MOODY'S
INVESTORS SERVICE

RATING METHODOLOGY

Non-Performing and Re-Performing Loan Securitizations Methodology

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This rating methodology replaces *Non-Performing and Re-Performing Loan Securitizations Methodology* published in April 2020. We clarified our approach on guarantees in the "Pool Size" section, and we made limited editorial updates.

Scope

This rating methodology applies to securities backed by non-performing and re-performing loans.

In this methodology, we explain our approach to assessing credit risks for securities backed by non-performing and re-performing loans, including quantitative and qualitative factors that are likely to affect rating outcomes in this sector. Non-performing loans (NPLs) are those that are delinquent or in default at the time of the securitization, while re-performing loans (RPLs) are those that were previously delinquent or in default and are now paying, under either the original or modified terms. The NPLs and RPLs may be secured or unsecured and the borrowers may be individuals or corporations. The securitizations covered under this methodology may be backed by pools consisting entirely of NPLs or RPLs, or pools backed by a combination of the two.

We discuss the asset and liability analysis, including associated modeling, as well as other considerations. We also describe our monitoring approach.

Rating Approach

In this section, we summarize our approach to assessing credit risks for securities backed by non-performing and re-performing loans, including quantitative and qualitative factors that are likely to affect rating outcomes in this sector.

Our analysis of NPL and RPL transactions typically follows our methodology for analyzing the underlying asset type (e.g., residential mortgage loans, commercial mortgage loans, etc.) when appropriate, and focuses on the following:

- The general portfolio characteristics, such as NPL vs. RPL; secured vs. unsecured; individual borrowers vs. corporate borrowers; property type and location; for NPLs, defaulted vs. delinquent; legal status and timing of foreclosure or insolvency procedures; and for RPLs, modified vs. non-modified.
- The type and quality of the available data, such as loan-level information, property valuations, and historical data. We incorporate a review of any third-party verification reports and representations and warranties where applicable.
- The servicers' or asset managers' strategies and capabilities, which include their experience and resources, business plans, compensation, and alignment of interest with investors (e.g., the size of the servicer's or manager's equity stake).
- The liability/cash flow structure, including the payment priority for the various securities and the servicer/sponsor, and any other structural features in the transaction, such as liquidity, triggers and hedging instruments.
- Any additional support available in the transaction, such as cash reserves or other collateral backing the securities.
- Our ratings on securities backed by NPLs and RPLs are based on the expected losses posed to investors, considering both the probability and the severity of credit losses that investors may suffer.[1]

We do not apply this methodology approach rigidly in all circumstances; our rating committees will, where appropriate, consider other factors that they deem relevant to their analysis, which could ultimately affect the rating outcome. As transactions season, some of the methodology criteria could become less relevant or not relevant to the analysis, while others, such as realized collateral performance, could become more relevant.

As with all rating methodologies, in applying this methodology, where appropriate, rating committees consider all factors that they deem relevant. Therefore, in addition to the quantitative analysis including the model outcome, rating committees also consider various qualitative factors. Consideration of these qualitative factors could lead a committee to assign a rating different from that indicated by the model output.

Asset-level Analysis and Related Modeling

In this section, we explain how we analyze the underlying assets that back NPL and RPL securitizations and how we estimate potential losses on those assets.

The specific approach that we use to analyze NPL and RPL pools depends on the type and quality of data available and the number and diversity of assets in the pool (i.e., its "granularity"). In the following sections,

[1] 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) and in the "Loss Benchmarks" section.

we describe our approaches to analyzing the three major types of NPL and RPL portfolios: residential mortgages, commercial real estate mortgages, and unsecured loans.

Residential Mortgage-Backed Securities

Overview

To determine the ratings on an NPL/RPL residential mortgage-backed securities (RMBS) transaction, we assess the transaction structure and the available credit enhancement for the securities against the projected portfolio losses.

To determine the adequacy of the available credit enhancement for a target rating, we first calculate the portfolio's expected loss, which, in general, is based on our analyses of both the likelihood of loan defaults and the extent of recoveries when loans default. Our default analysis examines the historical default performance of similar loans and, depending on the availability of data and the extent of delinquencies in the portfolio, may include an assessment of the extent to which delinquent loans are likely to "roll" to default status.

Our estimation of loan recovery values considers the historical recoveries observed for similar loans. It further considers the extent and quality of data regarding loan characteristics such as loan-to-value ratios, loan sizes, the type and location of the underlying property, the stage of delinquency or default, and the servicer's loan-recovery strategies and capabilities.

In the next step toward assessing the adequacy of the available credit enhancement consistent with the target ratings, we perform a stress analysis. Our starting point is generally a stress multiple of the pool's expected losses. We may then adjust this stressed loss depending on the availability of loan-level characteristics and their predictability of future loan performance in a severe economic scenario. We may use the relevant RMBS model to evaluate individual loans.[2] When applying this adjustment to our stressed loss, we consider individual loan characteristics, performance history and type of modification applied, if any.

NPL/RPL RMBS transactions have characteristics similar to those of seasoned RMBS transactions. Both types of securitizations have seasoned collateral in various stages of payment and distress. For that reason, the NPL/RPL approach we use for US RMBS has similarities with our US RMBS surveillance approach for pre-2009 vintages. The US RMBS surveillance approach[3] for pre-2009 vintages considers the loan delinquency "pipeline" and assigns a higher likelihood of default for severely delinquent loans. For current loans, the US RMBS surveillance approach for pre-2009 vintages projects future delinquencies and defaults based on past performance and modification history. For NPL securitizations, the approach considers expected recoveries on the loans upon liquidation. We also typically perform a loan-level analysis to assess the potential losses on each loan in a severe economic scenario considering the same characteristics described in our primary rating methodologies.

For NPL/RPL RMBS transactions, we require the same data that we typically receive for an RMBS transaction, such as loan-level information and historical performance data. In addition, we expect detailed information on loan restructuring terms, such as the type and date of modification. In the case of NPLs, we expect detailed information on the historical experience for recoveries, including the type of recovery strategy and a description of the legal proceedings related to the loans.

