is in Appendix C. These scenarios show the economic assumptions and how the default rates, prepayment rates, and loss severities are adjusted in each scenario. The severity represents losses on all defaulting loans, not just those entering REO, as many loans experience no loss following default. As one moves into the stress scenarios, loss severity rises sharply.

Table 1. Scenario Housing Price Assumptions and Loss Severity

	One Year HPI Growth	Two Year HPI Growth	Maximum HPI Decline	WAVG Severity
Best	16.3	31.1		5.9
2	14.0	26.6		7.2
3	11.8	22.3		8.8
4	9.6	18.2		10.5
5	7.9	15.1		11.9
6	6.3	12.0		13.3
7	4.6	9.1		14.8
Base	3.0	6.2		16.4
9	1.5	3.5		17.6
10	0.0	0.9	0.0	19.0
11	-1.5	-1.6	-1.8	20.6
12	-2.9	-4.1	-4.1	22.4
13	-4.4	-6.5	-6.6	24.6
14	-5.8	-8.8	-9.2	27.0
15	-7.5	-11.6	-12.5	30.3
16	-9.1	-14.3	-15.8	33.8
17	-10.7	-17.0	-19.0	37.2
18	-12.3	-19.6	-22.2	40.7
19	-13.9	-22.1	-25.2	44.1
Worst	-15.5	-24.5	-28.2	47.4

Each scenario is assigned a probability using the 3-part Vasicek method (see References), and these are shown in the table below. This allows one to weight the various credit performance metrics (default, expected losses, etc.) on a probability weighted basis. A diagram showing the scenario probabilities is provided in Appendix D.

Table 2. Scenario Probabilities

	Improving					Base		Moderate Stress				Stress			Extreme Stress					
Scenario	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CDF	0.0	2.9	9.8	17.4	25.2	33.2	41.5	50.0	57.4	64.6	71.3	77.5	83.0	87.8	91.8	95.0	97.5	99.0	99.8	100.0
Scenario Prob.	0.0	2.9	6.9	7.6	7.8	8.0	8.3	8.5	7.4	7.2	6.7	6.2	5.5	4.8	4.0	3.3	2.5	1.5	0.8	0.3

SENIOR/SUB APPROACH

This approach is based on an analogy with the non-agency RMBS market. In a securitization, the credit risk of a bond reflects the credit risk of the underlying collateral and its cash flow priority. A single loan can be viewed similarly. We define three risk components: senior, mezzanine, and subordinate. The riskier components take the losses, thereby providing credit enhancement to the more senior components. In other words, principal losses are first absorbed by the subordinate piece, then the mezzanine, and finally by the senior component. In the securities market, senior bonds are protected by lower rated bonds. The subordinate bond has the highest risk and takes the first principal write-downs. It has no credit support. If this bond is fully written down, the losses are then taken by the mezzanine bond. If losses are such that the mezzanine bond is totally written down, then the senior bond is subject to principal write-downs. We assume pools of similar loans to create the equivalence between loans and securities.

The size of the senior component can be derived by assigning a probability of default to the loan. For this analysis, 0.5% was selected. In other words, how much of the loan's principal is required to support the senior amount of principal up to a 0.5% probability of default. This is approximately Scenario 19 which has a home price trough of -25%. For the mezzanine's size, 5% was selected. This is near Scenario 16 which has a home price trough of -15%. Obviously, the riskier the loan, the smaller the senior component, and vice versa.

Once the three loan class sizes have been determined, the ACC formula is:

ACC = Base Case Loss/5 + Mezz Subordination * 10% + (Senior Subordination – Mezz Subordination) * 1%

This method is conservative as it assumes that the full capital requirement to bear all losses for the loans is partitioned from the senior bonds at the issuance of the securities. It is sensitive to assumptions about the range of potential scenarios, credit spreads, and the cost of debt. The “5” reflects the average life of the mortgage (see IOM below), the “10%” term is an equity premium, and the “1%” term is the average spread on the mezzanine bonds, AA to BBB.

CAPITAL REQUIREMENT APPROACH

This approach is equivalent to MI. In other words, given a rate of return on equity and an estimate of expected principal write-downs in the pool, what should the capital requirement be? To determine the capital requirement we use an Expected Shortfall (ES) methodology. The ES is the probability weighted loss on the loans in the 5% most adverse scenarios; that is scenarios 17 through 20. Note that the capital amount is less than the Senior enhancement level.

The Capital Requirement approach is based upon the following formula for a one period insurance contract.

$$p(1 + r) = \mu + (l_{ES} - \mu) \frac{R - r}{1 + R}$$

p is the insurance premium
 μ is the expected loss
 l_{ES} is the expected shortfall
 R is the pre-tax target ROE
 r is the risk-free rate.

The formula says that the value of the premium after investment for one period is equal to the expected loss (EL) plus a charge for the incremental capital required to cover losses up to the ES.

This equation can be generalized to a multi-period model assuming maximum losses are budgeted over the life of the loan to:

$$p = \frac{PV(loss) + l_{max}R(IOM) - l_{max}(IOF)}{(IOM)(1 + R)}$$

PV (loss) is the present value of the EL
IOM is Interest Only Multiple (IO price/coupon)
IOF is Interest Only Floater
 l_{max} is maximum annual loss rate (assumed to be ES/IOM)

These terms are further explained in Appendix B. We will assume a 20% pre-tax ROE for this analysis; the other parameters are results of the loan analysis. Higher ROE requirements will increase these costs. The important thing to recognize is that the ACC is driven by three major parameters: EL on the loan (pool), maximum annual loss rate, and the rate of return on equity assumption. EL is critical to both the Sr/Sub method and the Capital Requirement. The Capital Requirement approach coupled with the assumption that maximum losses are budgeted over the life of the loan is less conservative than the Sr/Sub method and produces a lower ACC even though we assumed a higher equity premium. This approach, with a lower total amount of capital, provides greater risk to the bond investors or the catastrophic guarantor.

