MOODY'S INVESTORS SERVICE

RATING METHODOLOGY

US RMBS Surveillance Methodology

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This rating methodology replaces *US RMBS Surveillance Methodology* published in July 2020. We clarified our approach on guarantees in the "Pool Size" sections, and we made limited editorial updates.

Introduction

This report describes our surveillance approach for pre-2009 US RMBS Prime Jumbo, Alt-A, Option ARM, Subprime, Scratch and Dent, Second Lien and Manufactured Housing transactions.

Summary

While we generally apply the same methodology to both new and existing RMBS ratings, we increase our emphasis on transaction-specific performance information on seasoned transactions. For seasoned transactions that have significant performance information available, and which have been exposed to significant declines in home prices and increases in unemployment (such as the ones issued prior to 2009), we can leverage the available performance information for our analysis. In these circumstances, borrowers' payment patterns are better predictors of default than initial loan credit characteristics which have not been updated or reviewed for reliability by an independent third party as required under our approach for rating new RMBS.[1]

In general, our surveillance approach on seasoned deals with a significant amount of performance information is based on estimating the expected losses of the underlying pools. We base each collateral pool's expected loss on its performance and on our assumptions regarding future delinquencies, default rates, loss severities, prepayments, and loan modifications. We compare our expected losses to each bond's total credit enhancement that can include excess spread, subordination, overcollateralization, and any external support.[2]

[1] When we receive updated loan-level data on existing transactions, or data on newly originated loans, that has been sampled and verified by an independent third party, we apply the approach detailed in the methodology for rating US residential MBS. A link to our sector and cross-sector methodologies, including the methodology referenced, can be found in the "Moody's Related Publications" section.

[2] For example, in methodologies where models are used, modeling is not relevant when it is determined that (1) a transaction is still revolving and performance has not changed from expectations, or (2) all tranches are at the highest achievable ratings and performance is at or better than expected performance, or (3) key model inputs are viewed as not having materially changed to the extent it would change outputs since the previous time a model was run, or (4) no new relevant information is available such that a model cannot be run in order to inform the rating, or (5) our analysis is limited to asset coverage ratios for transactions with undercollateralized tranches, or (6) a transaction has few remaining performing assets.

As further explained in this methodology, in some cases, we incorporate a cash flow analysis under which we run several loss levels, loss timing, and prepayment scenarios through our scripted cash flow waterfalls.

For Scratch and Dent transactions (See section 2); US Second Liens (See section 3) and US Manufactured Housing (See section 4), we use the static approach, also known as the structural method, described in this methodology.

We also apply the static approach for certain traditional RMBS transactions, particularly from vintages prior to 2001, that have one or more of the following features: they are backed by pools with very small loan counts; they have simple cash flow structures; they rely on guarantees or external credit enhancement; they are backed by collateral for which sufficient historical data is not available to develop cash flow assumptions; and/or they are backed by pools with small average loan balances. Where cash flow waterfalls are available for these transactions, we may use them to help inform rating committee decisions.

As with all rating methodologies, in applying this methodology, where appropriate, we consider all factors that we deem relevant to our analysis. In addition to these quantitative assessments, our rating committees also consider various qualitative factors in their analysis. If for instance actual performance or performance trends are not in line with the assumptions described in this methodology, we may consider or reflect that in our analysis. For example, in assessing the most recent actual severity observed on defaulted loans, we may subject that severity to bands based on the pool's vintage and sector type to address any loan performance anomalies that we believe are reflected in such recent average observed severity. Where we expect actual loss severities to fall outside the band, we may decide not to constrain the loss severity level within the band, but instead may apply a loss severity level more in line with the observed or our expected future loss severity levels.

Environmental, Social and Governance Considerations

Environmental, social and governance (ESG) considerations may affect the ratings of securities backed by a portfolio of residential mortgage loans. We evaluate the risk following our cross-sector methodology that describes our general principles for assessing these ESG issues[3] and may incorporate it in our analysis.

1. Prime Jumbo, Alt-A, Option ARM and Subprime Methodology

Summary

We base our surveillance approach for Prime Jumbo, Alt-A, Option ARM and Subprime transactions on our expected loss on the collateral pool(s) underlying the transactions and on the protection available to the rated tranches to withstand the forecasted loss.

We base our expected loss on the collateral pool(s) on their performance and on our assumptions regarding future delinquencies, default rates, loss severities, prepayments, and loan modifications.

To arrive at a rating for Prime Jumbo, Alt-A, Option ARM and Subprime transactions, we typically analyze the tranche's performance using our cash flow method. Under our cash flow method, we run several different loss levels, loss timing, and prepayment scenarios using our scripted cash flow waterfalls to estimate the losses to the different bonds under these scenarios.

This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the issuer/deal page on ratings.moodys.com for the most updated credit rating action information and rating history.

[3] For more information, see our methodology that describes our general principles for assessing ESG issues. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

For a limited number of Prime Jumbo, Alt-A, Option ARMS and Subprime transactions, our analysis relies on the structural or static method rather than on the cash flow method. We use the structural or static method for certain traditional RMBS transactions, particularly from vintages prior to 2001, that have one or more of the following features: they are backed by pools with very small loan counts; they have simple cash flow structures; they rely on guarantees or external credit enhancement; they are backed by collateral for which sufficient historical data is not available to develop cash flow assumptions; and/or they are backed by pools with small average loan balances. Where cash flow waterfalls are available for these transactions, we may use them to help inform rating committee decisions.

In the limited instances where we use the structural or static method for these types of transactions, we compare our expected losses on the underlying pool to each bond's total credit enhancement (CE), including excess spread, subordination, overcollateralization, and any other form of internal or external credit support. The process starts with a quantitative analysis that includes a comparison of the available credit enhancement (relative to the expected loss) to the required credit enhancement at the different rating levels and continues with an evaluation of various qualitative factors in rating committee.

Our methodology also addresses tail-end risk in shifting interest or pro-rata pay transactions. We will subject the ratings of securities from deals with pro-rata pay mechanisms that do not have compensating mechanisms of support, such as credit enhancement floors or non-declining reserve funds, to a cap of A3 (sf) for bonds that have exposure to tail risk but take no losses in the A (sf) rating level stress scenario and Baa1 (sf) for all other bonds, except for securities that take no losses in their respective rating level stress scenario and are either likely to pay off within a year or likely to pay off two years before the date by which we project the number of loans in the underlying pool to fall below 100.

Loss Projection Approach

Our loss projection approach forecasts delinquency and loss rates on the underlying pool over the coming years based on historical pool-specific performance as well as economic and sector trends.

The approach is described below, and Appendices A and B detail the specific assumptions used by each sector and vintage.

The quantitative part of our loss projection approach incorporates four steps:

» *Step 1:* We first calculate the annualized rate at which current or 30 days delinquent loans became seriously delinquent during the past 12 months (the rate of new delinquencies or the baseline delinquency rate). In this step we treat modified loans as delinquent and increase the observed rate of new delinquencies by the observed rate of modifications.

» *Step 2:* We then project future annual delinquencies for seven years by applying sector-specific delinquency burnout[4] factors to the rate of new delinquencies that we calculated in Step 1. The delinquency burnout factors reflect our expected change in economic and housing conditions in the coming years.

» *Step 3:* We then aggregate the delinquencies and convert them to losses by applying pool-specific lifetime default frequency and loss severity assumptions. Total defaults consist of delinquency pipeline-implied defaults and projected future defaults (calculated in Step 2). We obtain pool-specific loss severities through sector-wide assumptions and from actual observed severities.

[4] The delinquency burnout factor is the percentage of the baseline delinquency rate that will be used for a given period. A higher burnout factor means we are using a higher percentage of the baseline rate of new delinquencies for that period.

» *Step 4:* We reduce our cumulative loss estimates to account for the positive impact of successful loan modifications.

Step 1: Measuring the Rate of New Delinquencies

To forecast future defaults, we first calculate the rate of new delinquencies that occurred over the past 12 months. The rate of new delinquencies is the 12-month change in serious delinquencies divided by the balance of loans that were current or 30 days delinquent at the beginning of the period. We then add the rate of modification activity to this rate of new delinquencies to capture the amount of at-risk (i.e., modified) loans that are missing from the delinquency buckets (classified as "current") due to modifications. Even though loan modification increases a loans' likelihood of curing, whether the loan has ever been delinquent is a critical determinant of its repayment. This adjustment for the modified loans allows us to calculate a "true" measure of at-risk loans.

We also use the loan-level data, when available, to calculate the rate of new delinquency. In this analysis, we determine the rate of delinquency observed on always current and modified current loans for the specific pool. When the data is not available, we compare the rate of new delinquency of transactions from a similar issuer, asset type and vintage.

Small Pool Adjustment

For pools with loans less than 100, we adjust our projections of loss to account for the higher loss volatility of such pools. For small pools, a few loans becoming delinquent would greatly increase the pools' delinquency rate. To project losses on pools with fewer than 100 loans, we first calculate an annualized rate of new delinquencies based on asset type, vintage, number of loans remaining in the pool and the level of current delinquencies in the pool. Appendix C describes the assumptions used to calculate this delinquency rate.

Step 2: Calculating Future Delinquencies

After calculating the rate of new delinquencies (as described in Step 1), we apply annual delinquency burnout factors to forecast the rate of new delinquencies in future years. Each burnout factor represents our expectation about the persistence of the new delinquency rate. A burnout factor for year one of 85%, for example, represents our expectation that in year one the prevailing rate of new delinquencies will be 85% of the current rate of new delinquencies calculated in Step 1. We forecast burnout factors for the next seven years based on long-term macroeconomic and default forecasts by incorporating our macro-economic projections and information from other sources.

Step 3: Calculating Losses from Delinquencies

We estimate future pool losses by aggregating three values: losses from the current delinquency pipeline, losses from projected delinquencies, and post-projection-horizon losses.

To obtain losses from the delinquency pipeline we first calculate defaults by applying lifetime default rates ("roll rates") to the current delinquency buckets. Appendices A and B list our lifetime roll rate assumptions for each sector. These roll rates indicate the percentage of borrowers in each delinquency bucket that we expect to ultimately default. The more severe the delinquency, the lower the likelihood of curing and thus the higher the resulting roll rate. Once we obtain the defaulted balance, we apply a liquidation severity to calculate the loss upon default. We explain our method of calculating loss severity below.

Losses from projected delinquencies are the losses realized from the delinquent balances calculated in Step 2. We assume that a large percentage of these projected delinquent balances will default. We apply a liquidation severity to these defaulting balances to calculate losses.

Post-projection-horizon losses occur after the seventh year. At that point, only a fraction of the pool will remain, and subsequent pool losses will be much smaller. Appendices A and B list our assumptions for these subsequent losses based on sector and vintage.

Calculating loss severities: We obtain the loss severity by taking a simple average of a pool's recent actual severity and a sector-specific severity.

1. The actual severity is the most recent average severity observed on defaulted loans in the pool. We may subject the estimate to bands based on the pool's vintage and sector type to eliminate any performance anomalies. Where we expect actual loss severities to fall outside this band, we may decide not to apply the band, and may instead apply a loss severity level more in line with the observed or with our expected future loss severity levels.
2. We base our sector-specific severity assumptions on our vintage- and sector-level views. Appendices A and B provide our sector-specific severity assumptions.

Step 4: Adjusting for Modifications

To assess the impact of modifications on pool losses we:

» Estimate the number of borrower defaults that loan modifications will prevent. Loans in REO status are not eligible to be modified and we generally assume that only 30%-50% of the loans in foreclosure are eligible for modification.

» Apply the percentage of eligible defaults likely to be modified. We base these on actual observed modification rates for the different sectors.

» Estimate the success rate of modifications by applying sector specific re-default rate on the total modifications.

Appendices A and B list our assumptions for these modification adjustments based on sector and vintage. As loans originated post-2004 have suffered the highest home price depreciation and many are severely underwater, we assume that some portion of successful modifications on these loans will entail principal reduction in addition to interest rate reduction. Even though principal reduction is an instrumental component of successful modifications, it also represents a loss to the pool. We also expect that some borrowers who we do not project to default will receive modifications that include principal reductions. Losses attributable to principal reductions will partially offset the overall benefit from modifications.

Appendix D provides a sample calculation of the modification adjustment as described above.

Cash Flow Analysis

To assess the rating implications of the projected loss levels on Alt-A, Option ARM, Subprime RMBS and 2005-2008 vintage prime Jumbo RMBS, we run 96 different loss and prepayment scenarios through our scripted cash flow waterfalls. The scenarios combine six loss levels, four loss timing curves, and four prepayment curves.

For pre-2005 prime Jumbo RMBS, we run nine different combinations of three loss timing curves and three prepayment vectors at six loss levels for a total of 54 scenarios.

The six loss levels include our expected losses on each pool and five increasingly stressful loss scenarios that reflect our loss assumptions for the higher rating levels. To determine our loss assumptions for the higher rating levels we apply a "multiplier" to the expected loss; Exhibit 1 shows the range of the multipliers. The multiplier applied to our expected loss to arrive at losses for higher rating levels depends on the level of expected loss. As the expected loss levels increase, we reduce our stress multiples to account for the lower expected volatility associated with pools with high expected losses. As expected losses decrease, we broaden the stress multiples within rating levels to account for the volatility of pools with low expected losses. For example, if our expected loss on a pool is 20%, the stressed loss expectation at a Baa2 (sf) level would be 28.0% (a multiple of 1.4). However, if our expected loss on a pool is 50%, the stressed loss expectation at a Baa2 (sf) level would be 64.5% (a multiple of 1.29).

Although we use these multiples to define the stress loss scenarios that we apply to the various pools, we base our quantitative analysis of the tranche ratings on the individual cash flow analyses of the pools under each of the different scenarios.

EXHIBIT 1

Loss Scenarios' Rating Multiple Range

Loss ranging from 1% to 50%

Rating	Multiples	1.0% Loss Level	20% Loss Level	50% Loss Level
Aaa (sf)	6.50 – 1.59	6.50%	45.0%	79.5%
Aa2 (sf)	4.63 - 1.47	4.63%	41.0%	73.5%
A2 (sf)	2.88 - 1.38	2.88%	34.0%	69.0%
Baa2 (sf)	1.93 - 1.29	1.93%	28.0%	64.5%
Ba2 (sf)	1.45 - 1.2	1.45%	24.0%	60.0%

Source: Moody's Investors Service

In our cash flow analysis for deals with excess spread, we usually subject the excess spread to a haircut of 35 - 100% to address spread volatility from rate-modifications and low advancing rates. Appendices E1 through F4 summarize our cash flow assumptions for the different asset classes and vintages.