[2] For more information, see our RMBS methodologies. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

[3] For more information, see our US RMBS surveillance methodology. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

In the following sections, we provide more details on how we derive default and recovery projections, and how we combine those projections with our stress analysis to derive the credit enhancement levels that are consistent with each rating level for an NPL/RPL RMBS transaction.

Portfolio Expected Loss Analysis

We review the historical performance observed for loans similar to those included in the portfolio. Typically, we perform a separate default and recovery analysis.

HISTORICAL PERFORMANCE DEFAULT ANALYSIS

To estimate defaults on RPL and NPL pools, we analyze historical performance data to predict future loan performance. We review the performance of the types of loans in the securitized collateral pool, other performance data from the same or comparable originators/servicers, and any other relevant data available in the mortgage market or other comparable markets. We may benchmark performance against portfolios with similar general characteristics, and we consider differences in key characteristics, such as the delinquency status of the loans in the portfolio and the types of loan modifications the servicer has made or is likely to make, to increase the borrower's ability to meet the loan payment terms.

When available, we consider the loan-level information and third-party verification of the same in our default analysis. We consider the performance history of the underlying loans in the pools, including the delinquency history and loan modification information. We also consider collateral characteristics such as loan type, amortization type, loan modification type and updated valuation/credit data, if available. For loans that are currently delinquent, we calculate lifetime default rate based on their delinquency status and collateral profile using a "roll rate" analysis. This is based in part on historical data and examines the frequency with which loans at each stage of delinquency are likely to eventually "roll" into default. The roll rates we apply when assessing NPL and RPL transactions typically align with those used in the surveillance of RMBS transactions.[4] For loans that are currently re-performing as a result of a loan modification, we estimate lifetime default rates based on the collateral profile, the modification type and available performance of similar loans post modification. Similar to our surveillance approach, our default projection approach on such loans may involve, among other things, application of a projected annualized delinquency rate, voluntary prepayment rates and delinquency burnout factors.

HISTORICAL RECOVERY ANALYSIS

One of the major factors we consider when assessing expected recoveries on projected defaults is the historical recoveries observed for similar loans. Additionally, depending on the quality and extent of available data, we may estimate loan-level recoveries by considering attributes such as the loan-to-value (LTV) ratios, the time and costs to foreclosure in the relevant jurisdiction, the current and projected house values at the time of default, and the servicer's strategies and capabilities in collecting on the loans and in foreclosing on properties or restructuring loans, where necessary.

In our loan-level analysis, we use, to the extent available, updated market value estimates of the property securing the loans and then adjust for potential variations in future market values to estimate the final gross proceeds upon sale. Our estimates of the current property market values are typically based on:

- Updated independent third-party valuation(s) and independent third-party verification of the same; or
- A court-determined price[5] or other legally recognized evaluation, if available; or

[4] For example, see our US surveillance RMBS methodology for pre-2009 vintages. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

[5] For example, in Italy the official valuation used to set the base price for an auction in a foreclosure process is known as Consulente Tecnico d'Ufficio, or CTU.

» Our own estimate of the property's current market value, which is typically based on an extrapolation using the property's original value or the most recent valuation and the average growth rate in prices of similar properties in the same region since the original valuation date.

We may apply a haircut to the estimated sale proceeds to reflect the distressed nature of the sale if we believe it is not captured in the above data points. Further haircuts may also be applied based on the quality of the data provided.

To calculate the loss severities, we deduct the expected expenses from the gross sales proceeds. Most of the costs are fixed in nature while some depend on the foreclosure timeline. In the US, for example, the largest costs typically result from principal and interest advances to the transaction while other costs include escrow advances. More generally in all markets, some of the key costs include those related to property maintenance and associated with the sale of the property, such as legal fees and valuations.

Finally, the servicer's strategy and capability can affect the net recovery proceeds. In assessing the servicer's impact on recoveries, we evaluate its strategy and capabilities in resolving delinquent and defaulted loans, either through legal procedures or other resolution processes, or through out-of-court settlements with debtors and loan restructuring. We discuss the servicer's role in more detail in the "Servicing" section.

Stressed Loss Analysis

In assessing the portfolio's potential stressed losses, we generally first apply a stress multiple of the pools expected loss. Depending on the availability of loan-level information and its predictability of future loan performance in a severe economic scenario, we may then adjust this stress loss considering individual loan characteristics.

The multiple we apply to the pool's expected loss is a measure of the stress losses consistent with the higher rating levels and typically align with those used in our rating approach for RMBS transactions.[6]

When adjusting the stressed losses based upon individual loan characteristics, we typically perform a loan-level analysis to assess the potential losses on each loan in a severe economic scenario. We generally consider the same characteristics as described in our primary rating methodologies for RMBS. In addition to accounting for the risk factors that we use generally for RMBS, for NPLs and RPLs we also consider the following factors, as applicable:

» Current delinquency status

» Time since last delinquent

» Type of loan modification applied

» Time since modification applied

For certain portfolios of defaulted mortgage loans where the timing of the cash flows is critical, we may apply the approach described in the "Other Secured NPLs" section. In this case, to assess the uncertain evolution of the current house price until the expected moment of the "forced sale," we typically derive our base case future house price assumptions from historical market data. In general, the key input drivers of our base case house price evolution assumptions are the property type and the location. The historical analysis is complemented by the evaluation of other factors, such as market trends and information, benchmark

[6] For more information, see our RMBS rating methodologies. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

transactions, and other qualitative considerations to derive the future house price evolution. Once we determine the base case assumption, we apply further stresses to account for house price volatility.

Concentrated Commercial Real Estate Portfolios

Commercial real estate (CRE) liquidating vehicles monetize recoveries from pools of NPLs[7] secured by mortgages on real estate via asset liquidation. Proceeds from liquidations of the resolved loans backing the securities are used to pay down rated debt.