The Results

Using the Sr/Sub and Capital Requirement methods, ACC estimates were calculated with and without MI. This takes into account the risk that MI providers will be undercapitalized and default on their obligations which occurred in the last cycle. The estimated ACC will be provided for the pool and by selected FICO/LTV buckets.

The base case credit risk profile of the pool is shown in Tables 3 and 4. The pool has a Cumulative Loss of 32 bps, a Cumulative Default % of 2, and Loss Severity of 16%. Cumulative Loss is defined as the projected life-time principal write-down plus interest shortfalls in the base case scenario. Similarly, Cumulative Default is the base case estimated life-time default rate. Loss Severity is base case loss given default. In other words, the Loss Severity multiplied by the Cumulative Default will equal the Cumulative Loss. The results are also shown by LTV and FICO buckets. As one would expect, higher LTVs correspond to higher defaults and losses. Clearly, the 90+ LTV buckets are the riskiest, even with MI. Similar results hold for the FICO buckets. There is a significant increase in risk below 700 FICO, and it accelerates dramatically below 650 FICO.

The base case results produce losses that appear reasonable for a book of business that is somewhat riskier than the current GSE originations. Defaults include loans which may not experience losses, thus producing lower severities than if we only included loss terminations in the definition of default.

Table 3. Base Case Credit Performance by OLTV

OLTV Bucket	Count	Balance (\$)	Balance (%)	Cumulative Loss (%)	Cumulative Default (%)	Severity (%)	FICO	OLTV	OCLTV
50 - 55	77	\$19,606,674	1.76%	0.0	0.4	5	778	55	57
55 - 60	466	\$114,259,582	10.27%	0.0	0.4	7	770	58	60
60 - 65	383	\$96,198,582	8.65%	0.0	0.4	9	774	63	65
65 - 70	523	\$134,296,273	12.07%	0.1	0.5	13	774	68	69
70 - 75	713	\$176,789,705	15.89%	0.1	0.7	16	773	73	74
75 - 80	299	\$76,579,378	6.88%	0.2	1.0	17	767	77	78
80 - 85	319	\$63,764,207	5.73%	0.5	2.4	22	753	84	84
85 - 90	736	\$159,341,172	14.32%	0.5	2.8	17	756	89	89
90 - 95	1142	\$232,523,693	20.90%	0.6	3.9	15	755	94	95
95 - 100	126	\$21,893,755	1.97%	1.5	7.6	20	725	98	99
100 - 105	98	\$17,254,660	1.55%	2.0	9.0	22	723	103	104
Grand Total	4882	\$1,112,507,681	100.00%	0.3	2.0	16	762	80	80

Table 4. Base Case Credit Performance by FICO

FICO Bucket	Count	Balance (\$)	Balance (%)	Cumulative Loss (%)	Cumulative Default (%)	Severity (%)	FICO	OLTV	OCLTV
450 - 500	1	\$51,497	0.00%	24.2	44.9	54	472	103	103
500 - 550	7	\$836,598	0.08%	9.8	35.4	28	528	92	92
550 - 600	17	\$2,752,939	0.25%	5.5	24.6	23	577	88	89
600 - 650	60	\$9,015,875	0.81%	2.8	13.1	21	636	85	87
650 - 700	343	\$64,094,879	5.76%	1.4	7.8	18	682	85	86
700 - 750	1074	\$234,674,599	21.09%	0.6	3.7	16	728	83	84
750 - 800	2603	\$620,281,829	55.76%	0.1	0.9	14	778	79	79
800 - 850	777	\$180,799,465	16.25%	0.0	0.2	14	808	75	76
Grand Total	4882	\$1,112,507,681	100.00%	0.3	2.0	16	762	80	80

ANNUAL CREDIT CHARGE—WITH MORTGAGE INSURANCE

Note: The ACC estimates discussed below are only credit costs and do not include the operating costs of an entity or the assumption of catastrophic risk absorbed by the government.

For the sample pool, the annual Sr/Sub ACC is 45.7 bps, and the CC ACC is 30.8 bps. These estimates are based upon the scenarios above, which define the level of credit risk being covered. Our methodology is intended to provide a range of potential ACCs, not a point estimate. Note that the Sr/Sub ACC is approximately 50% larger. This is explained by the fact that the Sr/Sub ACC is funded immediately at the time of securitization. Conversely, the CC ACC is funded and accretes over time. However, assumptions about ROE versus subordination levels are not directly comparable.

Table 5. Pool ACC Assuming MI

Pool(MI Coverage)				
Expected Loss (%)	Expected Shortfall (%)	Senior Subordination (%)	Mezz Subordination (%)	Base Case Loss (%)
0.9	5.3	7.6	3.5	0.3
ACC (bp) Sr/Sub	ACC (bp) Capital			
45.7	30.8			

Although the pool does include high LTV/low FICO loans, the credit metrics of this pool are quite positive. The Base Case Loss is only 32 bps, and the EL, the probability weighted loss across all 20 scenarios, is 90 bps. The ES, the probability weighted loss of Scenarios 16-20 (Extreme Stress), is 5.3%. If this pool was securitized, the credit support for the Senior bond would be 7.56%.

In order to look at a range of potential risk-based pricing, we produced a matrix of results by three FICO (650-700, 700-750, and 750-800) and LTV buckets (80-85, 85-90, and 90-95). The

FICO/LTV break-downs are in Table 6. Note that all of the FICO/LTV buckets for the entire pool are provided in Appendix E.