We examine the result of the stress loss scenarios independently. Taking one scenario at a time, we determine the loss level at which the tranche fails, or "breaks" (meaning the tranche is subject to a loss). We then determine the rating for that scenario according to the next highest loss level (Ba2 (sf), Baa2 (sf), etc.) the tranche passes (i.e., does not suffer a loss). For example, if, for one of the scenarios, a tranche passes the Ba2 (sf) loss level but breaks at the Baa2(sf) loss level, the rating on the tranche will revert to Ba2 (sf) for that scenario. We employ a similar process to assess the rating of the tranche in all scenarios. The scripted cash flow waterfall output weighs the individual scenarios' output using the technique of a weighted average rating factor[5] (WARF) and it takes into account the magnitude of loss a tranche takes in the scenario that it fails.[6] If the loss levels are lower the quantitative output will be notched higher.

Structural analysis for transactions where we do not use the scripted cash flow waterfalls, as previously described, will utilize a static analysis, wherein total credit enhancement (CE) for a bond, including excess spread, subordination, overcollateralization and other external form of support, if any, will be compared to expected losses on the mortgage pool(s) supporting that bond. We typically calculate credit enhancement from excess spread by multiplying annualized excess spread by the expected weighted average life of the related bond and usually subject it to a haircut. The quantitative output of the analysis will be determined by the resulting ratio of a bond's total CE to its related mortgage pool losses.

[5] For more information, see our methodology for rating collateralized loan obligations (CLOs). A link to our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

[6] If the tranche takes a loss in the expected case scenario, we will generally treat the tranche as a defaulted or impaired security.

Pool Size

In assessing pool diversity for US RMBS transactions, we look beyond the nominal number of borrowers in a pool to take into account the actual size of the borrowers' loans. We express this pool diversity measurement, referred to as the effective number, in terms of equal-sized exposures, using the formula in Exhibit 2.

We typically use loan-level information to calculate an effective number of borrowers or loans.

EXHIBIT 2

$$Effective\ Number\ of\ n\ Borrowers\ (or\ Loans) = {}^{1}\!/\!\textstyle\sum_{i=1}^{n}(W_i)^2$$

Where:

» W_i is the weight of a borrower (or loan) i in the total pool.

Source: Moody's Investors Service

We do not assign nor maintain ratings on securities backed by US residential mortgage loans in a structure – defined as a group of securities that share support – with the following characteristics:

» Structures without support mechanisms, such as a credit enhancement floor or reserve fund floor, when any of the underlying pool(s) has decreased to an effective number of borrowers or loans of 30 or below. If we cannot obtain the effective number, we will use a threshold of 45 instead.

» Structures with a reserve fund or credit enhancement floor, which partially compensates for the increased exposure to single borrowers, when any of the underlying pool(s) has decreased to an effective number of borrowers or loans of 15 or below. If we cannot obtain the effective number, we will use a threshold of 25 instead.

However, we make exceptions for securities with ratings that do not rely on our assessment of individual obligor creditworthiness, such as those that benefit from a full and unconditional third-party guarantee, whether at pool or security level, or for securities that benefit from full cash collateralization. For securities with full support from a guarantor, we apply the rating that is the higher of the support provider's rating and the published or unpublished underlying rating, if any, in accordance with the approach outlined in "Guarantees, Letters of Credit and Other Forms of Credit Substitution Methodology."

Addressing Tail Risk in Shifting Interest Structures

Tail risk is the risk of a disproportionately large loss (based on current balance of the pool) on the underlying pool at the end of a transaction's term when few loans remain in the pool and credit enhancement although high in percentage terms may be very low in dollar terms. Shifting interest transactions in which the subordinate bonds receive a portion of prepayment and principal, and where there are no credit enhancement floors, expose the most senior bonds to tail risk by depleting the dollar credit enhancement available to absorb future losses.

To assess the vulnerability of Aaa (sf)- to A (sf)-rated bonds to tail risk, we run an additional stress test, whereby we increase our projection of losses and delay the timing of future defaults.

We first calculate a stress loss on the underlying pool by multiplying our pool expected loss by a stress factor that depends upon the pool's collateral quality and varies from 1.0 to 1.5.[7] We vary the loss according to the pool's updated weighted average LTV ratio, its percentage of loans above an updated LTV of 80, the number of loans, the loans' average balance and the year of securitization. We then subject this stress loss

[7] We will apply the average sector-specific stress factor when loan-level collateral data is unavailable.

to a floor, which we describe in Appendix G. We apply multiples to the resulting stress expected loss, as described earlier to determine the minimum loss that a tranche should be able to sustain at the Aaa (sf) to A (sf) rating levels.

We then perform a cash flow analysis that delays future defaults, employing a stress loss timing curve. The stress curve pushes out future delinquencies by delaying the roll of the current and 30 days' delinquent loans to future years when the transaction is most likely to be exposed to tail risk. We run this stress curve through our current prepayment scenarios. Appendix G details our stress loss timing curve assumptions.

We will cap the ratings of the bonds with exposure to tail risk at 1) A3 (sf) for bonds that have exposure to tail risk but take no losses in the A (sf) rating level stress scenario and 2) Baa1 (sf) for all other bonds. However, there are some exceptions. We will not cap the ratings (and maintain Aaa (sf) to A (sf) ratings) on tranches if 1) they pass their corresponding rating level stresses and 2) they are either likely to pay off within a year or likely to pay off two years before the date we project as when the number of loans in the underlying pool will fall below 100.

In shifting interest transactions for which we do not run cash flows, we stress the bonds for tail risk by first applying a haircut to the bonds' total credit enhancement to account for our projection of the pay down of the subordinate tranches. We then compare the lower enhancement to the stress loss on the underlying loans and further evaluate various qualitative factors in the rating committee.

Interest Shortfall Risks

Our ratings also take into account interest payments to tranches. We generally apply our approach to defaulted or impaired securities to tranches that have interest shortfalls resulting from insufficient funds to meet their interest obligation (as defined in transaction documents), although for tranches that have suffered very small unrecoverable interest shortfalls we may cap the ratings at Baa3 (sf).

In addition, we cap ratings on tranches that currently have no interest shortfalls, but weak reimbursement mechanisms should any shortfalls occur. Our cap on these tranches is A3 (sf) or lower. In these structures, the interest shortfall is typically reimbursed from excess interest only after overcollateralization builds to a pre-specified target amount. In transactions where performance is poor, and the overcollateralization has depleted, the shortfall is unlikely to be reimbursed and could be permanent. As such, we may consider the magnitude of a potential interest shortfall when assessing the rating of bonds with weak reimbursement mechanism.

Loss Benchmarks

In evaluating the model output for pre-2009 Prime Jumbo, Alt-A, Option ARMS and Subprime transactions, we select loss benchmarks referencing the Idealized Expected Loss table[8] using the Standard Asymmetric Range, in which the lower-bound of loss consistent with a given rating category is computed as an 80/20 weighted average on a logarithmic scale of the Idealized Expected Loss of the next higher rating category and the Idealized Expected Loss of the given rating category, respectively. For upgrade rating actions, the upper-bound of loss consistent with a given rating category is computed as an 80/20 weighted average on a logarithmic scale of the Idealized Expected Loss of the given rating category and the Idealized Expected Loss of the next lower rating category, respectively. When monitoring a rating for downgrade, the upper-bound

8 For more information, see the discussion of Idealized Probabilities of Default and Expected Losses in *Rating Symbols and Definitions.* A link can be found in the "Moody's Related Publications" section.

of loss is computed as a 50/50 weighted average on a logarithmic scale. That is, the benchmark boundaries of loss appropriate for evaluating rating category R are given by:

EXHIBIT 3

$$[1]\ Rating\ Lower\ Bound_R = exp\{0.8 \cdot \log(Idealized\ Expected\ Loss_{R-1}) + 0.2 \cdot log(Idealized\ Expected\ Loss_R)\}$$

$$[2]\ Initial\ Rating\ Upper\ Bound_R = exp\{0.8 \cdot \log(Idealized\ Expected\ Loss_R) + 0.2 \cdot log(Idealized\ Expected\ Loss_{R+1})\}$$

$$[3]\ Current\ Rating\ Upper\ Bound_R = exp\{0.5 \cdot \log(Idealized\ Expected\ Loss_R) + 0.5 \cdot log(Idealized\ Expected\ Loss_{R+1})\}$$

Where:

» *Rating Lower Bound$_R$* means the lowest Idealized Expected Loss associated with rating *R* and the expected loss range of rating *R* is inclusive of the *Rating Lower Bound$_R$*.

» *Initial Rating Upper Bound$_R$* means the highest Idealized Expected Loss associated with rating *R* that is upgraded and the expected loss range of rating *R* is exclusive of the *Rating Upper Bound$_R$*.

» *Current Rating Upper Bound$_R$* means the highest Idealized Expected Loss associated with rating *R* that is currently outstanding and the expected loss range of rating *R* is exclusive of the *Rating Upper Bound$_R$*.

» *R-1* means the rating just above *R*.

» *R+1* means the rating just below *R*.

» The Rating Lower Bound for Aaa is 0% and the Rating Upper Bound for C is 100%. These are not derived using the formula.

Source: Moody's Investors Service

As with all methodologies, in applying this methodology, where appropriate, we consider all factors that we deem relevant to our analysis. If for instance actual performance or performance trends are not in line with the assumptions described in this methodology, we may consider or reflect that in our analysis.

Appendix A: 2005-2008 Loss Forecast Assumptions

Lifetime Roll Rates

	Jumbo (FRM & ARM)	Alt-A	Option ARM	Subprime
60 – 89 Days Delinquent	75%	80%	85%	85%
90+ Days Delinquent	85%	95%	90%	90%
Foreclosure	100%	100%	100%	100%
REO	100%	100%	100%	100%

Delinquency Burnouts

Year	Jumbo (FRM & ARM)	Alt-A	Option ARM	Subprime
1	75%	75%	65%	70%
2	65%	65%	55%	55%
3 - 7	60%	60%	55%	55%

Modification Assumptions

	Jumbo (FRM & ARM)	Alt-A	Option ARM	Subprime
% of Eligible Loans Modified	25%	25%	10%	35%
Re-default Rate	45%	65%	75%	75%
% of Mods with Principal Reduction	20%	20%	25%	20%
% of Non-Default Loans Modified	5%	5%	5%	15%
% Loss due to Principal Reduction	10%	15%	20%	15%

Sector Specific Severity *

Year	Jumbo (FRM & ARM)	Alt-A	Option ARM	Subprime
2005	45%	55%	70%	75%
2006	47.50%	60%	70%	75%
2007	50%	60%	70%	75%

*For 15 year pools, our global severity assumption is 5 points lower.

Prepayment Cap and Floor Assumptions

	Jumbo (FRM & ARM)	Alt-A	Option ARM	Subprime
Cap	15%	4%	1.50%	1.50%
Floor	5%	4%	1.50%	1.50%

Annual Prepayment Vector (Factor based on current assumptions)

	Jumbo (FRM & ARM)	Alt-A	Option ARM	Subprime
Year 1	100%	100%	100%	100%
Year 2	50%	100%	100%	100%
Year 3	50%	100%	100%	100%
Year 4 and onwards	50%	125%	125%	125%

Post Horizon Remaining Loss

	Jumbo (FRM & ARM)	Alt-A	Option ARM	Subprime
Subsequent loss as a percentage of outstanding balance (after year 7)	1%	3%	3%	5%

Source: Moody's Investors Service

Appendix B: Pre-2005 Loss Forecast Assumptions

Lifetime Roll Rates

	Jumbo				Alt-A	Option ARM	Subprime
	FRM		ARM				
	2003 and Prior	2004	2003 and Prior	2004			
60 – 89 Days Delinquent	40%	50%	50%	60%	70%	70%	85%
90+ Days Delinquent	65%	75%	75%	85%	85%	85%	90%
Foreclosure	85%	90%	90%	95%	95%	95%	100%
REO	100%	100%	100%	100%	100%	100%	100%

Delinquency Burnouts

	Jumbo (FRM & ARM)		Alt-A	Option ARM	Subprime
Year	2003 and Prior	2004			
1	60%	75%	85%	85%	100%
2	50%	60%	75%	75%	85%
3	30%	40%	60%	60%	75%
4 - 7	30%	40%	60%	60%	70%

Modification Assumptions	Jumbo	Alt-A	Option ARM	Subprime
% of Eligible Loans Modified	25%	25%	25%	35%
Re-default Rate	45%	65%	65%	65%

Sector Specific Severity

	Jumbo		Alt-A	Option ARM	Subprime
Year	30-Year Pool	15-Year Pool			
2002 and Prior	20%	10%	45%	50%	70%
2003	30%	15%	45%	50%	70%
2004	40%	25%	50%	55%	70%

Prepayment Cap and Floor Assumptions

	Jumbo	Alt-A	Option ARM	Subprime
Cap	30%	6%	4%	2%
Floor	5%	6%	4%	2%

Annual Prepayment Vector (Factor based on current assumptions)

	Jumbo (FRM & ARM)	Alt-A	Option ARM	Subprime
Year 1	100%	100%	100%	100%
Year 2	100%	100%	100%	100%
Year 3	100%	100%	100%	100%
Year 4 and onwards	100%	125%	125%	100%

Post Horizon Remaining Loss

	Jumbo (FRM & ARM)	Alt-A	Option ARM	Subprime
Subsequent loss as a percentage of outstanding balance (after year 7)	1%	1%	3%	3%

Source: Moody's Investors Service

Appendix C: Small Pool Delinquency Rate Calculation and Assumptions

To project losses on pools with fewer than 100 loans, we first estimate a "baseline" average rate of new delinquencies for the pool that is dependent on the vintage of loan origination (see table below for the baseline rates for the different asset types and vintages). The baseline rates are higher than the average rate of new delinquencies for larger pools for the respective assets and vintages.