When analyzing concentrated commercial portfolios, we focus on two main performance drivers: the net recovery rate after resolution, and the timing of resolution. We test the sizing of the proceeds, which is ultimately leverage based. Each leverage target corresponds to a rating, similar to what we apply in the relevant commercial mortgage-backed securities (CMBS) methodologies. The process is as follows:

- Determine property disposition values for the collateral pool
- Assess projected costs (i.e., foreclosure, fees, liens, etc.) and projected revenues (i.e., cash flow from assets, including post real estate owned [REO])
- Assess the effect of our projected timing for all cash flow, cost, and liquidation events (NPV using asset appropriate discount rates)
- Determine the leverage on the projected net recovery
- Assess the effects of portfolio adjustments, such as pooling and recourse profile

Where current property cash flows and/or valuations are available and there is an anticipated short time to resolution, we analyze the asset manager's resolution strategy for each property in the portfolio (for example, foreclosure, restructuring, selling the property post foreclosure [REO strategy]) to determine the most likely resolution strategy and timing. To determine the amount likely to be collected on the resolution date, we usually focus on:

- Asset manager's or sponsor's purchase price for the collateral
- Asset manager's loan-level recovery strategy and net proceeds expectations
- Third-party valuations such as recent broker opinions of value and/or appraisals
- Our assessment of sustainable net cash flow and its implications for the value of commercial properties (if applicable)

The recovery rate net of transaction costs primarily determines the proceeds that can be used to repay noteholders. The condition of the collateral and the market in which it is located affects the recovery rate. Given the usually expedited resolution strategy for these transactions, the near-term (one-to-three year) property and capital market outlooks are important data points for assessing recovery value. A slower-than-expected resolution time reduces proceeds available for principal payments to the extent that additional property protection expenses and interest must be paid during that holding period. Given the potential for significant variations in timing, we also examine the adequacy of reserves and the rated final maturity date.

Once we determine the expected future property costs (for example, property taxes, insurance, etc.), recoveries, and associated timing for each asset in the pool, we assess the risk associated with each underlying property by discounting the cash flow stream using various discount rates.

[7] In the absence of an active CRE RPL market, we focus on NPLs in this section.

Other Secured NPLs

Our approach described in this section applies to more varied portfolios of secured NPLs, although it can also be applied to pools of RMBS NPLs where the timing of the cash flows is critical and depends, among other things, on the specific asset location. Our analysis usually involves a loan-level assessment, which provides views regarding both the timing and amount of future collections on each debt obligation in the portfolio. For concentrated portfolios or for the largest exposures in granular portfolios, we analyze loan-level information to assess the timing and potential recoveries. For smaller exposures or for granular pools, we model timing and recovery assumptions based on key loan and asset security characteristics, for example average time to resolution for the relevant region. Although this represents the most common approach, other approaches may be used given data availability, granularity of portfolio and market specifics. For example, if a secured portfolio is extremely granular and information provided by the servicer on recoveries is sufficiently robust, we may utilize the statistical method described in the "Unsecured NPLs" section.

For such secured NPL exposures, the anticipated recovery of each position depends on the individual LTV ratio, the size of the debt obligation, the type and location of the property or other asset security, the insurance payout (if any) and the status of the legal proceedings. Below, we describe our assessment of the key aspects of the most common NPL transactions. However, as each country has different legal proceedings, we adapt our approach to reflect the actual practices in that jurisdiction.

Timing of Collections: We derive our assumption based on the legal stage of a claim and the estimated remaining time to cash distribution through the courts, given the type of obligor and location of the court in which proceedings were initiated. In some countries, the length of the legal proceedings may vary significantly within regions or even on a court-by-court basis. In certain jurisdictions, the foreclosure could be completed without court proceedings. We model a recovery time for each position in the portfolio and may utilize a stochastic approach to account for potential volatility.

Net Value of Claim: To determine the amount likely to be collected for each loan in a granular portfolio, we take the minimum of the following:

- The maximum amount that the lender may claim on the asset, (e.g., the mortgage value), if applicable
- The loan/claim amount at the time of expected collection (including accrued legal interest)
- The secured asset's "forced sale value" (net of expenses) at the expected collection time

Current Price: We typically consider the lower of the following, though we may also apply a further haircut to reflect the distressed sale value of the assets if not already captured:

- Updated independent third-party valuation(s)
- A court attributed price or other legally recognized evaluation, if available
- The estimated current market value obtained by an extrapolation using the property's original value or the most recent valuation and the average growth rate in prices of similar properties or asset securities located in the same region since the original valuation date

Future Price Value and Volatility: To assess the uncertain evolution of the current price until the expected moment of the "forced sale," we typically derive our base case future price assumptions from historical market data. In general, the key input drivers of our base case price evolution assumptions are the property or asset type and the location. The historical analysis is complemented with the evaluation of other factors such as market trends and information, benchmark transactions, and other qualitative considerations to

derive the future price evolution. Once the base case is determined, we apply further stresses to account for the volatility. We also assess the likelihood of such high volatility outcomes. We have found that we can usually fit house price growth rate to a normal distribution. However, we consider alternatives where the normal distribution does not appear to fit the data. An example of how we model property price is described in Appendix A.

Unsecured NPLs

The approach described in this section also applies to securitizations backed by other non-traditional bank products, such as unpaid tax or social security receivables when the pools are granular and historical data on comparable pools exists. In addition, this approach can also be applied to secured pools under similar circumstances, if data on a loan-level basis is not available.

For unsecured NPLs or RPLs, we usually focus on historical cohort information that shows the cash flows received on the pool so far, according to the year of origination. We then calculate the future expected cash flows on the pool, either by assuming certain haircuts to recoveries observed to date or by modeling the means and variances we have observed in the historical data set.

We analyze the historical data we receive, in particular the average collections over time and the volatility and timing of such collections. Such data would ideally cover 10 to 15 years of collected amounts (on a semi-annual or annual basis) and be representative of the securitized portfolio.

We can model recoveries as a function of the initial balance of each cohort (static variable) or as a percentage of the previous period balance of such cohort (dynamic variable). We perform our analysis based on both extrapolations. The dynamic variable is the preferred method if data is available as it allows for a consistent path of recoveries for each future collection period. Under a static approach, unless truncated or modified, it is possible to simulate a total collection amount along a given simulated recovery path that is greater than the original outstanding balance. Such outcomes are more likely as the collection period increases. A dynamic approach leads to a natural bound on total recoveries by defining a recovery amount as a function of previous period's outstanding balance.