The 3x3 FICO/LTV matrix clearly demonstrates that the risks of lower FICOs and higher LTVs are significant.

Table 6. Pool Annual Credit Charge Variation with MI—Selected Buckets

Selected FICO/LTV Buckets		FICO Bucket		
OLTV Bucket		650 - 700	700 - 750	750 - 800
80 - 85	Base Case Loss (%)	1.7	0.7	0.2
	Expected Loss (%)	3.2	1.6	0.6
	Expected Shortfall (%)	16.2	9.7	4.3
	Senior Subordination (%)	21.9	13.7	6.5
	Mezz Subordination (%)	11.6	6.5	2.6
	ACC (bp) Sr/Sub	162	87	34
	ACC (bp) Capital	102	56	23
85 - 90	Base Case Loss (%)	1.5	0.9	0.2
	Expected Loss (%)	2.7	1.8	0.6
	Expected Shortfall (%)	13.4	10.5	4.6
	Senior Subordination (%)	18.2	14.6	7.0
	Mezz Subordination (%)	9.6	7.2	2.8
	ACC (bp) Sr/Sub	135	97	37
	ACC (bp) Capital	127	92	37
90 - 95	Base Case Loss (%)	1.9	1.0	0.3
	Expected Loss (%)	3.3	2.1	0.9
	Expected Shortfall (%)	15.7	11.8	6.0
	Senior Subordination (%)	20.6	16.4	8.9
	Mezz Subordination (%)	11.7	8.2	3.8
	ACC (bp) Sr/Sub	164	110	49
	ACC (bp) Capital	102	70	32

For example, the 700-750 FICO bucket was considered to be “near-prime.” In the 80-85% LTV bucket the ACCs now range from 56 bps to 87 bps. In the 90-95% bucket, the range is 70 bps to 110 bps. If the FICO bucket is 650-700, the ACC are above 100 bps in all cases, peaking at 164 bps.

To summarize, while ACCs across the entire sample pool and the higher risk pool segment appear to be relatively moderate, these estimates mask considerable variation across the FICO and LTV distribution.

ANNUAL CREDIT CHARGE WITH NO MI

Without MI, the ACC estimates rise as expected. The Sr/Sub ACC increases to 67.3 bps, and the CC ACC rises to 44.9 bps. The Base Case Loss is now 53 bps, the EL is 1.35%, and the ES is 7.5%. If this pool was securitized in a Sr/Sub structure, the senior bond's subordination would be nearly 300 bps higher, reflecting the high proportion of high LTV loans in the sample pool.

Table 7. Pool Annual Credit Charge—No MI

Pool(NO MI Coverage)				
Expected Loss (%)	Expected Shortfall (%)	Senior Subordination (%)	Mezz Subordination (%)	Base Case Loss (%)
1.4	7.5	10.5	5.1	0.5

ACC (bp) Sr/Sub	ACC (bp) Capital
67.3	44.9

In order to have a consistent comparison, the same 3X3 FICO/LTV buckets are show below in Table 8. All of the cohorts for this scenario are in Appendix F.

The impacts of this scenario on gfees are quite substantial. In the 700-750/80-85 the ACC range is 63 bps to 99 bps. Using the same FICO range and the next LTV range (85-90), the ACCs are now 90 bps to 142 bps. Therefore in the absence of MI, the potential credit costs are substantial. If borrowers must meet the 750-800 FICO range, then the effects are muted.

Table 8. Annual Credit Charge by FICO/LTV Buckets, No MI

Selected FICO/LTV Buckets				
OLTV Bucket		FICO Bucket		
		650 - 700	700 - 750	750 - 800
80 – 85	Base Case Loss (%)	2.0	0.8	0.2
	Expected Loss (%)	3.6	1.8	0.7
	Expected Shortfall (%)	18.4	11.0	4.9
	Senior Subordination (%)	24.8	15.5	7.4
	Mezz Subordination (%)	13.2	7.4	3.0
	ACC (bp) Sr/Sub	183	99	39
	ACC (bp) Capital	115	63	26
85 – 90	Base Case Loss (%)	2.2	1.3	0.4
	Expected Loss (%)	3.9	2.7	1.0
	Expected Shortfall (%)	19.4	15.2	7.0
	Senior Subordination (%)	26.0	21.0	10.4
	Mezz Subordination (%)	14.0	10.6	4.3
	ACC (bp) Sr/Sub	196	142	57
	ACC (bp) Capital	123	90	37

90 – 95	Base Case Loss (%)	3.4	1.9	0.6
	Expected Loss (%)	5.7	3.7	1.6
	Expected Shortfall (%)	25.5	19.8	10.5
	Senior Subordination (%)	32.8	26.8	15.2
	Mezz Subordination (%)	19.4	14.1	6.8
	ACC (bp) Sr/Sub	276	192	89
	ACC (bp) Capital	171	121	58