Once the baseline rate is set, further adjustments are made based on 1) the number of loans remaining in the pool and 2) the level of current delinquencies in the pool. The volatility of pool performance increases as the number of loans remaining in the pool decreases. Once the loan count in a pool falls to 75, the rate of delinquency is increased by 1.0% for every loan. In addition, if current delinquency levels in a small pool is low, future delinquencies are expected to reflect this trend. On the other hand, if current delinquencies are high, future delinquencies are expected to be even higher. To account for that, the rate calculated above is multiplied by a factor that is based on the current level of delinquencies in the pool and the asset type (the higher the current level of delinquencies, the higher the factor; see second table below).

Small Pool Baseline Rate

Vintage	Jumbo	Alt-A	Option Arm	Subprime
2002 and Prior	3.00%	3.00%	3.00%	11.00%
2003	3.00%	5.00%	5.00%	11.00%
2004	3.00%	10.00%	10.00%	11.00%
2005	3.50%	10.00%	10.00%	10.00%
2006	6.50%	19.00%	19.00%	19.00%
2007	7.50%	21.00%	21.00%	21.00%

Asset Type	Delinquency range	Factor
Jumbo	0% - 50%	0.50 - 2.50
Alt-A/ Option ARM	0% - 50%	0.20 - 2.00
Subprime	0% - 50%	0.20 - 2.25

Source: Moody's Investors Service

Appendix D: Modification Adjustment on a sample Subprime Transaction

Modification Adjustment On Sample Subprime Transaction

A	Projected Loss (% of CB)	39.56%	Loss Methodology Steps 1, 2, 3
B	Expected Loss (% of OB)	16.99%	
C	Expected Future Severity	75.00%	Loss Methodology Step 3
D	Foreclosure (% of CB)	10.42%	
E	REO (% of CB)	1.01%	
F	Total Delinquencies Projected in the first two years (% of CB)	29.41%	
G	Projected Future Defaults (% of CB)	52.75%	= A / C
H	Potential Modifications	23.19%	= F - (0.5 * D) - E
I	Assumed Modification Rate	35.00%	
J	Projected Modifications (% of CB)	8.12%	= H * I
K	Projected Lifetime Re-default Rate	75.00%	
L	Defaults Despite Modification	6.09%	= J * K
M	Non Modified Defaults	44.63%	= G - J
N	Adjusted Total Defaults	50.72%	= L + M
O	% of "Successful" Mods with Principal Reduction	20.00%	
P	% of Loss Associated with Reduction	15.00%	
Q	Loss to Trust from "Successful" Principal Reduction (%CB)	0.06%	= (J - L) * O * P
R	% of Projected Non-Defaults to be Modified	15.00%	
S	% of "Non-Default" Mods With Principal Reduction	20.00%	
T	Loss to Trust "Non-Default" Principal Reduction (%CB)	0.21%	= (100% - G) * R * S * P
U	Loss to Trust from Principal Reduction (%CB)	0.27%	= Q + T
V	Projected Loss (%CB)	38.04%	= (N * C)
W	Net Change in Loss Projections (%CB)	-1.52%	= V - A

Source: Moody's Investors Service

Appendix E1: 2005-2008 Prime Jumbo Cash Flow Assumptions

Step 1 Projected Defaults: In modeling defaults on each of the pools backing prime Jumbo transactions, we first project aggregate lifetime defaults on delinquent loans, using the lifetime default rates described in the table below. We base remaining expected defaults on loans classified as current upon loss expectations that we derive from this methodology and pool-specific loss severity assumptions. The roll rates will vary according to loss level as seen below.

Roll Rates

	B (sf)	Ba (sf)	Baa (sf)	A (sf)	Aa (sf)	Aaa (sf)
60-90	75%	80%	85%	85%	90%	90%
90+	85%	85%	90%	90%	95%	100%
FC	100%	100%	100%	100%	100%	100%
REO	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 2 Default Timing: Once we have projected future expected defaults from each delinquency bucket we distribute the timing of those defaults over the next eight years. The distribution of bucket-specific defaults for each of our three loss-timing scenarios are below.

Timing of Defaults in Back-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**52**	**33**	**31**	**29**	**23**	**7**
1	0%	13%	19%	24%	38%	86%
2	4%	29%	29%	28%	26%	12%
3	22%	22%	21%	19%	14%	2%
4	25%	15%	13%	12%	9%	0%
5	18%	10%	8%	7%	6%	0%
6	13%	6%	5%	5%	4%	0%
7	11%	3%	3%	3%	2%	0%
8	7%	2%	2%	2%	1%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Base Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**41**	**31**	**28**	**25**	**17**	**5**
1	3%	15%	22%	29%	53%	93%
2	20%	31%	32%	31%	25%	7%
3	25%	22%	20%	18%	11%	0%
4	20%	14%	12%	10%	5%	0%
5	15%	8%	7%	6%	3%	0%
6	9%	5%	4%	3%	2%	0%
7	5%	3%	2%	2%	1%	0%
8	3%	2%	1%	1%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Front-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**30**	**23**	**21**	**18**	**12**	**3**
1	8%	24%	32%	43%	68%	99%
2	35%	40%	38%	34%	21%	1%
3	29%	20%	17%	14%	7%	0%
4	15%	9%	7%	6%	3%	0%
5	7%	4%	3%	2%	1%	0%
6	4%	2%	2%	1%	0%	0%
7	1%	1%	1%	0%	0%	0%
8	1%	0%	0%	0%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 3 Prepayment: We match the main default timing curves described above[9] with each of the four prepayment curves described below to generate sixteen scenarios. We model the scenarios using our scripted cash flow waterfalls, to arrive at a set of projected tranche recoveries. We apply the voluntary prepayment rates described below for all prime Jumbo transactions, and model incremental yearly changes in prepayment rates as even monthly increases throughout the earlier year. The baseline CPR rate will vary by loss level as seen below.

Annual Voluntary Prepayment Rates

Year	Back	Flat	Climb-Drop	Climb
1	15%	15%	15%	15%
2	12%	15%	8%	15%
3	10%	15%	8%	18%
4	8%	15%	8%	18%
5	5%	15%	8%	20%
6	5%	15%	8%	20%
7	8%	15%	8%	20%
8	8%	15%	8%	20%
9	10%	15%	8%	20%
10	10%	15%	8%	20%

Baseline CPR

Aaa (sf)	5%
Aa (sf)	7%
A (sf)	8%
Baa (sf)	10%
Ba (sf)	12%
B (sf)	15%

Source: Moody's Investors Service

9 We also run an additional scenario based on the "Base Loss Scenario" curve with the timeline for receiving liquidation proceeds extended by 12 months.

Appendix E2: 2005-2008 Alt-A Cash Flow Assumptions

Step 1 Projected Defaults: In modeling defaults on each of the pools backing Alt-A transactions, we first project aggregate lifetime defaults on delinquent loans, using the lifetime default rates described in the table below. We base remaining expected defaults on loans classified as current upon loss expectations that we derive from this methodology and pool-specific loss severity assumptions. The roll rates will vary according to loss level as seen below.

Roll Rates

	B (sf)	Ba (sf)	Baa (sf)	A (sf)	Aa (sf)	Aaa (sf)
60-90	80%	90%	100%	100%	100%	100%
90+	90%	95%	100%	100%	100%	100%
FC	100%	100%	100%	100%	100%	100%
REO	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 2 Default Timing: Once we have projected future expected defaults from each delinquency bucket we distribute the timing of those defaults over the next eight years. The distribution of bucket-specific defaults for base, front- and back-ended loss-timing scenarios are found below.

Timing of Defaults in Back-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	52	31	27	25	20	9
1	3%	21%	28%	32%	42%	78%
2	11%	28%	29%	28%	30%	17%
3	17%	19%	18%	17%	14%	4%
4	17%	12%	10%	10%	7%	1%
5	16%	8%	6%	6%	3%	0%
6	14%	5%	4%	3%	2%	0%
7	12%	4%	3%	2%	1%	0%
8	10%	3%	2%	2%	1%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Base Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	36	24	21	20	12	6
1	7%	29%	37%	37%	62%	89%
2	26%	36%	35%	36%	28%	10%
3	27%	17%	15%	15%	8%	1%
4	18%	8%	6%	6%	2%	0%
5	11%	4%	3%	3%	0%	0%
6	6%	3%	2%	1%	0%	0%
7	3%	2%	1%	1%	0%	0%
8	2%	1%	1%	1%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Front-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	27	24	18	17	10	4
1	13%	37%	50%	52%	77%	96%
2	39%	33%	31%	31%	17%	4%
3	26%	12%	9%	9%	3%	0%
4	13%	6%	4%	3%	1%	0%
5	6%	4%	2%	2%	1%	0%
6	2%	3%	2%	1%	1%	0%
7	1%	3%	1%	1%	0%	0%
8	0%	2%	1%	1%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 3 Prepayment: We match the main default timing curves described above[10] with each of the four prepayment curves described below to generate sixteen scenarios. We model the scenarios using our scripted cash flow waterfalls, to arrive at a set of projected tranche recoveries. We apply the voluntary prepayment rates described below for all Alt-A transactions, and model incremental yearly changes in prepayment rates as even monthly increases throughout the earlier year. The baseline CPR rate will vary by loss level as seen below.

Annual Voluntary Prepayment Rates

Year	Back	Flat	Climb-Drop	Climb
1	4.00%	4.00%	4.00%	4.00%
2	3.00%	4.00%	6.00%	5.00%
3	2.00%	4.00%	7.50%	6.00%
4	4.00%	4.00%	7.50%	7.00%
5	5.00%	4.00%	6.00%	7.50%
6	6.00%	4.00%	5.00%	7.50%
7	7.50%	4.00%	4.00%	7.50%
8	7.50%	4.00%	4.00%	7.50%
9	10.00%	10.00%	10.00%	10.00%
10	10.00%	10.00%	10.00%	10.00%

Baseline CPR

Aaa (sf)	1.5%
Aa (sf)	1.5%
A (sf)	2.0%
Baa (sf)	3.0%
Ba (sf)	4.0%
B (sf)	4.0%

Source: Moody's Investors Service

10 We also ran an additional scenario based on the "Base Loss Scenario" case with the timeline for receiving liquidation proceeds extended by 12 months.

Appendix E3: 2005-2008 Option ARM Cash Flow Assumptions

Step 1 Projected Defaults: In modeling defaults on each of the pools backing Option ARM transactions, we first project aggregate lifetime defaults on delinquent loans, using the lifetime default rates described in the table below. We base remaining expected defaults on loans classified as current upon loss expectations that we derive from this methodology and pool-specific loss severity assumptions. The roll rates will vary according to loss level as seen below.

Roll Rates

	B (sf)	Ba (sf)	Baa (sf)	A (sf)	Aa (sf)	Aaa (sf)
60-90	80%	90%	100%	100%	100%	100%
90+	90%	95%	100%	100%	100%	100%
FC	100%	100%	100%	100%	100%	100%
REO	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 2 Default Timing: Once we have projected future expected defaults from each delinquency bucket we distribute the timing of those defaults over the next eight years. The distribution of bucket-specific defaults for base, front- and back-ended loss-timing scenarios are below.

Timing of Defaults in Back-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**47**	**28**	**25**	**24**	**20**	**9**
1	4%	24%	30%	32%	44%	76%
2	15%	30%	31%	31%	28%	18%
3	20%	19%	18%	17%	14%	5%
4	18%	11%	9%	9%	7%	1%
5	15%	7%	5%	5%	3%	0%
6	12%	4%	3%	3%	2%	0%
7	9%	3%	2%	2%	1%	0%
8	7%	2%	2%	1%	1%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Base Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**33**	**24**	**20**	**19**	**11**	**6**
1	9%	29%	40%	41%	72%	89%
2	30%	34%	33%	34%	20%	10%
3	26%	18%	14%	14%	5%	1%
4	16%	9%	6%	6%	2%	0%
5	9%	5%	3%	3%	1%	0%
6	5%	3%	2%	1%	0%	0%
7	3%	1%	1%	1%	0%	0%
8	2%	1%	1%	0%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Front-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**25**	**23**	**18**	**17**	**9**	**4**
1	17%	26%	41%	48%	81%	97%
2	40%	39%	35%	33%	15%	3%
3	24%	20%	14%	12%	3%	0%
4	11%	9%	6%	4%	1%	0%
5	5%	4%	2%	2%	0%	0%
6	2%	1%	1%	1%	0%	0%
7	1%	1%	1%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 3 Prepayment: We match the main default timing curves described above[11] with each of the four prepayment curves described below to generate sixteen scenarios. We model the scenarios using our scripted cash flow waterfalls, to arrive at a set of projected tranche recoveries. We apply the voluntary prepayment rates described below for all Option ARM transactions, and model incremental yearly changes in prepayment rates as even monthly increases throughout the earlier year. The baseline CPR rate will vary by loss level as seen below.

Annual Voluntary Prepayment Rates

Year	Climb	Flat	Climb-Drop	Back
1	1.50%	1.50%	1.50%	1.50%
2	1.50%	1.50%	3.75%	3.00%
3	1.50%	1.50%	3.75%	3.00%
4	1.50%	1.50%	3.00%	3.00%
5	2.25%	1.50%	1.50%	3.00%
6	3.00%	1.50%	0.75%	3.00%
7	3.75%	1.50%	0.80%	4.50%
8	3.75%	1.50%	0.80%	4.50%
9	3.75%	1.50%	0.80%	4.50%
10	12.0%	12.0%	12.0%	12.0%

Baseline CPR	
Aaa (sf)	1.0%
Aa (sf)	1.0%
A (sf)	1.0%
Baa (sf)	1.0%
Ba (sf)	1.5%
B (sf)	1.5%

Source: Moody's Investors Service

11 We also run an additional scenario based on the "Base Loss Scenario" curve with the timeline for receiving liquidation proceeds extended by 12 months.

Appendix E4: 2005-2008 Subprime Cash Flow Assumptions

Step 1 Projected Defaults: In modeling defaults on each of the pools backing subprime transactions, we first project aggregate lifetime defaults on delinquent loans, using the lifetime default rates described in the table below. We base remaining expected defaults on loans classified as current upon loss expectations that we derive from this methodology and pool-specific loss severity assumptions. The roll rates will vary according to loss level as seen below.

Roll Rates

	B (sf)	Ba (sf)	Baa (sf)	A (sf)	Aa (sf)	Aaa (sf)
60-90	80%	90%	100%	100%	100%	100%
90+	90%	95%	100%	100%	100%	100%
FC	100%	100%	100%	100%	100%	100%
REO	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 2 Default Timing: Once we have projected future expected defaults from each delinquency bucket we distribute the timing of those defaults over the next eight years. The distribution of bucket-specific defaults for base, front- and back-ended loss-timing scenarios are below.