We have generally observed that average recoveries from the previous period's balance decrease as the distance from origination increases. Hence, we usually incorporate this feature into our recovery projections. We typically do so by calculating the mean and standard deviation of recoveries as a function of distance from origin. We may choose to eliminate certain outliers in this process and may further adjust based on the experience we gained when analyzing cohort information from other originators. For example, we have found that the ratio of the standard deviation to the mean (or "coefficient of variation") normally lies above a certain threshold. We would use that minimum level in cases for which less data is available. Appendix B includes a detailed example of how historical data may be used to derive assumptions about potential future recoveries on unsecured NPLs.

Once we have derived average recovery and volatility values from historical data, we complement our analysis with the evaluation of other factors. These may include market trends and information, benchmark transactions, and other qualitative considerations to derive our assumptions for mean recovery and volatility, or appropriate haircuts to apply to the business plan.

If we use a simulation model, since recovery percentages must lie between 0% and 100%, we have found that we can typically fit the observed data and inputs to a Beta distribution to simulate the asset cash flows resulting from the unsecured NPL portfolio in the transaction. However, we consider alternatives where the Beta distribution does not appear to fit the data.

To simulate the expected collections in a cash flow model, we perform an analysis of the correlation within the same collection year across the different cohorts. Our single-factor approach typically leads to high correlation assumptions on recoveries within the same collection year across the different cohorts. This is appropriate since the economic factors that produce lower-than-average recoveries will affect all cohorts regardless of their age.

For transactions securitizing several pools of unsecured NPLs corresponding to different asset types (e.g., NPLs made to individuals as opposed to SMEs), we measure the correlation in recoveries between each pool and incorporate these findings in the joint recovery projections.

Finally, for revolving structures for which the seller adds new receivables to the collateral pool, we focus on the predictability of future collections. We run cash flow scenarios in which we stress the difference between historical collections on the receivables and the seller's forecast collections to assess the impact on the securities, given different levels of credit enhancement.

Our analysis of revolving NPL transactions relies on structural features, such as eligibility criteria and concentration limits. In addition, the securitized portfolio must be sufficiently granular to allow us to statistically assess the anticipated performance of additional receivables.

Diversity and Concentration Risk for NPL and RPL Portfolios

We adjust our assumptions to reflect certain characteristics of a transaction. In particular, we assess whether the portfolio is diversified in terms of obligors, regions, asset type and debt claim type. If the portfolio is concentrated in one or more aspects, we perform some sensitivity analysis in relation to such concentration. For example, we may test the impact of limited recoveries among the largest five or ten loans to account for the effect of concentration risk, or for a particular region or certain asset type.

Similarly, we look in detail at any specific asset types included in the pool (for example, portfolios of agricultural credits, subsidized loans to public entities, buildings under construction, hotels, hospitals, land, etc.) and may adjust our analysis to reflect the asset's risk characteristics (for example, we may assume higher volatility for certain asset types). Some assets may also be exposed to specific environmental risks, such as pollution or seismic events.

Structural Analysis and Liability Modeling

In this section, we explain how we analyze the structural features of an NPL or RPL securitization, including how we model and allocate cash flows to different classes of securities, taking into account asset cash flows and available credit support.

Most structural features of an NPL or RPL transaction are similar to those found in transactions securitizing the general asset type (e.g., residential mortgages, commercial real estate, and unsecured loans). Therefore, we analyze those features in a manner described in the specific methodology for that asset type.

In general, we assess the transaction's structural features using the outputs from the portfolio analysis described above. We assess the protection provided to each bond, through credit enhancement for example, against the range of potential portfolio losses. In some cases, we incorporate a cash flow model to help in this assessment.

As part of the quantitative analysis, we assess the model output by comparing the expected loss of a security or bond and its weighted average life to Moody's Idealized Cumulative Expected Loss Rates table.[8]

Our assigned rating adjusts the outcome of the above analysis, as necessary, to incorporate counterparty default risks not explicitly modeled in the cash flow model, as well as the transaction's legal risks.

Below, we describe our assessment of some structural features that are specific to NPL and RPL transactions.

Structures for CMBS

After assessing the effects of portfolio adjustments, such as pooling benefit and recourse profile, we use the total net present value (NPV) of the portfolio to assess the leverage corresponding to each tranche. This approach is similar to the analysis we use in the Large Loan and Single Borrower CMBS methodology.

» **Pooling benefit:** Since all of the loan collateral represented in the pool is typically in (or near) default, probability of default is not a credit variable affected by pooling. Asset diversity within NPL transactions may have a significant impact on loan recoveries. We analyze the pool's loan Herfindahl score as well as pockets of concentration (i.e., property type, geography) that could potentially create correlations in loan recovery estimates.

» **Recourse profile:** Recourse loans are debt agreements secured by real property which give lenders additional rights against the debtor and are equivalent to general obligations. Recourse lenders have the right to seek payment, beyond the property pledged as collateral, from a borrower in default. Our approach to analyzing a pool of recourse loans shares the same methodology we use for non-recourse loans, except for the additional step to assess any incremental benefit derived from recourse. Recourse to the borrower typically results in a lower loss given default, as it is an effective negotiating tool for quicker and fuller resolutions. If the pool contains recourse loans and we have sufficient and up-to-date information, we analyze the amount of recourse, recourse exposure coverage and the recourse provider credit profile and may provide some additional benefit to the pool.

We also perform cash flow model stress testing. The cash flow model considers available funds as it relates to our resolution timing, recovery assumptions, and any equity leakage that may occur if or when performance hurdles are met. For classes to pass, they must receive timely interest with return of principal before the rated final maturity date.

Structures with Liquidity Lines

Liquidity lines typically are designed solely to pay interest on the securities for a limited time during a cash-flow shortfall that is likely to be temporary. Similar to typical pure liquidity lines in other securitizations, the line is not intended to act as credit enhancement in the transaction and ranks senior to the rated securities.

Structures with Advance Facilities

An advance facility (or "AF," which is often referred to in transactions as the servicer advance facility, liquidity advance facility, or limited recourse facility) is a form of credit facility that servicers provide to make payments in the event of a collection shortfall. Thus, whenever collections from a portfolio fall below a predefined level, known as the AF threshold, the special purpose entity (SPE) draws the shortfall amount

[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) and in the "Loss Benchmarks" section. When evaluating the model output for certain underlying asset classes, such as US or Asian-Pacific CMBS transactions, we typically do not select loss benchmarks. For more information about evaluating model outputs for a certain asset class, consult the relevant rating methodology for the structured finance asset class underlying an NPL or RPL transaction.

from the available AF. The interest and principal due on the AF draw is subordinated to the rated securities, and therefore the AF provides some credit benefit to the transaction.