Appendix A—Pool Stratification Reports

OBAL Bucket	Count	Balance (\$)	Balance (%)	Cumulative Loss (%)	Cumulative Default (%)	Severity (%)	FICO	OLTV	OCLTV
0 – 50000	24	\$983,895	0.09%	2.0	2.9	70	737	81	81
50000 - 100000	510	\$41,852,304	3.76%	1.0	3.0	34	748	80	80
100000 - 150000	860	\$106,383,368	9.56%	0.6	2.5	22	756	82	83
150000 - 200000	903	\$157,583,892	14.16%	0.4	2.3	18	760	84	84
200000 - 250000	730	\$163,286,205	14.68%	0.3	2.0	17	768	80	80
250000 - 300000	557	\$152,375,629	13.70%	0.3	2.1	15	765	79	80
300000 - 350000	446	\$144,469,325	12.99%	0.3	1.9	13	769	78	79
350000 - 400000	451	\$169,083,646	15.20%	0.2	1.5	11	771	75	76
400000 - 450000	310	\$127,424,405	11.45%	0.2	1.6	10	768	73	75
450000 - 500000	31	\$14,719,436	1.32%	0.1	1.0	9	779	75	75
500000 - 550000	21	\$10,931,282	0.98%	0.1	1.0	9	773	72	73
550000 - 600000	16	\$9,171,998	0.82%	0.1	1.5	8	766	72	72
600000 - 650000	23	\$14,242,297	1.28%	0.0	0.5	7	770	65	67
Grand Total	4882	\$1,112,507,681	100.00%	0.3	2.0	16	762	80	80

Purpose	Count	Balance (\$)	Balance (%)	Cumulative Loss (%)	Cumulative Default (%)	Severity (%)	FICO	OLTV	OCLTV
Refi-Rate	2739	\$634,271,916	57.01%	0.3	1.6	18	763	77	78
Purchase	1716	\$380,724,246	34.22%	0.4	2.9	15	759	87	87
Refi-CO	427	\$97,511,519	8.77%	0.1	0.5	15	771	67	68
Grand Total	4882	\$1,112,507,681	100.00%	0.3	2.0	16	762	80	80

Occupancy	Count	Balance (\$)	Balance (%)	Cumulative Loss (%)	Cumulative Default (%)	Severity (%)	FICO	OLTV	OCLTV
Owner	4593	\$1,059,664,200	95.25%	0.3	2.0	16	762	80	81
Investor	163	\$25,211,937	2.27%	0.4	1.7	24	768	75	75
SH	126	\$27,631,544	2.48%	0.3	1.6	21	767	73	74
Grand Total	4882	\$1,112,507,681	100.00%	0.3	2.0	16	762	80	80

PropertyType	Count	Balance (\$)	Balance (%)	Cumulative Loss (%)	Cumulative Default (%)	Severity (%)	FICO	OLTV	OCLTV
SFR	3400	\$737,690,383	66.31%	0.4	2.2	17	760	81	81
PUD	1224	\$321,872,532	28.93%	0.2	1.4	13	770	77	77
OTHER	249	\$51,891,171	4.66%	0.4	2.4	17	760	83	83
MH	8	\$855,321	0.08%	0.7	1.5	47	754	80	83
Co-Op	1	\$198,274	0.02%	0.1	0.3	32	797	97	97
Grand Total	4882	\$1,112,507,681	100.00%	0.3	2.0	16	762	80	80

State	Count	Balance (\$)	Balance (%)	Cumulative Loss (%)	Cumulative Default (%)	Severity (%)	FICO	OLTV	OCLTV
CA	598	\$199,047,475	17.89%	0.1	0.8	9	774	71	71
IL	335	\$69,197,142	6.22%	0.4	1.9	19	759	81	82
TX	255	\$52,014,622	4.68%	0.4	2.6	15	755	80	80
IN	228	\$37,338,325	3.36%	0.6	2.4	23	753	84	85
OH	206	\$33,774,587	3.04%	0.7	2.9	23	757	89	89
NC	190	\$43,130,746	3.88%	0.3	2.0	14	765	77	78
PA	177	\$37,052,203	3.33%	0.5	2.1	22	761	78	79
WI	176	\$29,098,430	2.62%	0.5	2.5	20	759	84	85
NJ	153	\$43,820,049	3.94%	0.3	1.8	18	763	75	76
VA	151	\$46,226,817	4.16%	0.2	1.5	11	771	75	76
MA	151	\$43,888,755	3.95%	0.4	2.8	15	758	78	79
NY	150	\$30,678,392	2.76%	0.6	2.7	21	758	86	86
MN	148	\$30,748,693	2.76%	0.4	2.7	16	765	86	86
FL	144	\$28,797,762	2.59%	0.2	1.3	13	766	79	79
MI	136	\$22,261,165	2.00%	0.5	3.0	18	757	86	87
CO	109	\$25,122,899	2.26%	0.3	2.0	13	769	80	81
AZ	106	\$25,664,879	2.31%	0.2	1.4	11	765	73	75
WA	100	\$25,605,267	2.30%	0.2	2.1	10	765	79	79
UT	99	\$21,628,747	1.94%	0.2	1.5	12	770	80	80
MD	99	\$28,784,937	2.59%	0.1	1.2	11	765	74	75
MO	96	\$18,112,455	1.63%	0.3	2.1	15	764	85	85
KY	94	\$17,839,398	1.60%	0.5	2.3	22	760	84	84
GA	91	\$19,080,859	1.72%	0.3	1.8	15	764	81	81
SC	88	\$18,647,232	1.68%	0.3	1.8	18	763	80	81
KS	84	\$14,752,829	1.33%	0.6	3.1	19	748	87	87
OR	82	\$18,916,648	1.70%	0.2	1.5	11	777	79	80
CT	68	\$16,341,289	1.47%	0.6	3.0	19	762	79	79
TN	58	\$10,840,871	0.97%	0.5	3.2	17	750	86	87
IA	54	\$8,470,390	0.76%	0.6	2.4	23	755	85	85
OK	41	\$6,503,565	0.58%	0.7	3.3	20	751	85	85
AR	38	\$8,390,585	0.75%	0.4	2.8	13	761	80	80
LA	38	\$5,983,987	0.54%	0.8	3.3	24	739	83	83
AL	37	\$7,806,768	0.70%	0.5	4.0	14	746	83	83
NE	30	\$3,941,488	0.35%	0.5	2.6	21	768	81	81
HI	28	\$11,838,885	1.06%	0.3	2.7	10	759	79	79
NH	27	\$5,904,615	0.53%	0.8	4.8	16	754	85	85
VT	25	\$5,299,003	0.48%	0.5	2.4	20	760	84	84
NM	24	\$3,707,239	0.33%	0.3	1.4	19	772	78	78
ID	22	\$3,596,723	0.32%	0.4	1.8	19	759	80	82
RI	22	\$4,863,875	0.44%	0.2	1.6	14	754	77	79
ME	18	\$3,935,669	0.35%	0.4	2.6	17	767	82	82