Timing of Defaults in Back-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**51**	**32**	**29**	**29**	**23**	**9**
1	0%	20%	26%	26%	40%	81%
2	7%	29%	29%	28%	28%	15%
3	23%	19%	17%	17%	13%	3%
4	22%	11%	10%	10%	7%	1%
5	17%	8%	6%	7%	5%	0%
6	13%	6%	5%	5%	3%	0%
7	10%	4%	4%	4%	2%	0%
8	8%	3%	3%	3%	2%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Base Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**37**	**29**	**25**	**25**	**14**	**6**
1	6%	25%	35%	35%	65%	91%
2	25%	29%	29%	29%	21%	8%
3	25%	16%	14%	14%	6%	1%
4	18%	11%	8%	8%	3%	0%
5	11%	7%	5%	5%	2%	0%
6	7%	5%	4%	4%	1%	0%
7	5%	4%	3%	3%	1%	0%
8	3%	3%	2%	2%	1%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Front-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**26**	**20**	**17**	**16**	**10**	**4**
1	14%	35%	47%	52%	77%	97%
2	41%	37%	32%	30%	17%	3%
3	25%	16%	13%	11%	4%	0%
4	12%	7%	5%	4%	1%	0%
5	5%	3%	2%	2%	1%	0%
6	2%	1%	1%	1%	0%	0%
7	1%	1%	0%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 3 Prepayment: We match the main default timing curves described above[12] with each of the four prepayment curves described below to generate sixteen scenarios. We model the scenarios using our scripted cash flow waterfalls, to arrive at a set of projected tranche recoveries. We apply the voluntary prepayment rates described below for all subprime transactions, and model incremental yearly changes in prepayment rates as even monthly increases throughout the earlier year. The baseline CPR rate will vary by loss level as seen below.

Annual Voluntary Prepayment Rates

Year	Back	Flat	Climb-Drop	Climb
1	1.50%	1.50%	1.50%	1.50%
2	1.50%	1.50%	3.75%	3.00%
3	1.50%	1.50%	3.75%	3.00%
4	1.50%	1.50%	3.00%	3.00%
5	2.25%	1.50%	1.50%	3.00%
6	3.00%	1.50%	0.75%	3.00%
7	3.75%	1.50%	0.80%	4.50%
8	3.75%	1.50%	0.80%	4.50%
9	3.75%	1.50%	0.80%	4.50%
10	12.0%	12.0%	12.0%	12.0%

Baseline CPR	
Aaa (sf)	1.0%
Aa (sf)	1.0%
A (sf)	1.0%
Baa (sf)	1.0%
Ba (sf)	1.5%
B (sf)	1.5%

Source: Moody's Investors Service

12 We also run an additional scenario based on the "Base Loss Scenario" curve with the timeline for receiving liquidation proceeds extended by 12 months.

Appendix F1: Pre-2005 Jumbo Cash Flow Assumptions

Step 1 Projected Defaults: In modeling defaults on each of the pools backing prime Jumbo transactions, we first project aggregate lifetime defaults on delinquent loans, using the lifetime default rates described in the table below. We base remaining expected defaults on loans classified as current upon loss expectations that we derive from this methodology and pool-specific loss severity assumptions. The roll rates will vary according to loss level as seen below.

2004 - Roll Rates FRM

	B (sf)	Ba (sf)	Baa (sf)	A (sf)	Aa (sf)	Aaa (sf)
60-90	50%	55%	60%	65%	70%	75%
90+	75%	80%	85%	85%	90%	95%
FC	90%	90%	95%	100%	100%	100%
REO	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

2004 - Roll Rates ARM

	B (sf)	Ba (sf)	Baa (sf)	A (sf)	Aa (sf)	Aaa (sf)
60-90	60%	65%	70%	75%	80%	85%
90+	85%	85%	90%	90%	95%	100%
FC	95%	95%	100%	100%	100%	100%
REO	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

2003 and Before - Roll Rates FRM

	B (sf)	Ba (sf)	Baa (sf)	A (sf)	Aa (sf)	Aaa (sf)
60-90	40%	45%	50%	55%	60%	65%
90+	65%	70%	75%	80%	85%	90%
FC	85%	85%	90%	95%	100%	100%
REO	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

2003 and Before - Roll Rates ARM

	B (sf)	Ba (sf)	Baa (sf)	A (sf)	Aa (sf)	Aaa (sf)
60-90	50%	55%	60%	65%	70%	75%
90+	75%	80%	85%	85%	90%	95%
FC	90%	90%	95%	95%	100%	100%
REO	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 2 Default Timing: Once we have projected future expected defaults from each delinquency bucket we distribute the timing of those defaults over the next eight years. The distribution of bucket-specific defaults for each of our three loss-timing scenarios are below.

Timing of Defaults in Back-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**52**	**33**	**31**	**29**	**23**	**12**
1	0%	13%	19%	24%	38%	65%
2	4%	29%	29%	28%	26%	23%
3	22%	22%	21%	19%	14%	8%
4	25%	15%	13%	12%	9%	3%
5	18%	9%	8%	7%	6%	1%
6	13%	6%	5%	5%	4%	0%
7	11%	4%	3%	3%	2%	0%
8	7%	2%	2%	2%	1%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Base Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**41**	**31**	**28**	**21**	**17**	**7**
1	3%	15%	22%	36%	53%	85%
2	20%	31%	32%	32%	25%	13%
3	25%	22%	20%	16%	11%	2%
4	20%	14%	12%	8%	5%	0%
5	15%	8%	7%	4%	3%	0%
6	9%	5%	4%	2%	2%	0%
7	5%	3%	2%	1%	1%	0%
8	3%	2%	1%	1%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Front-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**30**	**23**	**21**	**12**	**7**	**3**
1	8%	24%	32%	62%	86%	100%
2	35%	40%	38%	30%	13%	0%
3	29%	20%	17%	6%	1%	0%
4	15%	9%	8%	1%	0%	0%
5	7%	4%	3%	1%	0%	0%
6	4%	2%	1%	0%	0%	0%
7	1%	1%	1%	0%	0%	0%
8	1%	0%	0%	0%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 3 Prepayment: We match the default timing curves described above with each of the three prepayment curves described below to generate nine scenarios. We model the scenarios using our scripted cash flow waterfalls, to arrive at a set of projected tranche recoveries. We apply the voluntary prepayment rates described below for all prime Jumbo transactions, and model incremental yearly changes in prepayment rates as even monthly increases throughout the earlier year. The baseline CPR rate will vary by loss level as seen below.

Annual Voluntary Prepayment Rates

Year	Climb	Flat	Back
1	15%	15%	15%
2	20%	15%	10%
3	25%	15%	10%
4	25%	15%	10%
5	30%	15%	10%
6	30%	15%	18%
7	35%	15%	18%
8	35%	15%	25%
9	35%	15%	25%
10	35%	15%	25%

Baseline CPR

Aaa (sf)	6.0%
Aa (sf)	8.0%
A (sf)	10.0%
Baa (sf)	12.0%
Ba (sf)	15.0%
B (sf)	15.0%

Source: Moody's Investors Service

Appendix F2: Pre-2005 Alt-A Cash Flow Assumptions

Step 1 Projected Defaults: In modeling defaults on each of the pools backing Alt-A transactions, we first project aggregate lifetime defaults on delinquent loans, using the lifetime default rates described in the table below. We base remaining expected defaults on loans classified as current upon loss expectations that we derive from this methodology and pool-specific loss severity assumptions. The roll rates will vary according to loss level as seen below.

Roll Rates

	B (sf)	Ba (sf)	Baa (sf)	A (sf)	Aa (sf)	Aaa (sf)
60-90	70%	75%	80%	85%	90%	95%
90+	85%	90%	95%	100%	100%	100%
FC	95%	100%	100%	100%	100%	100%
REO	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 2 Default Timing: Once we have projected future expected defaults from each delinquency bucket we distribute the timing of those defaults over the next eight years. The distribution of bucket-specific defaults for base, front- and back-ended loss-timing scenarios are found below.

Timing of Defaults in Back-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**52**	**31**	**27**	**25**	**20**	**9**
1	3%	21%	28%	32%	42%	78%
2	11%	28%	29%	28%	30%	17%
3	16%	19%	18%	17%	14%	4%
4	18%	12%	10%	10%	7%	1%
5	16%	8%	6%	6%	3%	0%
6	14%	5%	4%	3%	2%	0%
7	12%	4%	3%	2%	1%	0%
8	10%	3%	2%	2%	1%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Base Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**36**	**24**	**21**	**20**	**12**	**6**
1	7%	29%	37%	37%	62%	89%
2	26%	36%	35%	36%	28%	10%
3	27%	17%	15%	14%	8%	1%
4	18%	8%	6%	6%	2%	0%
5	11%	4%	3%	3%	0%	0%
6	6%	3%	2%	2%	0%	0%
7	3%	2%	1%	1%	0%	0%
8	2%	1%	1%	1%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Front-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**27**	**24**	**18**	**17**	**10**	**4**
1	13%	37%	50%	52%	77%	96%
2	39%	33%	31%	31%	17%	4%
3	26%	12%	9%	9%	4%	0%
4	13%	6%	4%	3%	1%	0%
5	6%	4%	2%	2%	1%	0%
6	2%	3%	2%	1%	0%	0%
7	1%	3%	1%	1%	0%	0%
8	0%	2%	1%	1%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Stress-Back Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**58**	**38**	**33**	**30**	**25**	**12**
1	1%	8%	14%	19%	29%	65%
2	6%	22%	26%	27%	29%	23%
3	12%	24%	23%	22%	19%	8%
4	17%	18%	16%	14%	11%	3%
5	18%	12%	10%	8%	6%	1%
6	17%	8%	6%	5%	3%	0%
7	16%	5%	3%	3%	2%	0%
8	13%	3%	2%	2%	1%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 3 Prepayment: We match the default timing curves described above with each of the four prepayment curves described below to generate sixteen scenarios. We model the scenarios using our scripted cash flow waterfalls, to arrive at a set of projected tranche recoveries. We apply the voluntary prepayment rates described below for all Alt-A transactions, and model incremental yearly changes in prepayment rates as even monthly increases throughout the earlier year. The baseline CPR rate will vary by loss level as seen below.

Annual Voluntary Prepayment Rates

Year	Climb	Climb-Drop	Flat	Back
1	6%	6%	6%	6%
2	7%	9%	6%	4%
3	8%	11%	6%	3%
4	10%	12%	6%	5%
5	11%	9%	6%	8%
6	11%	8%	6%	9%
7	11%	6%	6%	10%
8	12%	6%	6%	12%
9	12%	6%	6%	12%
10	12%	12%	12%	12%

Baseline CPR

Aaa (sf)	2.0%
Aa (sf)	2.0%
A (sf)	3.0%
Baa (sf)	5.0%
Ba (sf)	6.0%
B (sf)	6.0%

Source: Moody's Investors Service

Appendix F3: Pre-2005 Option ARM Cash Flow Assumptions

Step 1 Projected Defaults: In modeling defaults on each of the pools backing Option ARM transactions, we first project aggregate lifetime defaults on delinquent loans, using the lifetime default rates described in the table below. We base remaining expected defaults on loans classified as current upon loss expectations that we derive from this methodology and pool-specific loss severity assumptions. The roll rates will vary according to loss level as seen below.

Roll Rates

	B (sf)	Ba (sf)	Baa (sf)	A (sf)	Aa (sf)	Aaa (sf)
60-90	70%	75%	80%	85%	90%	95%
90+	85%	90%	95%	100%	100%	100%
FC	95%	100%	100%	100%	100%	100%
REO	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 2 Default Timing: Once we have projected future expected defaults from each delinquency bucket we distribute the timing of those defaults over the next eight years. The distribution of bucket-specific defaults for base, front- and back-ended loss-timing scenarios are below.

Timing of Defaults in Back-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**47**	**28**	**25**	**24**	**20**	**9**
1	4%	24%	30%	32%	44%	76%
2	15%	30%	31%	31%	28%	18%
3	20%	19%	18%	17%	14%	5%
4	18%	11%	9%	9%	7%	1%
5	15%	7%	5%	5%	3%	0%
6	12%	4%	3%	3%	2%	0%
7	9%	3%	2%	2%	1%	0%
8	7%	2%	2%	1%	1%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Base Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**33**	**24**	**20**	**19**	**11**	**6**
1	9%	29%	40%	41%	72%	89%
2	30%	34%	33%	34%	20%	10%
3	26%	18%	14%	14%	5%	1%
4	16%	9%	6%	6%	2%	0%
5	9%	5%	3%	3%	1%	0%
6	5%	3%	2%	1%	0%	0%
7	3%	1%	1%	1%	0%	0%
8	2%	1%	1%	0%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Front-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**25**	**23**	**18**	**17**	**9**	**4**
1	17%	26%	41%	48%	81%	97%
2	40%	39%	35%	33%	15%	3%
3	24%	20%	14%	12%	3%	0%
4	11%	9%	6%	4%	1%	0%
5	5%	4%	2%	2%	0%	0%
6	2%	1%	1%	1%	0%	0%
7	1%	1%	1%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Stress-Back Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**58**	**38**	**33**	**30**	**25**	**12**
1	1%	8%	14%	19%	29%	65%
2	6%	22%	26%	27%	29%	23%
3	12%	24%	23%	22%	19%	8%
4	17%	18%	16%	14%	11%	3%
5	18%	12%	10%	8%	6%	1%
6	17%	8%	6%	5%	3%	0%
7	16%	5%	3%	3%	2%	0%
8	13%	3%	2%	2%	1%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 3 Prepayment: We match the default timing curves described above with each of the four prepayment curves described below to generate sixteen scenarios. We model the scenarios using our scripted cash flow waterfalls, to arrive at a set of projected tranche recoveries. We apply the voluntary prepayment rates described below for all Option ARM transactions, and model incremental yearly changes in prepayment rates as even monthly increases throughout the earlier year. The baseline CPR rate will vary by loss level as seen below.