We incorporate the potential positive AF credit impact in our analysis. The AF's rating impact depends on:

» The rating of the AF provider (and/or the back-up AF provider)

» The mechanics of the trigger to replace the AF provider or to cash-collateralize its obligations if an AF provider's credit quality declines

» The amount of, and drawing conditions for, the available AF

» Our assessment of the risk that the AF provider chooses not to renew the AF, which is typically a 364-day renewable facility. In assessing this risk, we evaluate any requirements on the AF provider to find a substitute AF provider, including the required time frame and any requirement for a cash payment by the original AF provider if a substitute cannot be found in the specified time frame.

Structures with Reserves

In this type of structure, the transaction sponsor provides additional reserves to support the collections from the portfolio. The reserves typically are either in cash or other liquid assets (e.g., Treasury bonds) and are usually available to pay interest on the securities or certain (senior) expenses in the event of a shortfall and/or to fund working capital needs for the underlying assets. In analyzing structures with reserves, we assess the reserves' characteristics (including the amount, rating, liquidity, and market value) as well as the mechanics for their use.

Waterfall Mechanisms

Our structural analysis also considers any features which may erode or build subordination as a source of credit enhancement and the interest payment mechanism on the securities. Some examples are outlined below.

Sequential-Pay Structures

Simple sequential structures that allocate principal payments top-down from the senior to the subordinate classes provide a form of credit enhancement by amortizing the senior securities at a faster pace. Transactions may be structured with or without any cash flow triggers/initial overcollateralization. Additionally, excess spread may be available to make interest and principal payments to the securities.

Shifting-Interest/Pro-rata Structures

This is a weaker structure for the senior securities compared to a sequential-pay structure because subordinate securities receive their pro-rata share of scheduled principal payments and increasing amount of prepayments after the step-down date, provided delinquency and cumulative loss tests are satisfied. Shifting-interest transactions in which the subordinate securities receive a portion of prepayment and principal expose the most senior securities to tail risk by depleting the dollar credit enhancement available to absorb future losses. Transactions may allow for a subordination floor that mitigates this risk by preserving enhancement in the transaction at the tail-end. Such structures without a subordination floor may be subject to a ratings cap.

Interest Promise/Reimbursement Mechanism

Our analysis also incorporates review of the interest promise on the securities. Those with a weak interest promise (for example, those based on collections that net servicer advances in the US) and those with a weak interest shortfall reimbursement mechanism may be subject to ratings caps.

Loan Sale Provisions

Some transactions may allow sales of loans to an individual or on a bulk sale basis to a third party. We evaluate such provisions and analyze the credit enhancement impact consistent with each rating level as a result of such provisions.

Loss Benchmarks

In evaluating the model output for NPL or RPL transactions, we use the expected loss benchmark approach relevant to the underlying asset class, as applicable. Please consult the relevant Moody's methodology for the structured finance asset class underlying an NPL or RPL transaction for information about the loss benchmark approach used for that asset class.

In the case of an NPL or RPL transaction related to residential mortgage or unsecured loans, for example, we select loss benchmarks referencing the Idealized Expected Loss table[9] 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 initial ratings and 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 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 1

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

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

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

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 either initially assigned or 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

[9] 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.

Other Considerations

Along with our asset, structural and liability analysis, we consider other quantitative and qualitative factors in our credit analysis such as transaction counterparties, legal risks, reliability and completeness of historical and portfolio data, country ceilings, and environmental, social and governance (ESG) considerations.

Counterparty Risks

Servicer

The servicer in transactions backed by NPLs and RPLs typically plays a much greater role in determining the securitization's cash flows than it does in other securitizations, where most debtors make regular payments pursuant to their loan agreements without servicer intervention. For NPLs, the servicer's ability to resolve seriously delinquent or defaulted loans is critical in determining the amount of cash flow the loans will produce over their lives. We review the detailed business plan of the resolution strategy and timeline for the assets in the portfolio and consider it in our analysis. Similarly, for RPLs, where borrowers typically have a history of serious payment difficulties, the servicer plays a crucial role in determining the success of any modified loan.

In evaluating servicing, we focus on the servicer's strategy and its resources, incentives and demonstrated abilities. We often visit the servicer to observe its operations and interview its management to help us better understand its capabilities.

Servicing Strategy

The servicer's collection strategy typically can be categorized as either one that goes through traditional legal proceedings to foreclose on and sell assets backing defaulted loans, or one that uses extrajudicial settlements, either through discounted payoffs or through the restructuring of loans. In many cases, the servicer uses one strategy on some loans and the other on the remaining loans. Servicers typically use an extrajudicial approach when the debtor shows some willingness to settle the debt obligation. On the other hand, servicers typically use traditional legal proceedings when the relationship with debtors is relatively weak and not strong enough to pursue an out-of-court strategy. In choosing a strategy, the servicer also evaluates the costs and time involved in going through the legal system in the particular jurisdiction governing the loans. In many jurisdictions, recovery amounts are typically higher and recovery times longer using the traditional legal proceedings method compared with the extrajudicial method.

Some transactions may include a program/asset manager (PM) to oversee the servicer's strategy related to modifications and liquidations in addition to assisting with other aspects of the transaction, such as loan sales and effecting representation and warranty breaches.

Therefore, to interpret and assess the servicer's record in collections and to help us understand its likely success in the future, we examine the strategies the servicer, and PM if applicable, has used and how they might change in the future.

Operational Risks

We analyze operational risks (the risk of a payment disruption on the securitization due to non-performance of a servicer, cash manager, or trustee attributable to an interruption in their operations) and counterparty

risks (the risk of default by a counterparty on an account or other investment of the transaction or on a hedge agreement) as we describe in our cross-sector methodology.[10]

Legal Risks

We assess legal risks posed by the potential bankruptcy of the transaction originator, securitization vehicle, servicer, collections account bank and any other relevant party. We review legal opinions to gain insight into the key legal risks identified in a transaction.