WV	14	\$2,235,035	0.20%	0.4	2.5	16	754	85	85
NV	14	\$2,966,799	0.27%	0.2	2.1	11	760	79	80
MT	12	\$3,016,133	0.27%	0.2	2.0	10	769	79	80
SD	11	\$2,314,384	0.21%	0.3	1.7	20	775	86	88
AK	11	\$3,037,024	0.27%	0.9	5.6	16	736	81	81
DE	10	\$2,537,963	0.23%	0.1	0.4	13	761	66	67
MS	10	\$2,152,672	0.19%	0.5	2.8	17	756	86	86
WY	8	\$1,401,539	0.13%	0.1	0.5	16	788	77	77
DC	7	\$2,463,878	0.22%	0.1	1.2	11	766	80	80
Grand Total	4873	\$1,110,781,693	100.00%	0.3	2.0	16	762	80	80

MI Coverage (%)	Count	Balance (\$)	Balance (%)	Cumulative Loss (%)	Cumulative Default (%)	Severity (%)	FICO	OLTV	OCLTV
0	2456	\$616,957,771	55.46%	0.1	0.6	13	772	68	69
6	100	\$18,305,173	1.65%	0.2	1.0	24	763	84	84
12	349	\$72,956,214	6.56%	0.5	2.4	22	753	87	88
16	3	\$508,673	0.05%	1.9	6.2	31	706	96	96
17	23	\$4,822,044	0.43%	1.7	7.2	23	734	95	96
18	10	\$1,373,149	0.12%	2.8	9.9	29	704	96	96
20	44	\$5,438,122	0.49%	2.6	9.3	28	710	98	98
25	864	\$182,788,422	16.43%	0.6	3.2	17	755	91	91
30	984	\$202,241,259	18.18%	0.6	4.4	14	753	95	95
35	48	\$7,059,607	0.63%	1.5	8.5	18	713	95	95
40	1	\$57,247	0.01%	2.2	4.3	50	684	97	97
Grand Total	4882	\$1,112,507,681	100.00%	0.3	2.0	16	762	80	80

Coupon Bucket	Count	Balance (\$)	Balance (%)	Cumulative Loss (%)	Cumulative Default (%)	Severity (%)	FICO	OLTV	OCLTV
2.50 - 3.00	1053	\$223,172,584	20.06%	0.1	0.5	23	767	75	75
3.00 - 3.50	2318	\$607,114,853	54.57%	0.2	1.4	14	770	77	78
3.50 - 4.00	1353	\$257,617,536	23.16%	0.6	4.0	16	751	86	87
4.00 - 4.50	155	\$24,182,486	2.17%	1.9	8.9	22	714	96	96
4.50 - 5.00	3	\$420,223	0.04%	1.0	6.1	17	738	89	89
Grand Total	4882	\$1,112,507,681	100.00%	0.3	2.0	16	762	80	80

Balance (%)	OLTV											Grand Total	
	FICO	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75	75 - 80	80 - 85	85 - 90	90 - 95	95 - 100		100 - 105
450 - 500	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
500 - 550	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.01%	0.02%	0.00%	0.02%	0.08%
550 - 600	0.00%	0.00%	0.00%	0.02%	0.02%	0.00%	0.04%	0.04%	0.03%	0.06%	0.03%	0.03%	0.25%
600 - 650	0.00%	0.04%	0.05%	0.10%	0.07%	0.04%	0.06%	0.07%	0.17%	0.06%	0.14%	0.14%	0.81%
650 - 700	0.04%	0.36%	0.24%	0.33%	0.40%	0.24%	0.53%	1.19%	1.68%	0.51%	0.24%	0.24%	5.76%
700 - 750	0.27%	1.74%	1.39%	1.58%	2.37%	1.46%	1.41%	3.68%	6.19%	0.62%	0.39%	0.39%	21.09%
750 - 800	1.00%	6.23%	5.00%	7.37%	9.69%	3.86%	3.00%	7.65%	10.74%	0.65%	0.56%	0.56%	55.76%
800 - 850	0.46%	1.90%	1.96%	2.67%	3.32%	1.29%	0.66%	1.67%	2.07%	0.07%	0.17%	0.17%	16.25%
Grand Total	1.76%	10.27%	8.65%	12.07%	15.89%	6.88%	5.73%	14.32%	20.90%	1.97%	1.55%	100%	

Appendix B—Glossary of Terms

Generic Terms

FICO—borrower’s credit score, Fair Isaac Company

HPI—housing price index

HPA—percentage change in the HPI

OLTV—original loan-to-value ratio on the property, first lien only

OCLTV—combined loan-to-value ratio inclusive of 2nd liens and home equity lines of credit (HELOCs)

General Loss Measures

Base Case Loss—the projected life-time loss (principal and interest) in the base case or “most likely” scenario