Annual Voluntary Prepayment Rates

Year	Climb	Climb-Drop	Flat	Back
1	4%	4%	4%	4%
2	8%	8%	4%	4%
3	8%	8%	4%	4%
4	8%	6%	4%	4%
5	8%	4%	4%	6%
6	8%	2%	4%	8%
7	10%	2%	4%	10%
8	10%	2%	4%	10%
9	10%	2%	4%	10%
10	12%	12%	12%	12%

Baseline CPR

Aaa (sf)	1.0%
Aa (sf)	1.0%
A (sf)	2.0%
Baa (sf)	3.0%
Ba (sf)	4.0%
B (sf)	4.0%

Source: Moody's Investors Service

Appendix F4: Pre-2005 Subprime Cash Flow Assumptions

Step 1 Projected Defaults: In modeling defaults on each of the pools backing subprime transactions, we first project aggregate lifetime defaults on delinquent loans, using the lifetime default rates described in the table below. We base remaining expected defaults on loans classified as current upon loss expectations that we derive from this methodology and pool-specific loss severity assumptions. The roll rates will vary according to loss level as seen below.

Roll Rates

	B (sf)	Ba (sf)	Baa (sf)	A (sf)	Aa (sf)	Aaa (sf)
60-90	85%	90%	100%	100%	100%	100%
90+	90%	95%	100%	100%	100%	100%
FC	100%	100%	100%	100%	100%	100%
REO	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 2 Default Timing: Once we have projected future expected defaults from each delinquency bucket we distribute the timing of those defaults over the next eight years. The distribution of bucket-specific defaults for base, front- and back-ended loss-timing scenarios are below.

Timing of Defaults in Back-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**51**	**32**	**29**	**29**	**23**	**8**
1	0%	20%	26%	26%	40%	81%
2	7%	29%	28%	28%	28%	15%
3	23%	19%	17%	17%	13%	3%
4	22%	11%	10%	10%	7%	1%
5	17%	8%	7%	7%	5%	0%
6	13%	6%	5%	5%	3%	0%
7	10%	4%	4%	4%	2%	0%
8	8%	3%	3%	3%	2%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Base Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**37**	**29**	**25**	**25**	**14**	**6**
1	6%	25%	35%	35%	65%	91%
2	25%	29%	29%	29%	21%	8%
3	25%	17%	14%	14%	6%	1%
4	17%	10%	8%	8%	3%	0%
5	11%	7%	5%	5%	2%	0%
6	8%	5%	4%	4%	1%	0%
7	5%	4%	3%	3%	1%	0%
8	3%	3%	2%	2%	1%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Front-Ended Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	26	20	17	16	10	4
1	14%	35%	47%	52%	77%	97%
2	41%	37%	32%	30%	17%	3%
3	25%	16%	13%	11%	4%	0%
4	12%	7%	5%	4%	1%	0%
5	5%	3%	2%	2%	1%	0%
6	2%	1%	1%	1%	0%	0%
7	1%	1%	0%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Timing of Defaults in Stress-Back Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	61	49	43	42	35	12
1	1%	6%	10%	12%	18%	65%
2	5%	14%	18%	17%	23%	23%
3	11%	16%	18%	18%	19%	8%
4	14%	15%	16%	15%	14%	3%
5	17%	14%	13%	13%	10%	1%
6	18%	13%	10%	10%	7%	0%
7	18%	12%	8%	8%	5%	0%
8	16%	10%	7%	7%	4%	0%
	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Step 3 Prepayment: We match the default timing curves described above with each of the four prepayment curves described below to generate sixteen scenarios. We model the scenarios using our scripted cash flow waterfalls, to arrive at a set of projected tranche recoveries. We apply the voluntary prepayment rates described below for all subprime transactions, and model incremental yearly changes in prepayment rates as even monthly increases throughout the earlier year. The baseline CPR rate will vary by loss level as seen below.

Annual Voluntary Prepayment Rates

Year	Climb	Climb-Drop	Flat	Back
1	2%	2%	2%	2%
2	4%	5%	2%	2%
3	4%	5%	2%	2%
4	4%	4%	2%	2%
5	4%	2%	2%	3%
6	4%	1%	2%	4%
7	6%	1%	2%	5%
8	6%	1%	2%	5%
9	6%	1%	2%	5%
10	12%	12%	12%	12%

Baseline CPR

Aaa (sf)	1.0%
Aa (sf)	1.0%
A (sf)	1.0%
Baa (sf)	2.0%
Ba (sf)	2.0%
B (sf)	2.0%

Source: Moody's Investors Service

Appendix G: Shifting Interest Stress Test Analysis

Step 1 Stress Factor: We first compute a stress factor that we base on the underlying pool's collateral characteristics: its updated weighted average LTV ratio, its percentage of loans above an updated LTV of 80, the number of loans, the loans' average balance and the year of securitization. We classify each of these five characteristics from strong to weak and weight them, with the largest weightings on the updated LTV and the loan count. The stress factor ranges from 1.0 for strong collateral pools to 1.5 for weak collateral pools. Strong collateral pools with a 1.0 factor would be those with loans issued prior to 2003, which have an average updated LTV below 60, have less than 10% of their loans with updated LTV greater than 80, and consist of more than 300 loans of average balance greater than $300,000. Weak collateral pools with a 1.5 factor would be those with loans issued from 2005 to 2008 with average updated LTV greater than 80, with percentage of loans greater than 80 LTV more than 20% and which have fewer than 100 loans with an average balance less than $100,000.

Step 2 Stress Expected Loss: In calculating the stress loss, we apply the stress factor we calculated in Step 1 to our projection of the loss on the pools. We further subject the stress loss to either a floor of 1% or the default of the five largest loans in the pool at the expected loss severity, whichever is higher. Appendix H shows an example of how we would derive our stress loss adjustments on a sample transaction.

Step 3 Default Timing: We distribute the timing of defaults in the current and delinquent loan pipelines over the next eight years. The following table shows the distribution of defaults for loans by delinquency category.

Timing of Defaults in Stress Loss Scenario

Year	Current	30-60	60-90	90+	FC	REO
Avg Months	**68**	**49**	**32**	**30**	**25**	**12**
1	0%	5%	20%	23%	30%	66%
2	2%	10%	25%	25%	29%	22%
3	5%	14%	20%	19%	18%	8%
4	8%	17%	13%	13%	11%	3%
5	15%	21%	9%	8%	6%	1%
6	25%	18%	6%	5%	3%	0%
7	25%	10%	4%	4%	2%	0%
8	20%	5%	3%	3%	1%	0%
Total	100%	100%	100%	100%	100%	100%

Source: Moody's Investors Service

Appendix H: Stress Loss Adjustment on a Sample Alt-A Transaction

Stress Loss Adjustment on a Sample Alt-A Transaction

		Pool 1	Pool 2	
A	Projected Loss (% of CB)	8.00%	15.00%	
B	Weighted Avg updated Loan - to - value (LTV)	45.00% (Strong)	83.00% (Weak)	
C	% of pool with updated LTV greater than 80	5.00% (Strong)	42.00% (Weak)	
D	Average Loan Balance	320,000 (Strong)	120,000 (Average)	
E	Securitization year	2005 (Weak)	2005 (Weak)	
F	Number of loans	39 (Weak)	400 (Strong)	
G	Stress Factor (Based on B through F)	1.2	1.4	
H	Stress Expected Loss	9.60%	21.00%	= A * G
I	% of 5 largest loans in pool	30.00%	3.00%	
J	Expected Severity	45.00%	55.00%	
K	Loss from default of 5 largest loans (% of CB)	13.50%	1.65%	= I * J
L	Loss Floor (% of CB)	1.00%	1.00%	
M	Stress Loss applied on the pool	13.50%	21.00%	= Max (H,K,L)

Source: Moody's Investors Service

2. Scratch and Dent Methodology

Executive Summary

Scratch and dent transactions differ from those in our primary categorizations (prime Jumbo, subprime, Option ARM and Alt-A) for a number of reasons. The pools may include mortgages that don't conform to an originator's program guidelines in some way, or mortgages in which the borrowers have missed payments. The pools may also include loans with document defects that were rectified after origination. The credit quality of Scratch & Dent (S&D) pools varies considerably because their content can range from seasoned prime-like loans to non-prime loans that were seriously delinquent at the time of securitization.

We base the quantitative part of our rating methodology for securities backed by S&D loans on two key factors: 1) our expected future pool losses based on delinquency, default rate, loss severity, and prepayment assumptions, and 2) the total credit enhancement (CE) available to each bond, including excess spread, subordination, overcollateralization, and any external support.

To arrive at a rating, we first calculate the expected losses on the pool(s) supporting each bond. We then compute the ratio of a bond's total CE to its related pool losses and we then apply the remainder of our qualitative analysis in the rating committee.

Loss Projection Approach

Our loss projection approach for S&D pools is similar to the approach that we use for prime, subprime, Alt-A, and Option ARM RMBS.

The approach forecasts delinquency and loss rates over the coming years based on pool-specific performance as well as economic and sector trends.

Delinquency Projection Approach

Our delinquency projection approach has four steps:

» *Step 1:* We first calculate the annualized rate at which current or 30 days delinquent loans became seriously delinquent during the past 12 months (the rate of new delinquencies). In this step we treat modified loans as delinquent and increase the observed rate of new delinquencies by the observed rate of modifications.

» *Step 2*: We then project future annual delinquencies for seven years by applying sector-specific burnout factors to the rate of new delinquencies from Step 1. This reflects our expected change in economic and housing conditions in the coming years.

» *Step 3:* We then aggregate the delinquent loan balances and convert them to losses by applying pool-specific lifetime default frequency and loss severity assumptions.

Total defaults consist of pipeline-implied defaults and projected defaults (calculated in Step 2). We obtain pool-specific loss severities from sector-wide assumptions and rolling averages of loan-level severities.

» *Step 4:* We reduce cumulative loss estimates to account for the positive impact of successful loan modifications (See Appendix L).

Step 1: Measuring the Rate of New Delinquencies

To forecast future defaults, we first calculate the rate of new delinquencies that occurred over the past 12 months. The rate of new delinquencies is the 12-month change in serious delinquencies divided by the balance of loans that were contractually current or 30 days delinquent at the beginning of the period. We then add the rate of modification activity to this rate of new delinquencies to capture the amount of at-risk (i.e., modified) loans that are missing from the delinquency buckets by virtue of having been modified and deemed "current." Even though loan modification increases a loan's likelihood of curing, whether the loan has ever been delinquent is the overwhelming determinant of loan repayment. This adjustment allows us to calculate a true measure of at-risk loans and give modified loans some performance benefit at a later stage.

Small Pool Adjustment

For pools with loans less than 100, we adjust our projections of loss to account for the higher loss volatility of such pools. For small pools, a few loans becoming delinquent would greatly increase the pools' delinquency rate. To project losses on pools with fewer than 100 loans, we first calculate an annualized rate of new delinquencies based on collateral quality, number of loans remaining in the pool and the level of current delinquencies in the pool. Appendix K describes the assumptions used to calculate this delinquency rate.

Step 2: Calculating Future Delinquencies

After calculating the rate of new delinquencies over the past year (as described in Step 1), we apply the annual delinquency burnout factors[13] to forecast the rate of new delinquencies in future years. Each burnout factor represents our expectation about the persistence of the new delinquency rate. A burnout factor for year one to two of 80% represents our expectation that in year one to two the prevailing rate of new delinquencies will be 80% of the current rate of new delinquencies calculated in Step 1. Appendices I and J list the annual burnout assumptions that we apply to standard and prime-like scratch and dent transactions.

Step 3: Calculating Losses from Delinquencies

We estimate future pool losses by aggregating three values: losses from the current delinquency pipeline, losses from projected delinquencies, and post-projection-horizon losses.

[13] The delinquency burnout factor is the percentage of the baseline delinquency rate that will be used for a given period. A higher burnout factor means we are using a higher percentage of the baseline rate of new delinquencies for that period.

To obtain losses from the current delinquency pipeline we first calculate defaults by applying lifetime default frequencies ("roll rates") to the current delinquency buckets. Appendices I and J list our lifetime roll rate assumptions. These roll rates indicate the percentage of borrowers in each delinquency bucket that we expect to ultimately default. The more severe the delinquency, the lower the likelihood of curing and thus the higher the resulting roll rate. Once we obtain the defaulted balance, we apply a loss upon liquidation (severity).

Losses due to projected delinquencies are the losses that the delinquent balances calculated in Step 2 realize. We assume that a large percentage of these projected delinquent balances will default. We apply a liquidation severity to these defaulting balances to calculate losses.

Post-projection-horizon losses occur after the seventh year. At this point only a fraction of the pool will remain and subsequent pool losses will be much smaller as the economy stabilizes. We assume subsequent losses of 3% for standard S&D and 1% for strong prime-like S&D, as percentages of their then-outstanding balances. This is a projection of losses and not a projection of defaulting balances.

We obtain our overall loss projections by combining the losses that these three sources generate.

We obtain the loss severity by taking a simple average of the actual severity and a global sector-specific severity:

1. The actual severity is the most recent average severity observed on defaulted loans in the pool. We may subject the estimate to bands based on the pool's vintage and sector type to eliminate any performance anomalies. Where we expect actual loss severities to fall outside this band, we may decide not to apply the band, and may instead apply a loss severity level more in line with the observed or with our expected future loss severity levels.
2. We base the global severity assumption on our vintage year and sector-level views. Appendices I and J provide our severity assumptions.

Step 4: Adjusting for Modification

To assess the impact of modifications on pool losses we:

» Estimate the number of borrower defaults that loan modifications will prevent. Loans in REO status are not eligible to be modified and we generally assume that only 30% of the loans in foreclosure are eligible for modification.

» Apply the percentage of eligible defaults likely to be modified as shown in Exhibit 4 below.

» Estimate the success rate of modifications by applying the re-default rate on the total modifications, again from Exhibit 4 below.

EXHIBIT 4

Modification Assumptions

	Standard S&D	Strong Prime-Like S&D
% of Eligible Loans Modified	40%	30%
Re-default Rate	65%	45%

Source: Moody's Investors Service

Structural Analysis and Ratings

Once we forecast pool-level losses we then calculate tranche-level recoveries. We run an analysis that compares a tranche's available credit enhancement to the credit enhancement required to withstand the stresses of a given rating level. We base the credit enhancement required at each rating level on a multiple of expected pool losses. Exhibit 5 shows a range of these multiples below. As expected loss levels increase, we gradually lower the multiples to account for the lower volatility associated with pools with high expected losses.