Data Quality Evaluation

In assessing the individual loan characteristics and the overall portfolio, we typically rely on data provided by the transaction originator. Therefore, our assessment depends on the extent to which the data are likely to accurately represent the asset characteristics. Consequently, we perform a data quality[11] assessment to evaluate the data provided, including a review of third-party verification reports and representations and warranties for the transaction. Based on that assessment, we may adjust our modeling inputs or results. In general, the less reliable the data, the more conservative our assumptions will be.

Local Currency Ceiling Considerations

The country in which the transaction's assets, originator or issuer is located could introduce systemic economic, legal or political risks to the transaction that could affect its ability to pay investors as promised. We usually incorporate such risks into the analysis by applying our local currency country risk ceilings (LCC) in accordance with our sovereign ceiling methodology.[12] In particular, we consider the LCC when calibrating the assumptions in order to estimate the cash flows to be generated by the portfolio during the life of the transaction.[13] A rating committee may also consider modifying appropriate assumptions to achieve a particular rating.

Environmental, Social and Governance Considerations

Environmental, social and governance (ESG) considerations may affect the ratings of securities backed by a portfolio of NPL or RPL assets. We evaluate the risk following our cross-sector methodology that describes our general principles for assessing these ESG issues[14] and may incorporate it in our analysis.

Liquidity

The nature of NPL and RPL assets means cash flows generated from the portfolio can be more volatile than in other transactions containing largely performing assets. However, the interest payable on the issued securities is due to be paid regularly. Consequently, in our analysis we assess the extent to which there is likely to be sufficient cash flow from the assets and from other sources (such as reserve funds or liquidity lines) to pay interest on the securities. To assess the sufficiency of these other sources, we consider the consequences of missed payments for each class of securities, as well as the likelihood and potential length of interest payment deferral.

[10] For more information, see our cross-sector methodology for assessing counterparty risks in structured finance. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

[11] For more information, see our cross-sector methodology for global structured finance data quality evaluation. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

[12] For more information, see our cross-sector methodology for assessing local currency country risk ceilings. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

[13] For example, we would typically adjust the Geometric Brownian Motion used to simulate future property values to account for sovereign risk in other secured NPLs, as per Appendix A.

[14] A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

Monitoring

In this section, we describe our approach when monitoring transactions.

Transaction Performance

When monitoring transactions, we generally apply the rating approach described in this report for initial ratings, with the exception of those elements that lose relevance over the life of the transaction (e.g., some elements of the structure's legal risk, originator assessment and certain representations and warranties).

For the portfolio analysis, we usually receive extensive data on transaction-specific performance that we use to help revise our loss assumptions during the life of the transaction. In the early months of a transaction's life, we typically maintain our initial assumptions unless we observe signs of a significant deviation in the transaction's performance. As the transaction becomes more seasoned, the performance data becomes a more reliable indicator of a transaction's future performance and we typically increase the weight we assign to it (compared to the weight assigned to the assumptions derived from pre-closing data) in projecting losses.

For the structural analysis, we typically reassess the cash flow model result using the updated capital structure. However, the monitoring of certain transactions may not always warrant updated cash flow model analysis. For example, model results would not normally change if the portfolio analysis is in line with expectations and the transaction's capital structure has not materially deleveraged.[15]

As part of our monitoring of NPL and RPL transactions, we may also evaluate concentration risk as the portfolios amortize. If we estimate that the securities' exposure to a few loans defaulting is not consistent with their ratings, we adjust the ratings accordingly.

Pool Size

In assessing pool diversity for NPL and RPL 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

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

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 NPLs and RPLs in structures – defined as a group of securities that share support – with the following characteristics:

[15] 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.

- Structures without support mechanisms, such as a credit enhancement floor or reserve fund floor, when the underlying pool 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 the underlying pool 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,[16] or for securities that benefit from full cash collateralization.

[16] For more information, see our rating methodology for assessing transactions based on a credit substitution approach. A link to a list of our sector and cross-sector methodologies can be found in "Moody's Related Publication" section.

Appendix A: Other Secured NPLs Model

Overview

To estimate the cash flows generated by the pool in other secured NPL transactions, the model we use in the credit analysis generates:

i) the timing of collections; and

ii) the collected amounts.

We may adjust the model described in the "Other Secured NPLs" section if deemed appropriate. We may also use other asset models for certain types of secured NPL transactions, for example for transactions backed by non-performing pools of reverse mortgages.

Timing of Collections

The model calculates the time to cash distribution for each loan in the pool individually. We start our analysis with the estimated remaining time to cash distribution, given the type of obligor, asset and current status of the legal proceedings based on averages for the region or country. The model timing is then stressed to factor into our analysis the possibility of longer-than-average recovery times, as well as to distinguish liquid vs. non-liquid properties. In some jurisdictions, the enforced properties are sold in auctions by the court. We assume that more than one auction may be required to sell less liquid assets. For each additional auction in the foreclosure process, property values are typically adjusted as set forward in Exhibit 3:

EXHIBIT 3

$$P_{adjusted} = P_0 * (1 - haircut)^{number\ of\ auctions-1}$$

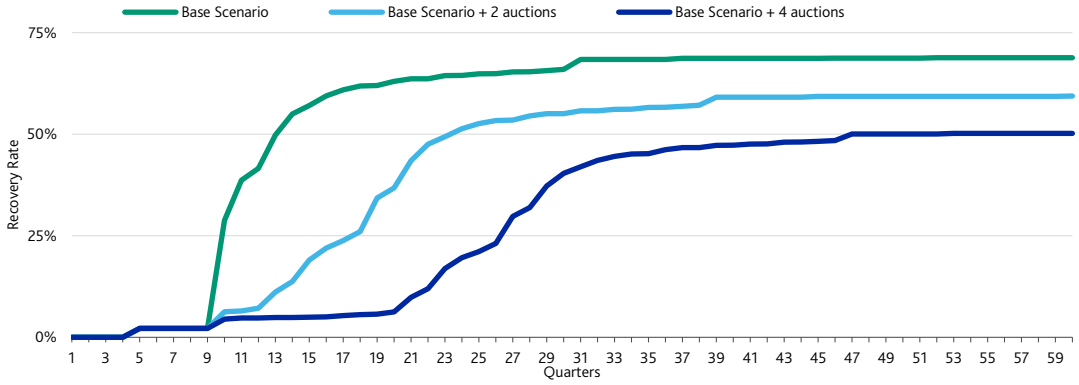
Source: Moody's Investors Service

The level of the haircut is a function of the type of property valuation used to estimate the P_0. For example, in Italy we typically reduce the property value by 10% to 25% for each additional auction.