Cumulative Loss—the projected life-time loss in any given scenario

Expected Loss—the probability weighted cumulative loss over the 20 scenarios

Loss Severity—the loss rate of a defaulted loan as the present value of cumulative losses divided by the principal balance; also the Cumulative Loss divided by the Cumulative Default rate

AD&Co Proprietary Metrics

Expected Shortfall—the probability weighted cumulative losses in the five extreme stress scenarios

Senior Subordination Percentage—the amount of credit support required to withstand defaults up to a 99.5% probability for the senior loan/bond component; the riskier the loan, the higher the subordination percentage

Mezzanine Subordination Percentage—the amount of credit support required to withstand defaults up to a 95% probability for the mezzanine loan/bond component

Capital Requirement Parameters

IOM—the IO multiplier is defined as the price of an interest only strip divided by the coupon; for example, an IO price of 15 on a coupon of 3 would equal an IOM of 5

IOF—the interest only strip on a risk-free floater

Appendix C—Scenario Matrix

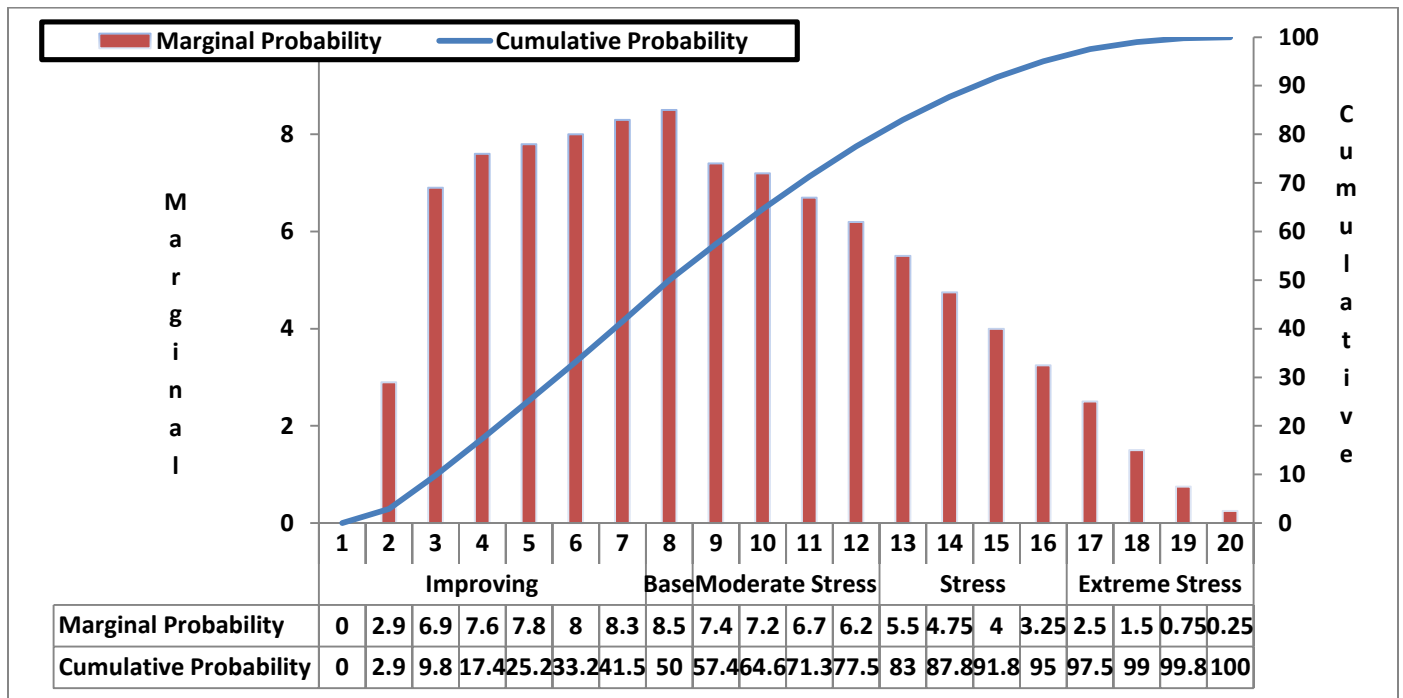
Scenario Type	Scenario	1yr HPA Growth	2yr HPA Growth	Max HPI Decline	IR Shift	MDR Scale	Severity Scale	Prepay Scale
Improving	1	16.3	31.1		-125	0.9	0.9	1.3
	2	14.0	26.6		-100	0.9	0.9	1.2
	3	11.8	22.3		-75	0.9	0.9	1.2
	4	9.6	18.2		-50	1.0	1.0	1.1
	5	7.9	15.1		-37.5	1.0	1.0	1.1
	6	6.3	12.0		-25	1.0	1.0	1.1
	7	4.6	9.1		-12.5	1.0	1.0	1.0
Base	8	3.0	6.2		0.0	1.0	1.0	1.0
Moderate Stress	9	1.5	3.5		12.5	1.0	1.0	1.0
	10	0.0	0.9	0.0	25	1.0	1.0	1.0
	11	-1.5	-1.6	-1.8	37.5	1.0	1.0	0.9
	12	-2.9	-4.1	-4.1	50	1.1	1.1	0.9
Stress	13	-4.4	-6.5	-6.6	62.5	1.1	1.1	0.9
	14	-5.8	-8.8	-9.2	75	1.1	1.1	0.9
	15	-7.5	-11.6	-12.5	100	1.1	1.1	0.8
	16	-9.1	-14.4	-15.8	125	1.1	1.1	0.8
Extreme Stress	17	-10.7	-17.0	-19.0	150	1.2	1.2	0.7
	18	-12.3	-19.6	-22.2	175	1.2	1.2	0.7
	19	-13.9	-22.1	-25.2	200	1.2	1.2	0.6
	20	-15.5	-24.5	-28.2	225	1.2	1.2	0.6