EXHIBIT 5

Loss Scenarios' Rating Multiple Range

Loss ranging from 0.5% to 30.0%

Rating	Multiples	0.5% Loss Level	30% Loss Level
Aaa (sf)	6.7 - 2.0	3.4%	60.0%
Aa2 (sf)	4.3 - 1.7	2.2%	51.0%
A2 (sf)	2.9 - 1.5	1.5%	45.0%
Baa2 (sf)	2.0 - 1.3	1.0%	39.0%
Ba2 (sf)	1.5 - 1.2	0.8%	36.0%

Source: Moody's Investors Service

Static Analysis for S&D

We analyze Scratch & Dent transactions using a static analysis. It incorporates the priorities of payment distribution, the average life, and the size of the tranches as well as the amount of cash flows that we expect under normal and stressed scenarios.

In our static analysis, we compare the total CE for a bond, including excess spread, subordination, overcollateralization, and other external support, if any, to our expected losses on the mortgage pool(s) supporting that bond. The starting point for consideration of ratings is the resulting ratio of a bond's total CE to its related mortgage pool losses. See Exhibit 6 for indicative coverage requirements for ratings at a variety of expected pool loss levels. We also evaluate various qualitative factors in rating committee. The analysis also incorporates credit enhancement provided by time tranching (such as priority within a sequential pay structure). The example in Exhibit 6 provides an illustration.

We typically calculate credit enhancement from excess spread by multiplying annualized excess spread by the expected weighted average life of the related bond and usually subject it to a haircut. The excess spread haircut takes into account future modification activity, such as interest rate reductions, as well as potential interest rate movements.

EXHIBIT 6

Hypothetical Transaction

Pool factor around 30%. Triggers expected to fail permanently so payment is sequential.

Tranche	Outstanding Balance	Subordination & OC	Annual Excess Spread	Lifetime Excess Spread Benefit	Total CE	Expected Loss on Pool	Coverage Ratio	Expected Loss	Quantitative Rating Output
Cl. A	30,000,000	62.5%	6.5%	12.2%	74.7%	30.0%	2.49	n/a	Aaa (sf)
Cl. M-1	20,000,000	37.5%	6.5%	12.2%	49.7%	30.0%	1.66	n/a	A (sf)
Cl. M-2	18,000,000	15.0%	6.5%	12.2%	27.2%	30.0%	n/a	13%	Caa (sf)
Cl. M-3	3,500,000	10.6%	6.5%	12.2%	22.8%	30.0%	n/a	100%	C (sf)
Cl. M-4	3,500,000	6.3%	6.5%	12.2%	18.4%	30.0%	n/a	100%	C (sf)
Cl. M-5	3,000,000	2.5%	6.5%	12.2%	14.7%	30.0%	n/a	100%	C (sf)
Overcollateralization:	2,000,000								
Outstanding Pool Balance:	80,000,000								

Source: Moody's Investors Service

Senior bonds may also benefit from structural features not directly measured in subordination levels or lifetime spread benefit. For example, we measure the enhancement to bonds that benefit from a sequential-pay structure until the subordinate bonds are completely written down (at which time senior bond payments switch to pro rata, or losses are allocated to senior bonds pro rata, or some other similar event) at stresses that we vary according to the rating level depending on their ability to pay off before a full write-down of subordinate bonds.

Pool Size

In assessing pool diversity for US RMBS transactions, we look beyond the nominal number of borrowers in a pool to take into account the actual size of the borrowers' loans. We express this pool diversity measurement, referred to as the effective number, in terms of equal-sized exposures, using the formula in Exhibit 7.

We typically use loan-level information to calculate an effective number of borrowers or loans.

EXHIBIT 7

$$Effective\ Number\ of\ n\ Borrowers\ (or\ Loans) = {}^{1}\!/_{\sum_{i=1}^{n}(W_i)^2}$$

Where:

» W_i is the weight of a borrower (or loan) i in the total pool.

Source: Moody's Investors Service

We do not assign nor maintain ratings on securities backed by US residential mortgage loans in a structure – defined as a group of securities that share support – with the following characteristics:

- Structures without support mechanisms, such as a credit enhancement floor or reserve fund floor, when any of the underlying pool(s) has decreased to an effective number of borrowers or loans of 30 or below. If we cannot obtain the effective number, we will use a threshold of 45 instead.
- Structures with a reserve fund or credit enhancement floor, which partially compensates for the increased exposure to single borrowers, when any of the underlying pool(s) has decreased to an effective number of borrowers or loans of 15 or below. If we cannot obtain the effective number, we will use a threshold of 25 instead.

However, we make exceptions for securities with ratings that do not rely on our assessment of individual obligor creditworthiness, such as those that benefit from a full and unconditional third-party guarantee, whether at pool or security level, or for securities that benefit from full cash collateralization. For securities with full support from a guarantor, we apply the rating that is the higher of the support provider's rating and the published or unpublished underlying rating, if any, in accordance with the approach outlined in "Guarantees, Letters of Credit and Other Forms of Credit Substitution Methodology."

Tail Risk in Shifting Interest Structures

Tail risk is the risk of a disproportionately large loss (based on current balance of the pool) on the underlying pool at the end of a transaction's term when few loans remain in the pool and credit enhancement although high in percentage terms may be very low in dollar terms. Shifting interest transactions in which the subordinate bonds receive a portion of prepayment and principal, and where there are not any credit enhancement floors expose the most senior bonds to tail risk by depleting the dollar credit enhancement available to absorb future losses. For these transactions with Aaa (sf)- through A (sf)-rated tranches, we apply additional stresses to assess the resilience of these tranches to tail-end risk. The stress is a combination of 1) stress loss based on collateral quality 2) stress from haircut to available credit enhancement.

We first calculate the stress loss by applying a collateral quality-based factor to our expected loss on these pools. The factor varies from 1.0 to 1.5 and is based on the pool's current collateral characteristics such as updated LTV, proportion of loans above 80 updated LTV, average balance, vintage, and number of loans. We also subject this stress loss to a floor of the loss from the default of the five largest loans in the pool, at the expected severity.

For the tranche analysis, we apply a haircut to the CE to account for the pay down of subordinate tranches. Our rating analysis starts with our quantitative analysis that includes comparing the available credit enhancement (relative to the stressed loss) to the required credit enhancement at the different rating levels and further incorporates various qualitative factors in rating committee. We will cap the ratings of the bonds with exposure to tail risk at 1) A3 (sf) for bonds currently rated Aaa (sf)- to A (sf) that have exposure to tail risk but maintain their ratings under the stress scenario and 2) Baa1(sf) for all other bonds. However, there are some exceptions. We will not downgrade the ratings of Aaa (sf)- to A (sf)-rated tranches if 1) they maintain their ratings under the stress scenario and 2) they are either likely to pay off within a year or likely to pay off two years before the date we project as when the number of loans in the underlying pool will fall below 100.

Interest Shortfall Risks

Our ratings also take into account the interest payment waterfall. We generally apply our approach to defaulted or impaired securities to tranches that have interest shortfalls resulting from insufficient funds to meet their interest obligation (as defined in transaction documents) although for tranches that have suffered very small unrecoverable interest shortfalls we may cap the rating at Baa3(sf).

In addition, we cap ratings on tranches that currently have no interest shortfalls, but weak reimbursement mechanisms should any shortfalls occur. Our cap on these tranches is A3 (sf) or lower. In these structures, the interest shortfall is typically reimbursed from excess interest only after overcollateralization builds to a pre-specified target amount. In transactions where performance is poor and the overcollateralization has depleted, the shortfall is unlikely to be reimbursed and could be permanent. As such, we may consider the magnitude of a potential interest shortfall when assessing bonds with weak reimbursement mechanism.

Appendix I: Standard S&D Assumptions

Lifetime Roll Rates

60 – 89 Days Delinquent	75%
90+ Days Delinquent	85%
Foreclosure	95%
REO	100%

Source: Moody's Investors Service

Annual Delinquency Burnouts

Year	
1-2	80%
2-3	75%
3-7	65%

Source: Moody's Investors Service

Global Severity

Year	
All Vintages	80%

Source: Moody's Investors Service

Prepayment Cap and Floor Assumptions

Cap	5%
Floor	5%

Source: Moody's Investors Service

Appendix J: Strong Prime-Like S&D Assumptions

Lifetime Roll Rates

60 – 89 Days Delinquent	65%
90+ Days Delinquent	75%
Foreclosure	90%
REO	100%

Source: Moody's Investors Service

Annual Delinquency Burnouts

Year	Burnout Factor
1-2	50%
2-3	40%
3-7	30%

Source: Moody's Investors Service

Global Severity

	Severity Assumption
All Vintages	45%

Source: Moody's Investors Service

Prepayment Cap and Floor Assumptions

Cap	30%
Floor	5%

Source: Moody's Investors Service

Appendix K: Small Pool Delinquency Rate Calculation and Assumptions

To project losses on pools with fewer than 100 loans, we first estimate a "baseline" average rate of new delinquencies for the pool that is dependent on the collateral type (see table below for the baseline rates). The baseline rates are generally higher than the average rate of new delinquencies for larger pools.

Once the baseline rate is set, further adjustments are made based on 1) the number of loans remaining in the pool and 2) the level of current delinquencies in the pool. The volatility of pool performance increases as the number of loans remaining in the pool decreases. Once the loan count in a pool falls to 75, the rate of delinquency is increased by 1% for every loan. In addition, if current delinquency level in a small pool is low, future delinquencies are expected to reflect this trend. On the other hand, if current delinquencies are high, future delinquencies are expected to be even higher. To account for that, the rate calculated above is multiplied by a factor that is based on the current level of delinquencies in the pool and the asset type (the higher the current level of delinquencies, the higher the factor - see second table below).

Vintage	Prime-Like S&D	Standard S&D
2002 -2007	3%	11%

Source: Moody's Investors Service

Collateral Performance	Delinquency range	Factor
Prime-Like S&D	0% - 10%	0.75 - 2.50
Standard S&D	10% - 50%	0.85 – 2.25

Source: Moody's Investors Service

Appendix L: Modification Adjustment on Sample Transaction

Modification Adjustment On Sample Transaction

A	Projected Loss (% of CB)	5.64%	Loss Methodology Steps 1, 2, 3	
B	Expected Loss (% of OB)	4.22%		
C	Expected Future Severity	45.00%	Loss Methodology Step 3	
D	Foreclosure (% of CB)	1.50%		
E	REO (% of CB)	0.50%		
F	Total Delinquencies Projected in the first two years (% of CB)	8.00%		
G	Projected Future Defaults (% of CB)	12.53%		= A / C
H	Potential Modifications	6.75%		= F - (0.5 * D) - E
I	Assumed Modification Rate	45.00%		
J	Projected Modifications (% of CB)	2.70%		= H * I
K	Projected Lifetime Re-default Rate	45.00%		
L	Defaults Despite Modification	1.22%		= J * K
M	Non Modified Defaults	9.83%		= G - J
N	Adjusted Total Defaults	11.05%		= L + M
O	% of "Successful" Mods with Principal Reduction	0.00%		
P	% of Loss Associated with Reduction	0.00%		
Q	Loss to Trust from "Successful" Principal Reduction (%CB)	0.00%		= (J - L) * O * P
R	% of Projected Non-Defaults to be Modified	0.00%		
S	% of "Non-Default" Mods With Principal Reduction	0.00%		
T	Loss to Trust "Non-Default" Principal Reduction (%CB)	0.00%		= (100% - G) * R * S * P
U	Loss to Trust from Principal Reduction (%CB)	0.00%		= Q + T
V	Projected Loss (%CB)	4.97%		= (N * C)
W	Net Change in Loss Projections (%CB)	-0.67%		= V - A

Source: Moody's Investors Service

3. US Second Lien Methodology

Summary

We base the quantitative part of our methodology in monitoring securities backed by second lien (closed-end and home equity line of credit) mortgage loans on our expected loss on the transaction's loan pool(s) and our assessment of the credit enhancement required at each rating level. We then take various qualitative factors into account in our analysis in rating committee.

We base the expected loss on the collateral pool(s) on their observed performance and on our assumptions regarding future delinquencies, default rates, and loss severities.

Our projected losses reflect the higher volatility of second lien loans to incorporate:

1) highly leveraged borrowers' propensity to default on subordinate liens
2) limited refinance options
3) a lack of data for related first-lien loans, especially combined loan-to-value ratios

To arrive at a rating, we compare the expected losses to the total credit enhancement (CE) for each bond, including excess spread, subordination, overcollateralization and any external support.

As a result of the greater volatility, we require that second lien-backed securities have much higher enhancement to achieve investment-grade ratings than their first-lien backed counterparts.

Second Lien Overview and Characteristics

Second lien securitizations consist of closed-end second lien (CES) or home equity line of credit (HELOC) loans that are in a subordinated lien position. Overall, second lien borrowers were highly leveraged at origination.

Closed-end second lien mortgages are loans where the proceeds are dispersed in full at closing to borrowers and amortize according to a specified schedule. HELOCs, however, are revolving loans for an initial period, generally amortizing after this period ends.

A majority of CES pools consist of loans made to subprime credit quality borrowers, though higher quality (non-subprime) borrowers back some CES pools. HELOC borrowers were historically strong, with FICOs in the low 700s. However, during 2004 through 2007, their risk profile deteriorated as they utilized these loans heavily to fund high combined loan-to-value purchases, drawing on the loans fully at closing, so they functioned more like their closed-end counterparts.

Loss Projection Approach

Our loss projection approach for second lien transactions forecasts annual conditional prepayment rates (CPR) and annual constant default rates (CDR) in order to calculate the expected loss (EL) for each deal.

Our methodology is broken down into the following steps:

- *Step 1:* Calculate baseline annual CDR, using the results of two separate calculations
- *Step 2*: Project annual CDR for the life of the deal
- *Step 3:* Calculate annual CPR
- *Step 4:* Project cash flows for the life of the transaction to calculate expected loss

Step 1: Calculate Baseline Annual Constant Default Rate (CDR)

We derive the baseline annual CDR from two separate calculations. One ("Annual CDR based on recent losses") represents the pool's performance over the past 12 months, and the second ("Annual CDR based on delinquency pipeline") looks at a snapshot of the deal's delinquency pipeline[14] as of today.