Exhibit 4 below shows how the increase in the number of auctions required to conclude the foreclosure process affects the cash flows generated by the portfolio. An increasing number of auctions lengthens the time required to conclude the foreclosure process, thereby delaying the collection of the cash flow from the asset sales. Moreover, it decreases the pool's overall recovery rate, which is expressed as the ratio between the total cash flows generated by the loans and the pool gross book value (GBV), which indicates the total amount due on the loans in terms of principal, accrued interest and fees (see y-axis of the chart in Exhibit 4).

EXHIBIT 4

Cumulative Collections over GBV



Source: Moody's Investors Service

Collected Amounts

The model divides the secured portfolio on the basis of collateral type (e.g., residential, commercial, industrial). For each type, the model uses a Geometric Brownian Motion to model the future property values. The Geometric Brownian Motions are assumed to be fully correlated. The stress we apply on future property values is consistent with the assumptions we use for house price decline in our relevant RMBS methodology for residential properties, and with the assumptions we use in our SME and CMBS methodology for commercial properties.

The example below illustrates various scenarios of a property price decline on one property in our "loan-level" model and the associated probabilities. It displays how the initial property value of a residential property in a specific area may vary over time in different scenarios.

In this example, we have used Exhibit 5 to derive potential future values at the point of sale. The volatility we apply in our analysis is calibrated by reference to the stressed house price decline (or the decline of property values in a stressed scenario) from the relevant methodology. For residential properties, we calibrate the volatility so that the stressed simulated value of house price at the average foreclosure time period is equal to the price calculated by applying the stressed house price decline in the residential mortgage-backed securitizations methodology.

EXHIBIT 5

$$P(t) = e^{\mu_p + \sigma_p \lambda}$$

Where:

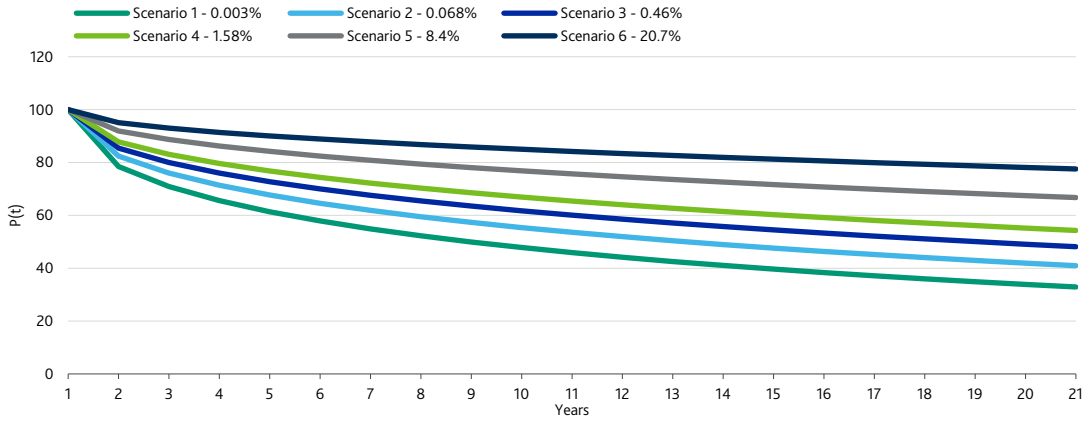
- *P(t)* is the property price at year *t*;
- $\mu_p = ln\, P_{adjusted} + \left(\mu - \frac{\sigma^2}{2}\right) t$
- $\sigma_p = \sigma\sqrt{t}$
- λ follows a normal distribution $N(0,1)$
- $P_{adjusted}$ is the property price after taking in consideration the stress due to the number of auctions needed to sell the property.
- μ is the assumed average growth rate of the property values in the pool. It depends on the asset type (residential, commercial or industrial) and on the geographical location.
- σ is the assumed volatility of the growth rate of the property values in the pool. It depends on the asset type (residential, commercial or industrial) and on the geographical location.

Source: Moody's Investors Service

Exhibit 6 below displays an example of how $P_{adjusted}$ will evolve under different property price scenarios. Each line represents a property price scenario through time. The chart's legend shows the cumulative probability of each property price curve. For example, the probability of being below the property price curve scenario 1 corresponds to 0.003%. In the example below we use $\mu = 0\%$ and $\sigma = 6\%$ to generate the property price paths.

EXHIBIT 6

Example of Property Price Evolution



Source: Moody's Investors Service

Appendix B: Example of Unsecured NPL Cohort Recovery Analysis

The example below illustrates the statistical historical cohort analysis and the possible resulting recovery assumptions.

In most cases, the servicer will provide information on each cohort's initial outstanding amounts and the recovery amount for each year going forward as presented in Exhibit 7 below.

EXHIBIT 7

Sample Servicer-Supplied Cohort Balance and Recovery Data

Year of Origination	Initial Bal	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2002	108,548	31,601	14,032	5,615	5,442	3,357	1,619	1,032	995	1,295	1,025	689
2003	267,855		26,575	11,906	6,712	10,812	5,221	3,650	2,644	13,858	8,839	1,783
2004	232,032			25,272	14,386	13,494	7,446	5,895	4,513	4,459	4,865	2,026
2005	171,105				13,464	17,336	5,678	3,832	4,169	2,771	4,600	1,573
2006	374,000					46,786	27,612	11,675	10,897	6,709	8,977	4,550
2007	298,835						26,884	14,093	11,362	6,383	8,445	16,381
2008	298,198							35,603	32,202	13,394	12,913	6,920
2009	322,044								34,929	37,107	17,443	9,686
2010	373,846									32,123	51,336	18,866
2011	572,812										72,957	35,854
2012	267,958											36,367

Source: Moody's Investors Service

From this servicer-supplied data, we construct a second table (Exhibit 9) in which we compute the outstanding balance using the following formula:

EXHIBIT 8

$$Outstanding\ Balance(t) = Outstanding\ Balance_{(t-1)} - Recovery_{(t)}$$

Source: Moody's Investors Service

Any annulments by court order or from a private agreement between creditors and debtors or any other type of factor that would result in a debt reduction have been ignored in this example for simplicity. In reality, these factors are modeled using the same formulation and are incorporated in the outstanding balance equation.