Appendix D—Scenario Probabilities

Scenario Grid

	Improving					Base			Moderate Stress				Stress			Extreme Stress				
Scenario	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CDF	0.0	2.9	9.8	17.4	25.2	33.2	41.5	50.0	57.4	64.6	71.3	77.5	83.0	87.8	91.8	95.0	97.5	99.0	99.8	100.0
Scenario Prob.	0.0	2.9	6.9	7.6	7.8	8.0	8.3	8.5	7.4	7.2	6.7	6.2	5.5	4.8	4.0	3.3	2.5	1.5	0.8	0.3

Scenario Probabilities



Appendix E—Pool Annual Credit Charge by FICO/LTV Buckets; MI

FICO/LTV Bucket		FICO Bucket							
		450 - 500	500 - 550	550 - 600	600 - 650	650 - 700	700 - 750	750 - 800	800 - 850
50 - 55	Base Case Loss (%)					0.1	0.1	0.0	0.0
	Expected Loss (%)					0.2	0.2	0.0	0.0
	Expected Shortfall (%)					2.1	1.3	0.3	0.1
	Senior Subordination (%)					3.7	2.0	0.6	0.1
	Mezz Subordination (%)					1.0	0.8	0.2	0.0
	ACC (bp) Sr/Sub					14	11	2	0
	ACC (bp) Capital					10	7	2	0
55 - 60	Base Case Loss (%)				1.1	0.2	0.1	0.0	0.0
	Expected Loss (%)				2.1	0.4	0.2	0.1	0.0
	Expected Shortfall (%)				10.9	2.8	1.5	0.4	0.1
	Senior Subordination (%)				14.5	4.2	2.4	0.8	0.2
	Mezz Subordination (%)				7.9	1.8	0.8	0.2	0.0
	ACC (bp) Sr/Sub				107	25	11	3	1
	ACC (bp) Capital				67	16	8	2	0
60 - 65	Base Case Loss (%)			3.9	0.5	0.4	0.1	0.0	0.0
	Expected Loss (%)			4.7	1.0	0.8	0.3	0.1	0.0
	Expected Shortfall (%)			13.5	6.0	5.4	2.5	0.6	0.2
	Senior Subordination (%)			16.2	8.5	8.0	4.0	1.1	0.4
	Mezz Subordination (%)			11.3	4.0	3.5	1.5	0.3	0.1
	ACC (bp) Sr/Sub			195	55	47	19	4	1
	ACC (bp) Capital			119	35	30	13	3	1
65 - 70	Base Case Loss (%)			0.7	0.7	0.5	0.2	0.0	0.0
	Expected Loss (%)			1.2	1.5	1.1	0.6	0.1	0.0
	Expected Shortfall (%)			5.4	9.4	6.5	4.1	1.3	0.4
	Senior Subordination (%)			7.1	13.5	9.6	6.3	2.2	0.8
	Mezz Subordination (%)			4.0	6.2	4.2	2.4	0.7	0.2
	ACC (bp) Sr/Sub			56	82	57	33	9	3
	ACC (bp) Capital			36	53	37	22	6	2
70 - 75	Base Case Loss (%)			1.9	1.9	0.7	0.3	0.1	0.0
	Expected Loss (%)			2.9	3.0	1.4	0.9	0.3	0.1
	Expected Shortfall (%)			11.7	13.6	7.7	6.3	2.2	0.7
	Senior Subordination (%)			15.2	18.0	10.9	9.5	3.6	1.2
	Mezz Subordination (%)			9.0	10.1	5.2	3.8	1.2	0.3
	ACC (bp) Sr/Sub			135	147	72	51	16	4
	ACC (bp) Capital			83	91	46	34	11	3