We calculate the annual CDR based on recent losses as the loss realized within the last year divided by the pool balance as of one year ago. Our formula for calculating the annual CDR based on realized losses is:

$$\frac{\text{Cum. realized loss to date (\%OB)} - \text{Cum. realized loss last year (\%OB)}}{\text{Pool Factor last year}}$$

We derive the annual CDR based on delinquency pipeline from today's delinquency levels for each transaction and use the roll rates described below. Given the charge-off policies on second lien loans

[14] Pipeline is the current delinquency stratification – percentage of loans 30–59 days delinquent, 60+ days delinquent, in foreclosure and REO.

(typically 180 days), we apply a pipeline replenishment factor to expected pipeline losses to derive the annual CDR.

We expect nearly all seriously delinquent loans (loans delinquent for over 60 days) to be charged off. We also expect that about half of the loans that are 30 to 60 days delinquent will eventually be charged off as described in Exhibit 8.

EXHIBIT 8

Roll Rate Assumptions

Delinquency. Status	Roll Rate
30 - 59 Days	50%
60 - 89 Days	100%
90+ Days	100%
Foreclosure	100%
REO	100%

Source: Moody's Investors Service

Since servicers typically charge off second lien loans after they are delinquent on average 180 days, pipelines can replenish more than once per year. Based on the vintage of the deal, we assume pipeline replenishment factors that mostly range from 1.00 to 1.75, where 1.00 would imply that the pipeline will replenish just one time in the coming year. See Exhibit 9 below.

EXHIBIT 9

Pipeline Replenishment Factors

	2002 and prior	2003	2004
Subprime CES	1.00	1.00	1.00
Non-subprime CES	1.00	1.00	1.00
HELOC	0.75	0.75	1.00
	2005	**2006**	**2007**
Subprime CES	1.25	1.50	1.75
Non-subprime CES	1.25	1.50	1.75
HELOC	1.00	1.25	1.50

Source: Moody's Investors Service

Our formula for calculating the annual CDR based on the delinquency pipeline is:

EXHIBIT 10

$$1-(1-\text{pipeline defaults})^{\text{pipeline replenishment factor}}$$

Source: Moody's Investors Service

Baseline annual CDR is the average between annual CDR based on recent losses and annual CDR based on delinquency pipeline for the majority of deals. However, in certain cases where the pipelines have expanded with little to no corresponding charge offs, then we may increase the weight to the CDR based on delinquency pipeline.

Step 2: Project Annual CDR for the Life of the Transaction

Once we establish the baseline annual CDR, we forecast how the annual CDR will increase or decrease in the coming years based on annual CDR factors. We base our annual CDR factors on our longer term macroeconomic forecasts and information from other sources. Exhibit 11 below shows the factors used currently. We multiply the baseline annual CDR by the respective annual CDR factors for each year going forward.

EXHIBIT 11
Second Lien Annual CDR Factors

	Year 1	Year 2	Year 3	Year 4+
Subprime CES	100%	85%	50%	50%
Non-subprime CES	140%	90%	55%	40%
HELOC	110%	80%	40%	30%

Source: Moody's Investors Service

Step 3: Calculate Annual CPR

We base the baseline annual CPR calculation on the change in realized losses over the past 12 months (see "Annual CDR based on Recent Losses" in Step 1) and the change in the pool factor over the same time period, along with certain assumptions related to scheduled principal. We assume that the annual CPR is constant over the life of the deal.

We calculate annual CPR as following:

EXHIBIT 12

Current Pool Factor (PF) = PF 1 year ago * (1 – Scheduled Prin./PF 1 year ago - Annual CPR – Annual CDR)

Annual CPR = 1 – Scheduled Prin./PF 1 year ago - Annual CDR – PF current / PF 1 year ago

This calculation assumes 100% loss severity.

Source: Moody's Investors Service

Step 4: Project Cash Flows for the Life of the transaction to Calculate Expected Loss

We project cash flows to calculate total projected cumulative realized loss using the annual CDRs and annual CPRs from the previous steps as well as scheduled payments based on standard amortization assumptions.

Second lien loans typically are charged off after about 180 days after becoming delinquent. Also, we generally expect second lien pools to suffer 100% loss severity due to the high combined loan to values on these loans.

We perform our calculations assuming annual (rather than monthly) cash flows. We calculate the Expected Loss as a percentage of current balance as:

EXHIBIT 13

(Expected Loss (%OB) - Cum Loss to date (%OB)) / Pool Factor

Source: Moody's Investors Service

Static Analysis for US Second Liens

To assess the quantitative implications of the updated loss levels on CES and HELOC securitizations, we analyze each tranche's loss coverage ratio based on an aggregate credit enhancement, which combines subordination (including overcollateralization, reserve accounts, or, in the case of HELOCs, subordination of transferor's interest) and excess spread compared to projected pool losses. We typically calculate credit enhancement from excess spread by multiplying annualized excess spread by the expected weighted average life of the related bond and usually subject it to a haircut. We further incorporate various qualitative factors in our analysis in rating committee.

For second lien deals, our coverage requirements at any given rating level are substantially greater than those that we use for first-lien pools with comparable loss expectations because of the heightened loss volatility in this sector.

We analyze each tranche's loss coverage multiples in light of potential stresses unique to the second lien sector. Additionally, we examine the amount and trajectory of non-insurance-based monthly principal payments to any highly-rated bond relative to the amount and trajectory of the related credit support's monthly erosion, to ensure that highly-rated tranches are better insulated against future volatility.

Pool Size

In assessing pool diversity for US RMBS transactions, we look beyond the nominal number of borrowers in a pool to take into account the actual size of the borrowers' loans. We express this pool diversity measurement, referred to as the effective number, in terms of equal-sized exposures, using the formula in Exhibit 14.

We typically use loan-level information to calculate an effective number of borrowers or loans.

EXHIBIT 14

$$Effective\ Number\ of\ n\ Borrowers\ (or\ Loans) = {}^{1}\!/_{\sum_{i=1}^{n}(W_i)^2}$$

Where:

» W_i is the weight of a borrower (or loan) i in the total pool.

Source: Moody's Investors Service

We do not assign nor maintain ratings on securities backed by US residential mortgage loans in a structure – defined as a group of securities that share support – with the following characteristics:

- Structures without support mechanisms, such as a credit enhancement floor or reserve fund floor, when any of the underlying pool(s) has decreased to an effective number of borrowers or loans of 30 or below. If we cannot obtain the effective number, we will use a threshold of 45 instead.
- Structures with a reserve fund or credit enhancement floor, which partially compensates for the increased exposure to single borrowers, when any of the underlying pool(s) has decreased to an effective number of borrowers or loans of 15 or below. If we cannot obtain the effective number, we will use a threshold of 25 instead.

However, we make exceptions for securities with ratings that do not rely on our assessment of individual obligor creditworthiness, such as those that benefit from a full and unconditional third-party guarantee, whether at pool or security level, or for securities that benefit from full cash collateralization. For securities with full support from a guarantor, we apply the rating that is the higher of the support provider's rating and the published or unpublished underlying rating, if any, in accordance with the approach outlined in "Guarantees, Letters of Credit and Other Forms of Credit Substitution Methodology."

Interest Shortfall Risks

Our ratings also take into account interest payments to tranches. We generally apply our approach to defaulted or impaired securities to tranches that have interest shortfalls resulting from insufficient funds to meet their interest obligation (as defined in transaction documents) although for tranches that have suffered very small unrecoverable interest shortfalls we may cap the ratings at Baa3 sf).

In addition, we cap ratings on tranches that currently have no interest shortfalls, but weak reimbursement mechanisms should any shortfalls occur. Our cap on these tranches is A3 (sf) or lower. In these structures, the interest shortfall is typically reimbursed from excess interest only after overcollateralization builds to a pre-specified target amount. In transactions where performance is poor and the overcollateralization has depleted, the shortfall is unlikely to be reimbursed and could be permanent. As such, we may consider the magnitude of a potential interest shortfall when assessing bonds with weak reimbursement mechanism.

Appendix M: Expected Loss Calculation on Sample Second Lien Transaction

Calculation on Sample Subprime CES Transaction

Pool Stats	A	Jan 2009 - Pool Factor	31%	
	B	Jan 2010 - Pool Factor	20%	
	C	Current Seasoning	44	
	D	WAC	8%	
	E	WAM	140	
	F	Jan 2009 - Cumulative Realized Loss to Date (% of OB)	29%	
	G	Jan 2010 - Cumulative Realized Loss to Date (% of OB)	38%	
	H	Severity	100%	
Delinquency Status	I	30 - 59 Day Delinquent (% of CB)	7%	
	J	60 - 89 Day Delinquent (% of CB)	3%	
	K	90+ Day Delinquent (% of CB)	9%	
	L	Foreclosure (% of CB)	0%	
	M	REO (% of CB)	0%	
	N	60+ Day to REO (% of CB)	12%	
Annual CPR / CDR	O	Implied Annual CPR	1%	=1- (Y / A) - P - (B / A)
	P	Annual CDR from recent loss	30%	= (G - F) / H / A
	Q	Annual CDR from current pipeline	23%	= 1 - (1 - (I * 50% + N * 100%))^ R
	R	Pipeline Refresh Rate	1.5	Replenishment factor for a 2006 subprime CES pool
	S	Annual CDR Burnout - Y1	100%	Subprime CES Burnout - Y1
	T	Annual CDR Burnout - Y2	85%	Subprime CES Burnout - Y2
	U	Annual CDR Burnout - Y3	50%	Subprime CES Burnout - Y3
	V	Annual CDR Burnout - Y4	50%	Subprime CES Burnout - Y4
	X	Baseline Annual CDR	26%	= Average (P:Q)
Cash Flows:				
Sch Prin	Y	Scheduled Principal - Y0	1%	= -PMT [D , ROUND (E / 12 , 0) + 1, A - (P * A) , 0] - D * (A - (P * A))
	Z	Scheduled Principal - Y1	1%	= -PMT [D , ROUND (E / 12 , 0) - 0, B - (B * AE) , 0] - D * (B - (B * AE))
	…	…		
	AA	Scheduled Principal - Y30	0%	= -PMT [D , ROUND (E / 12 , 0) - 29 , Pool Factor (PF) Y29 - (PF Y29 * AI) , 0] - D * (PF Y29 - (PF Y29 * AI))
Annual CPR	AB	Annual CPR - Y1	1%	= O
	AC	Annual CPR - Y2	1%	= O
	…	…		
	AD	Annual CPR - Y30	1%	= O
Annual CDR	AE	Annual CDR - Y1	26%	= X * S
	AF	Annual CDR - Y2	22%	= X * T
	AG	Annual CDR - Y3	13%	= X * U
	AH	Annual CDR - Y4	13%	= X * V
	…	…		
	AI	Annual CDR - Y30	13%	= X * V

Calculation on Sample Subprime CES Transaction

Loss Rate	AJ	Loss Rate - Y1	26%	= AE * H
	AK	Loss Rate - Y2	22%	= AF * H
	…	…		
	AL	Loss Rate - Y30	13%	= AI * H
Pool Factor	AM	Pool Factor - Y0	20%	= B
	AN	Pool Factor - Y1	14%	= AM - (AE * AM) - Z - (AB * (AM - (AE * AM) - Z))
	…	…		
	AO	Pool Factor - Y30	0%	= Pool Factor Y29 - (AI * Pool Factor Y29) - AA - (AD * (Pool Factor Y29 - (AI * Pool Factor Y29) - AA))
Cum. Loss	AP	Cumulative Losses - Y0	38%	= G
	AQ	Cumulative Losses - Y1	44%	= AP + AM * AJ
	…	…		
	AR	Cumulative Losses - Y30	52%	= Cumulative Loss Y29 + Pool Factor Y29 * Loss Rate Y30
Proj. Loss	AS	Cumulative Projected Loss (% of OB)	52%	= AR
	AT	Projected Loss (% of CB)	68%	= (AS - G) / B

Source: Moody's Investors Service

4. US Manufactured Housing Loan ABS Surveillance Methodology

Summary

Our methodology in rating securities backed by manufactured housing loans is based on two key factors 1) Future losses on the pools based on assumptions regarding delinquencies, default rates, loss severities, and prepayment and 2) Expectations regarding delinquencies and expected losses on delinquent loans, modified to reflect the high propensity of servicers to employ payment deferrals.

To arrive at the quantitative part of our rating analysis, we first calculate the expected losses on the pool(s) supporting each bond. We then compare the related expected losses to the total credit enhancement (CE) for each bond, including excess spread, subordination, overcollateralization, and any external support. We compute the ratio of a bond's total CE to its related pool losses and we evaluate various qualitative factors in rating committee.

However, transaction performance and our ratings depend not only on the creditworthiness of the MH loans, but also on servicing, an important factor in assessing MH ratings.

MH servicers typically employ payment deferral as a loss mitigation tool. When MH properties liquidate, loss severities are very high, in many cases reaching 100%. As a result, servicers generally use repossession and liquidation as a last resort. If a borrower can demonstrate an ability to make future payments, but has missed some payments in the past because of a temporary disruption in income, servicers usually add the missed payments to the balance of the loan outstanding and make the borrower's status as current. While deferrals can reduce overall default rates, deferred loans that are re-classified as current are still riskier than loans that have been contractually current. Re-default rate on loans with payment deferrals is approximately 65%. In many cases, half of the remaining borrowers in the pool receive multiple payment deferrals. The number of borrowers receiving payment deferrals and the rate at which they default after receiving this benefit drive the magnitude of the losses.

MH loan servicing is highly concentrated among a handful of servicers and is very specialized. These servicers have extensive knowledge about the borrowers as the same servicing representative typically deals with the borrower as they migrate through each delinquency stage. These representatives are in a position to determine the appropriate loss mitigation tool including granting payment deferrals and visiting the borrower, if practical, to collect payments. A disruption in servicing may result in a weakening of collection activities, leading to increased delinquencies, lower recoveries, and ultimately higher losses on the securitized pools. As a result, a servicer's financial stability and its ability to continue to perform in the long run weigh into our rating process.

Future cash flows on MH pools are uncertain given the high amount of payment deferrals offered to MH borrowers and the defaults that can occur should there be a disruption in this servicing practice. Generally, we will not rate MH bonds investment grade if they are expected to mature beyond ten years.