EXHIBIT 9

Recalculated Outstanding Balance

Year of Origination	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2002	76,947	62,915	57,300	51,858	48,501	46,882	45,850	44,855	43,560	42,535	41,846
2003		241,280	229,374	222,662	211,850	206,629	202,979	200,335	186,477	177,638	175,855
2004			206,760	192,374	178,880	171,434	165,539	161,026	156,567	151,702	149,676
2005				157,641	140,305	134,627	130,795	126,626	123,855	119,255	117,682
2006					327,214	299,602	287,927	277,030	270,321	261,344	256,794
2007						271,951	257,858	246,496	240,113	231,668	215,287
2008							262,595	230,393	216,999	204,086	197,166
2009								287,115	250,008	232,565	222,879
2010									341,723	290,387	271,521
2011										499,855	464,001
2012											231,591

Source: Moody's Investors Service

Next, we calculate the recovered percentage of the previous period balance using our definition of recovery as set forward in Exhibit 10:

EXHIBIT 10

$$Recovery_{(t-1)} = Recovery_t / Outstanding\ Balance_{(t-1)}$$

Source: Moody's Investors Service

EXHIBIT 11

Recalculated Recovery Percentage of Previous-Year Balance

Year of Origination	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
2002	29.1%	18.2%	8.9%	9.5%	6.5%	3.3%	2.2%	2.2%	2.9%	2.4%	1.6%
2003		9.9%	4.9%	2.9%	4.9%	2.5%	1.8%	1.3%	6.9%	4.7%	1.0%
2004			10.9%	7.0%	7.0%	4.2%	3.4%	2.7%	2.8%	3.1%	1.3%
2005				7.9%	11.0%	4.0%	2.8%	3.2%	2.2%	3.7%	1.3%
2006					12.5%	8.4%	3.9%	3.8%	2.4%	3.3%	1.7%
2007						9.0%	5.2%	4.4%	2.6%	3.5%	7.1%
2008							11.9%	12.3%	5.8%	6.0%	3.4%
2009								10.8%	12.9%	7.0%	4.2%
2010									8.6%	15.0%	6.5%
2011										12.7%	7.2%
2012											13.6%

Source: Moody's Investors Service

Additionally, we associate the recovery level with the time elapsed from the origination date of a loan to the time of recovery (which we refer to as "distance from origination"). The random variable values that we are interested in measuring are therefore the values that appear in the diagonal line from the upper-left corner to the bottom-right corner of Exhibit 11, as reproduced in Exhibit 12 below.

EXHIBIT 12

Recalculated Recovery Percentage of Previous-Year Balance - Distance from Origination

Distance from Origination	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
0	29.1%	9.9%	10.9%	7.9%	12.5%	9.0%	11.9%	10.8%	8.6%	12.7%	13.6%
1	18.2%	4.9%	7.0%	11.0%	8.4%	5.2%	12.3%	12.9%	15.0%	7.2%	
2	8.9%	2.9%	7.0%	4.0%	3.9%	4.4%	5.8%	7.0%	6.5%		
3	9.5%	4.9%	4.2%	2.8%	3.8%	2.6%	6.0%	4.2%			
4	6.5%	2.5%	3.4%	3.2%	2.4%	3.5%	3.4%				
5	3.3%	1.8%	2.7%	2.2%	3.3%	7.1%					
6	2.2%	1.3%	2.8%	3.7%	1.7%						
7	2.2%	6.9%	3.1%	1.3%							
8	2.9%	4.7%	1.3%								
9	2.4%	1.0%									
10	1.6%										

Source: Moody's Investors Service

We base our decision to define the variable as a function of the distance to recovery on the empirical analysis of several data samples for NPLs. Indeed, we have observed that recoveries appear to decrease as the distance from origination increases (recoveries on the same diagonal share equal distance from origination). However, in the event that a particular data set does not display this pattern, we adjust our

method accordingly and ensure that the simulation does not incorporate this assumption about recoveries. We then use the data shown in Exhibit 11 above to compute the average and standard deviation, taking into account distance from origination.

Exhibit 13 illustrates mean and standard deviation by distance from origination. Any outlier data for which there is a justification has been excluded from the calculation of the parameters (for example, 29.1% recovery rate in year 2002 from the 2002 cohort). A common risk measure used is the ratio between the standard deviation and the mean, sometimes referred to as the coefficient of variation. Our analysis of several data sets of NPLs suggests that this ratio is normally above a certain threshold. That minimum level is used in cases for which less data is available (for example, longer distance from origination).

EXHIBIT 13

Mean and Standard Deviation by Distance from Origination

Distance from Origination	Mean Recovery	Standard Deviation	Coefficient of Variation
0	10.8%	1.9%	18%
1	10.2%	4.4%	43%
2	5.6%	1.9%	34%
3	4.7%	2.2%	47%
4	3.6%	1.4%	38%
5	3.4%	1.9%	56%
6	2.3%	0.9%	40%
7	3.4%	2.5%	73%
8	3.0%	1.7%	57%
9	1.7%		
10	1.6%		

Source: Moody's Investors Service

Once a mean recovery and standard deviation are derived in part from the data above, we then consider the type of distribution. Since recovery percentages must lie between 0% and 100%, we have found that we can usually fit the observed data to a Beta distribution. A commonly used goodness-of-fit measure is to compute the sum of the squared distance between the empirical and the theoretical cumulative distributions. In cases where the Beta distribution does not provide a good fit, we will consider alternatives. Such choices may have a significant influence on the expected loss, especially for highly rated securities.

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 is available here.

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