75 - 80	Base Case Loss (%)			2.1	1.2	0.4	0.1	0.0	
	Expected Loss (%)			3.5	2.2	1.0	0.4	0.1	
	Expected Shortfall (%)			16.2	12.1	7.3	2.9	0.9	
	Senior Subordination (%)			21.8	16.5	10.9	4.7	1.6	
	Mezz Subordination (%)			11.8	8.5	4.5	1.6	0.4	
	ACC (bp) Sr/Sub			171	116	58	22	6	
	ACC (bp) Capital			107	73	39	15	4	
80 - 85	Base Case Loss (%)	11.4	6.3	2.1	1.7	0.7	0.2	0.0	
	Expected Loss (%)	13.5	8.2	3.4	3.2	1.6	0.6	0.2	
	Expected Shortfall (%)	39.5	27.3	15.8	16.2	9.7	4.3	1.3	
	Senior Subordination (%)	46.2	33.4	21.0	21.9	13.7	6.5	2.2	
	Mezz Subordination (%)	33.5	22.2	11.6	11.6	6.5	2.6	0.7	
	ACC (bp) Sr/Sub	575	359	168	162	87	34	9	
	ACC (bp) Capital	344	218	105	102	56	23	6	
85 - 90	Base Case Loss (%)	6.1	4.3	3.0	1.5	0.9	0.2	0.0	
	Expected Loss (%)	8.0	6.2	4.5	2.7	1.8	0.6	0.2	
	Expected Shortfall (%)	26.6	24.3	19.0	13.4	10.5	4.6	2.0	
	Senior Subordination (%)	32.3	29.6	24.5	18.2	14.6	7.0	3.3	
	Mezz Subordination (%)	21.8	19.6	14.5	9.6	7.2	2.8	1.1	
	ACC (bp) Sr/Sub	351	292	214	135	97	37	14	
	ACC (bp) Capital	319	265	198	127	92	37	14	
90 - 95	Base Case Loss (%)	12.3	8.7	4.0	1.9	1.0	0.3	0.1	
	Expected Loss (%)	14.2	12.4	5.8	3.3	2.1	0.9	0.3	
	Expected Shortfall (%)	36.9	43.8	22.4	15.7	11.8	6.0	2.2	
	Senior Subordination (%)	42.8	51.0	28.3	20.6	16.4	8.9	3.7	
	Mezz Subordination (%)	31.8	37.4	17.6	11.7	8.2	3.8	1.2	
	ACC (bp) Sr/Sub	576	562	266	164	110	49	16	
	ACC (bp) Capital	347	339	163	102	70	32	11	
95 - 100	Base Case Loss (%)		7.7	5.0	2.9	1.5	0.5	0.1	
	Expected Loss (%)		9.9	7.2	4.7	3.0	1.3	0.5	
	Expected Shortfall (%)		32.7	28.4	21.3	15.9	8.7	3.9	
	Senior Subordination (%)		39.8	35.8	27.6	21.5	12.7	6.4	
	Mezz Subordination (%)		26.7	22.2	16.1	11.5	5.6	2.2	
	ACC (bp) Sr/Sub		433	337	231	154	73	29	
	ACC (bp) Capital		262	206	143	97	47	20	
100 - 105	Base Case Loss (%)	24.2	14.7	9.5	5.7	4.0	1.7	0.8	0.2
	Expected Loss (%)	25.2	16.7	11.2	8.1	6.5	3.1	2.0	0.7
	Expected Shortfall (%)	45.6	43.7	30.8	30.6	28.6	16.0	12.7	5.7
	Senior Subordination (%)	49.3	49.9	36.2	37.8	36.3	21.5	17.8	8.7
	Mezz Subordination (%)	42.3	38.2	26.2	24.3	22.0	11.5	8.7	3.6
	ACC (bp) Sr/Sub	914	687	463	371	315	159	111	44
	ACC (bp) Capital	557	410	280	226	194	100	71	29

Appendix F—Pool Annual Credit Charge by FICO/LTV Buckets; No MI

FICO/LTV Bucket		FICO Bucket							
		450 - 500	500 - 550	550 - 600	600 - 650	650 - 700	700 - 750	750 - 800	800 - 850
80 - 85	Base Case Loss (%)		12.6	7.2	2.2	2.0	0.8	0.2	0.0
	Expected Loss (%)		15.3	9.4	3.6	3.6	1.8	0.7	0.2
	Expected Shortfall (%)		45.9	31.8	16.6	18.4	11.0	4.9	1.5
	Senior Subordination (%)		53.9	38.9	22.2	24.8	15.5	7.4	2.5
	Mezz Subordination (%)		38.7	25.8	12.2	13.2	7.4	3.0	0.8
	ACC (bp) Sr/Sub		655	416	177	183	99	39	11
	ACC (bp) Capital		393	253	110	115	63	26	7
85 - 90	Base Case Loss (%)		6.6	7.2	4.1	2.2	1.3	0.4	0.1
	Expected Loss (%)		8.5	10.5	6.2	3.9	2.7	1.0	0.3
	Expected Shortfall (%)		28.2	40.1	25.8	19.4	15.2	7.0	3.1
	Senior Subordination (%)		34.1	48.1	33.0	26.0	21.0	10.4	4.9
	Mezz Subordination (%)		23.2	32.9	19.7	14.0	10.6	4.3	1.7
	ACC (bp) Sr/Sub		375	487	293	196	142	57	22
	ACC (bp) Capital		227	295	180	123	90	37	15
90 - 95	Base Case Loss (%)		17.8	13.1	6.0	3.4	1.9	0.6	0.1
	Expected Loss (%)		20.2	17.6	8.5	5.7	3.7	1.6	0.5
	Expected Shortfall (%)		50.3	57.4	32.0	25.5	19.8	10.5	3.9
	Senior Subordination (%)		57.4	66.2	39.7	32.8	26.8	15.2	6.2
	Mezz Subordination (%)		44.0	49.5	25.5	19.4	14.1	6.8	2.2
	ACC (bp) Sr/Sub		809	773	389	276	192	89	29
	ACC (bp) Capital		488	465	238	171	121	58	20
95 - 100	Base Case Loss (%)			11.7	7.7	4.8	2.5	0.8	0.2
	Expected Loss (%)			14.5	10.7	7.4	4.7	2.0	0.7
	Expected Shortfall (%)			45.1	39.3	30.9	23.5	12.6	5.8
	Senior Subordination (%)			53.9	48.8	39.3	31.3	18.3	9.2
	Mezz Subordination (%)			37.4	31.2	23.9	17.2	8.3	3.3
	ACC (bp) Sr/Sub			624	485	350	236	110	44
	ACC (bp) Capital			377	296	216	148	71	30
100 - 105	Base Case Loss (%)	37.5	25.1	14.3	9.3	6.7	2.9	1.3	0.3
	Expected Loss (%)	38.4	27.5	16.6	12.5	10.1	5.1	3.0	1.0
	Expected Shortfall (%)	63.0	64.0	43.9	43.2	40.7	24.2	18.1	8.1
	Senior Subordination (%)	66.6	70.8	50.9	52.5	50.6	31.9	24.9	12.1
	Mezz Subordination (%)	59.6	57.5	37.7	35.1	32.1	17.9	12.5	5.1
	ACC (bp) Sr/Sub	1353	1090	676	555	474	252	163	63
	ACC (bp) Capital	829	651	409	337	290	157	104	42

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