Loss Projection Approach

Overall, our approach to calculating expected losses on the loan pool employs a static approach where we calculate losses separately for 1) loans that have received payment deferrals and 2) remaining loans that have received no payment deferrals to date. We then combine the losses from the portion of the pool that had a payment deferral and the portion of the pool without any payment deferral in the past to calculate the total projected expected loss for the deal.

Calculation of Loss Projection

We describe our loss projection approach using the following broad steps:

» Step 1: Determine losses on loans that have received payment deferrals in the past

» Step 2: Determine losses on loans that have not received any payment deferrals to date

» Step 2a: Determine baseline annual default rate for such loans

» Step 2b: Determine annual prepayment rate for such loans

» Step 2c: Based on the annual default rate (calculated in 2a) and annual prepayment rate (calculated in 2b), project future expected losses on the loans

» Step 3: Determine Total Transaction Loss

Step 1: Determine Losses on Loans that Received Payment Deferrals in the Past

We calculate losses on this portion of the pool based on the percentage of the pool that has received payment deferrals. On average we have observed that 40%-50% of borrowers in our rated-universe of MH pools have received one or more such deferrals.

Based on historical data, we have observed that 65% of the borrowers who have received payment deferrals in the past have eventually defaulted. Based on this observation, we use a 65% global re-default assumption on such loans.

The loss upon default, or severity of loss, on an MH pool is high given there is no real equity in an MH home at origination as additional costs such as insurance, taxes, add-ons, buy-down points, and park fees are typically financed in an MH loan. Also, the depreciating nature of the underlying assets and the costs associated with repossession of a foreclosed home add to the severity. Severity has been around 75% -85% for liquidated MH loans on average, and we expect future loss severities to remain at these levels. Our severity assumption is generally 85%.

Step 2: Determine Losses on Loans that Have Not Received Any Payment Deferrals to Date

Next we project losses on loans that have not received any payment deferrals to date. Since these borrowers have been truly contractually current and have consistently made their payments on time, we expect losses on these loans to be much lower.

Step 2a: Determine Baseline Annual Default Rate

To determine the baseline annual default rate (or CDR) on loans that have not received any payment deferrals, we use the current rate of projected defaults on delinquent loans. We apply certain annual roll-rates-to-default assumptions based on the severity of the delinquency status (see Exhibit 15 for details). Roll rates indicate the percentage of borrowers in each delinquency bucket that we expect to default over a one-year period. The more severe the delinquency, the lower the likelihood of curing, and the higher the roll rate. The roll rates multiplied by the respective delinquency buckets provides the annual default rate. We floor the annual default rate at 2% should there be any temporary decline in delinquency levels due to factors such as seasonality.

EXHIBIT 15

Annual Roll Rates

Delinquency Status	Roll Rate
30 - 59 Days	15%
60 - 89 Days	30%
90+ Days	90%
Repossession	100%

Source: Moody's Investors Service

We keep the annual default rate constant over the life of each deal. MH deals are very seasoned, and we therefore do not anticipate a sudden reversal in the existing trend of projected defaults and losses.

Step 2b: Determine Annual Prepayment Rate

We calculate the annual voluntary prepayment rate by averaging the actual monthly prepayment rate observed in the last six-month period and then annualizing this average by multiplying by 12. In projecting losses, we hold the annual prepayment rate constant for the life of the deal. Prepayment rate is low for MH deals (approximately 2%-5% for most deals) as MH borrowers typically have weak credit quality and limited ability to refinance. Given the seasoning of the deals, we do not expect a change in this trend.

Step 2c: Based on the Annual Default Rate (calculated in 2a) and Annual Prepayment Rate (calculated in 2b), Project Future Losses

We project cumulative lifetime defaults for the remaining current portion of the transaction using the annual default rate and annual prepayment rate from the previous two steps, as well as scheduled payments based on the term of the loan, interest rate on the loan, and beginning loan balance.

We then assume that all of the projected future defaults will receive payment deferrals given the prevalent servicing practice of deferring payments for delinquent MH borrowers. Based on the historical 65% re-default rate of payment deferred loans, we reduce the future lifetime defaults by about 35% (1-65%) to account for successful deferrals.

For all loans that default, we generally assume that these loans will experience a loss severity of 85%. We may adjust re-default rate and severity where appropriate based on deal/vintage specific data.

Step 3: Determine Total Combined Projected Loss

We determine the total projected pool loss by adding projected losses from loans that had a payment deferral (step 1) and the projected losses on loans that have not received any payment deferrals till date (steps 2a through 2c).

See Appendix O for a numeric example of this approach on a sample MH transaction.

Structural Analysis and Ratings

We base the quantitative part of the rating analysis on the MH bonds based on a coverage multiple. The coverage multiple is the ratio of the total credit enhancement for the bond to the total projected losses for the deal. The credit enhancement includes excess spread (XS), subordination, overcollateralization, and any external support including letters of credit, cash reserve accounts, or guarantees. We typically calculate credit enhancement from excess spread by multiplying annualized excess spread by the expected weighted average life of the related bond and subject it to a haircut to account for its long-term volatility. The final credit is capped at 10%. We have summarized excess spread "haircut" assumptions for each rating level in Exhibit 16.

EXHIBIT 16

Rating	XS Haircut
Aaa (sf)	100%
Aa (sf)	70%
A (sf)	50%
Baa (sf)	50%
Ba and below (sf)	30%

Source: Moody's Investors Service

The coverage multiple required to reach a particular rating varies based on the magnitude of the projected loss. As the projected loss levels increase, our coverage multiples are reduced to account for the lower expected volatility associated with pools with high expected losses (see Exhibit 17 for coverage multiple ranges for different loss scenarios). For example, at a 20% expected loss level, to reach a rating of Baa2 (sf), the bond should have enough credit enhancement to endure a 28.00% loss. We apply various qualitative factors to our analysis in the rating committee.

EXHIBIT 17

Loss Scenarios' Rating Multiple Range

Loss Ranging from 20% to 50%

Rating	Multiples	20% Loss Level	50% Loss Level
Aaa (sf)	2.25-1.59	45.0%	79.5%
Aa2 (sf)	2.05-1.47	41.0%	73.5%
A2 (sf)	1.70-1.38	34.0%	69.0%
Baa2 (sf)	1.40-1.29	28.0%	64.5%
Ba2 (sf)	1.20	24.0%	60.0%

Source: Moody's Investors Service

Other Factors that Impact our Ratings

Future performance of MH pools is uncertain since approximately 40%-50% of the borrowers have received at least one payment deferral and defaults will increase significantly should there be a disruption in this servicing practice. Even though servicers re-classify these borrowers as current, they continue to be riskier than those who have always been contractually current on their payments and are very likely to default if they do not receive payment deferrals in the future.

Also, MH borrowers are typically low-income earners with lower FICOs and limited resources and are therefore highly likely to default on their loans during periods of financial stress. Even contractually current MH borrowers are more susceptible to defaults during times of stress given they have little or negative equity. Furthermore, despite the seasoning of MH pools, they are likely to be outstanding for an additional 10-20 years due to low prepayments made by MH borrowers, exposing them to a wide range of macroeconomic conditions and potential shift in servicing practices. These factors also contribute to increased variability of MH performance.

As a result, there is lower visibility in projecting the performance of the sector over the long run and consequently, we consider high ratings on MH bonds only if we expect them to be paid in full within the next 5-10 years. For example, if our quantitative and qualitative analysis supported a Aaa (sf) rating, we would not assign such a rating on an MH bond unless we expected the bond to be paid down in full within the next five years. Likewise, we would expect a Aa (sf) rated MH bond to be paid down in full within the next five to seven years and a A (sf) and Baa (sf) rated MH bond to be paid down in full within the next 7-10 years.

EXHIBIT 18

Rating	Expected Number of Years for Bond to be Paid in Full
Aaa (sf)	0-5 Years
Aa (sf)	5-7 Years
A (sf)	7-10 Years
Baa (sf)	7-10 Years

Source: Moody's Investors Service

Pool Size

In assessing pool diversity for US RMBS transactions, we look beyond the nominal number of borrowers in a pool to take into account the actual size of the borrowers' loans. We express this pool diversity measurement, referred to as the effective number, in terms of equal-sized exposures, using the formula in Exhibit 19.

We typically use loan-level information to calculate an effective number of borrowers or loans.

EXHIBIT 19

$$Effective\ Number\ of\ n\ Borrowers\ (or\ Loans) = {}^{1}/_{\sum_{i=1}^{n}(W_i)^2}$$

Where:

» W_i is the weight of a borrower (or loan) i in the total pool.

Source: Moody's Investors Service

We do not assign nor maintain ratings on securities backed by US residential mortgage loans in a structure – defined as a group of securities that share support – with the following characteristics:

» Structures without support mechanisms, such as a credit enhancement floor or reserve fund floor, when any of the underlying pool(s) has decreased to an effective number of borrowers or loans of 30 or below. If we cannot obtain the effective number, we will use a threshold of 45 instead.

» Structures with a reserve fund or credit enhancement floor, which partially compensates for the increased exposure to single borrowers, when any of the underlying pool(s) has decreased to an effective number of borrowers or loans of 15 or below. If we cannot obtain the effective number, we will use a threshold of 25 instead.

However, we make exceptions for securities with ratings that do not rely on our assessment of individual obligor creditworthiness, such as those that benefit from a full and unconditional third-party guarantee, whether at pool or security level, or for securities that benefit from full cash collateralization. For securities with full support from a guarantor, we apply the rating that is the higher of the support provider's rating and the published or unpublished underlying rating, if any, in accordance with the approach outlined in "Guarantees, Letters of Credit and Other Forms of Credit Substitution Methodology."

Tail Risk in Pro-rata Structures

Tail risk is the risk of a disproportionately large loss (based on current balance of the pool) on the underlying pool at the end of a transaction's term when few loans remain in the pool and credit enhancement although high in percentage terms may be very low in dollar terms. Pro-rata pay transactions in which the subordinate bonds receive a portion of prepayment and principal, and where there are not any credit enhancement floors expose the most senior bonds to tail risk by depleting the dollar credit enhancement available to absorb future losses. For these transactions with Aaa (sf)- through A (sf)-rated tranches, we apply additional stresses to assess the resilience of these tranches to tail-end risk. The stress is a combination of 1) stress loss based 2) stress from a haircut to credit enhancement.

We first calculate the stress loss by applying a stress factor to our expected loss on these pools. For the tranche analysis, we apply a haircut to the CE to account for the pay down of subordinate tranches and we review the resulting ratio of the bond's haircut CE to its related mortgage pool's stress losses and we evaluate various qualitative factors in rating committee.

We will cap the ratings of the bonds with exposure to tail risk at 1) A3 (sf) for bonds currently rated Aaa (sf)- to A (sf) that have exposure to tail risk but maintain their ratings under the stress scenario and 2) Baa1 (sf) for all other bonds. However, there are some exceptions. We will not downgrade the ratings of Aaa (sf)- to A (sf)-rated tranches if 1) they maintain their ratings under the stress scenario and 2) they are either likely to pay off within a year or likely to pay off two years before the date we project as when the number of loans in the underlying pool will fall below 100.

Interest Shortfall Risks

Our ratings also take into account interest payments to tranches. We generally apply our approach to defaulted or impaired securities to tranches that have interest shortfalls resulting from insufficient funds to meet their interest obligation (as defined in transaction documents) although for tranches that have suffered very small unrecoverable interest shortfalls we may cap the ratings at Baa3(sf).

In addition, we cap ratings on tranches that currently have no interest shortfalls, but weak reimbursement mechanisms should any shortfalls occur. Our cap on these tranches is A3 (sf) or lower. In these structures, the interest shortfall is typically reimbursed from excess interest only after overcollateralization builds to a pre-specified target amount. In transactions where performance is poor and the overcollateralization has depleted, the shortfall is unlikely to be reimbursed and could be permanent. As such, we may consider the magnitude of a potential interest shortfall when assessing bonds with weak reimbursement mechanism.

Appendix N: Guidance Used in Rating Analytics

Annual Roll Rates	
30 – 59 Days Delinquent	15%
60 – 89 Days Delinquent	30%
90+ Days Delinquent	90%
Repossession	100%
Severity	
Severity Assumption	85%
CDR	
CDR Floor	2%
Payment-Deferral	
Lifetime Re-default Rate	65%

Source: Moody's Investors Service

Appendix O: Expected Loss Calculation on Sample MH Transaction

	Assumptions	
A	Payment Deferred Loans % CB	50%
B	Re-Default Rate	65%
C	Projected Defaults that are expected to receive payment deferral	100%
D	Severity	85%
E	Annualized Roll Rate 30-60	15%
F	Annualized Roll Rate 60-90	30%
G	Annualized Roll Rate 90+	90%
H	Annualized Roll Rate Repo	100%

	Inputs (Non-Payment Deferred Pool)	
I1	30-60 % CB	1.10%
I2	60-90% CB	0.30%
I3	90+ % CB	1.94%
I4	Repo % CB	1.24%
I5	Annual Prepayment Rate (CPR)	1.75%

	Output			
P	Loss from Payment Deferred Portion % CB	27.6%	=A*B*D	Payment Deferred Loans% CB *Re-default Rate *severity
Q	Annual Default Rate from pipeline (CDR)	3.2%	=E*I1+F*I2+G*I3+H*I4	Sum product of Delinquency pipeline and Annualized roll rate
R	Lifetime Defaults for non-payment deferred Loans based on cash flow run using CDR and CPR assumptions (i.e., Q and I5)	19.60%		This number is based on a cash flow run using CDR and CPR assumptions
S	Lifetime Defaults after adjusting for Payment Deferral	12.74%	=R*C*B	Lifetime Defaults * Defaults expected to receive payment deferral * Re-Default Rate
T	Loss from Non-Payment Deferred Portion % CB	5.41%	=S*D*(1-A)	
U	Total Projected Loss % CB	33.04%	=P+T	
V	Total Lifetime Default Rate	38.87%	=U/D	

Source: Moody's Investors Service

Moody's Related Publications

Credit ratings are primarily determined through the application of sector credit rating methodologies. Certain broad methodological considerations (described in one or more cross-sector rating methodologies) may also be relevant to the determination of credit ratings of issuers and instruments. A list of sector and cross-sector credit rating methodologies can be found here.

For data summarizing the historical robustness and predictive power of credit ratings, please click here.

For further information, please refer to *Rating Symbols and Definitions*, which includes a discussion of Moody's Idealized Probabilities of Default and Expected Losses, and which is available here.

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