MOODY'S INVESTORS SERVICE

RATING METHODOLOGY

Rating Methodology

Residential Mortgage-Backed Securitizations

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This new rating methodology contains five country-specific methodology supplements (Australia, Canada, Ireland, New Zealand and the United Kingdom), and replaces *Moody's Approach to Rating RMBS Using the MILAN Framework,* published in July 2022, for rating RMBS originated in these five countries. The *Moody's Approach to Rating RMBS Using the MILAN Framework* methodology will remain in effect for the other countries where we rate RMBS using the MILAN framework until updated country-specific settings using the new central framework approach contained in the new methodology have been adopted for all relevant countries. We expect to publish additional Requests for Comment on a rolling basis, proposing updated country-specific settings for the other countries where we rate RMBS using the MILAN framework.

In this new methodology, we have (1) updated several components of our asset-level analysis; (2) redefined the MILAN model output as the portfolio loss in a severe economic stress; (3) changed how we interpret the MILAN model output in the ABSROM™ cash flow model; and (4) changed our approach to model both defaults and recoveries in our cash flow model for all countries. In the five country-specific methodology supplements noted above, we have changed certain parameters and inputs used in our MILAN and ABSROM™ models.

Scope

This methodology applies to residential mortgage-backed securitizations (RMBS) and residential mortgage covered bond programs backed by portfolios of residential mortgage loans.[1] This methodology also includes several appendices, some applicable to more than one country.

[1] Excludes the US.

Rating approach

Asset description

A residential mortgage is typically a long-term loan made to one or more borrowers to purchase a house or flat with the property pledged as security. Borrowers repay the loan amount to the lender plus any additional interest accrued on the loan by making regular payments (mortgage installments) and unscheduled payments (prepayments) over the loan term. If a borrower cannot maintain payment of the mortgage installments, the lender typically has the legal right to repossess the property.

Key risks

The main risks in a transaction backed by a granular portfolio of residential mortgage loans are that borrowers default on their loans and that house prices decline. Borrowers' ability to service their debts relies on unemployment rates and household disposable income trends.

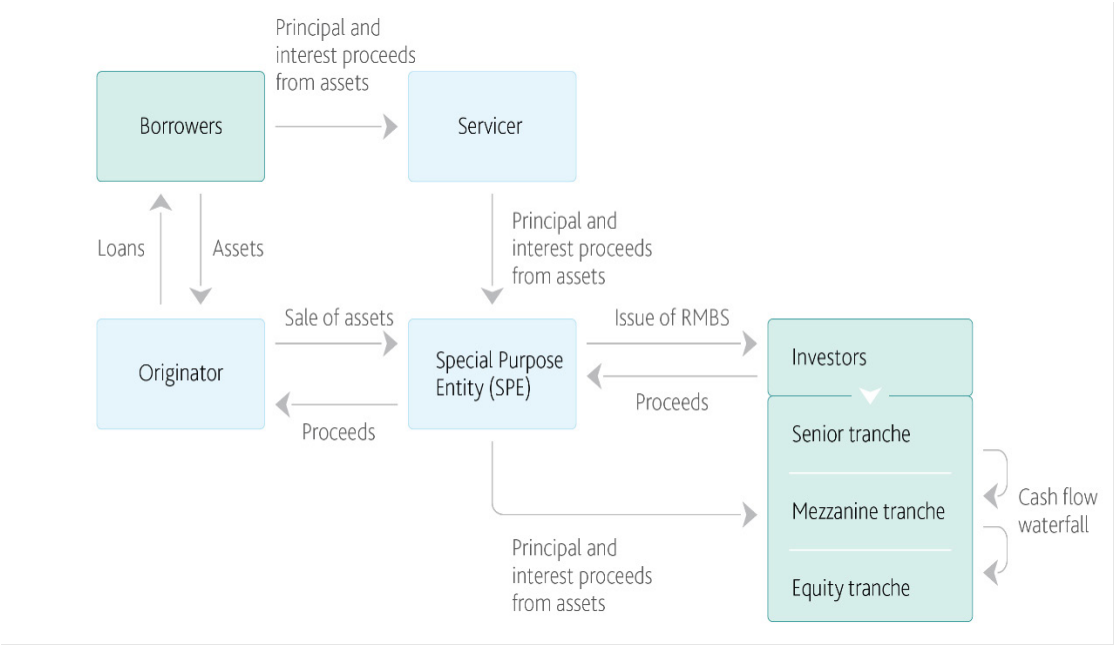
Transaction overview

RMBS are securities whose cash flows are generated from the mortgage payments and redemptions of an underlying portfolio of residential mortgage loans. In a typical RMBS transaction, the entity originating the portfolio of residential mortgage loans (the originator) or the owner of a loan portfolio (the seller), sells the portfolio to a non-recourse and bankruptcy-remote special purpose entity (SPE).

The SPE issues securities (RMBS) to finance the acquisition of the portfolio. Principal and interest proceeds from the underlying mortgage loans pass from the portfolio seller to the SPE, which transfers the cash flows to the RMBS investors. RMBS are split into different classes of securities (tranches), each reflecting a different risk level. The risk level is reflected in the returns paid to investors in the various classes of securities; senior securities earn the lowest return and junior securities the highest.

Exhibit 1

Typical RMBS transaction structure



Source: Moody's Investors Service

We model the cash flows to the different classes of securities. The model outputs derived by our quantitative modeling are important considerations in our rating committee process. However, the ratings assigned by the rating committee incorporate a variety of qualitative factors and may differ from the model output.

Asset-level analysis and related modeling

Overview

We first conduct an asset analysis in which we perform a loan-level assessment of the securitized collateral pool. The results of this asset analysis are a portfolio expected loss (Portfolio EL), a Moody's Individual Loan Analysis Stressed Loss (MILAN Stressed Loss) and a MILAN Recovery Rate.

- Portfolio EL: The cumulative loss we expect the portfolio to incur under the current economic environment. It is based on historical performance data, benchmarking against comparable portfolios and other considerations.
- MILAN Stressed Loss:[2] The loss (incorporating interest accrued on defaulted loans during the foreclosure period) we expect the portfolio to incur in a severe economic stress.
- MILAN Recovery Rate: The principal recovery rate we expect in a severe economic stress.

To determine the Portfolio EL and MILAN Stressed Loss, we supplement our portfolio analysis with assessments of the originator, servicer, data quality, and a qualitative assessment of sovereign risk.

We use the outputs from our portfolio analysis to determine a probability loss distribution which associates a probability with each potential future loss scenario for the portfolio. We typically assume the probability loss distribution is lognormal for residential mortgage loan portfolios.

Portfolio EL

We conduct a performance analysis to determine the Portfolio EL assumption for a residential mortgage loan portfolio, incorporating expectations of future performance considering the current economic environment and benchmarking against comparable portfolios.

Analyzing historical performance data allows us to extrapolate portfolio losses into the future.[3] We consider forecasts of economic variables, evaluating how changes in these variables will affect the future performance of various types of loans in the portfolio.

We analyze the historical performance of the types of loans included in a pool, other performance data from the same or comparable originators or servicers and any other data available in the segment of the mortgage market or other comparable markets. We review performance data in more detail, including arrears, defaults, loss severities and prepayment rates.

MILAN Stressed Loss

We use the MILAN model to analyze a residential mortgage loan portfolio's credit risk and determine the MILAN Stressed Loss. MILAN is a scoring model that assesses individual loans and overall portfolio diversification, estimating the portfolio's loss in a severe economic stress.

In the MILAN model, we first define a benchmark loan and benchmark portfolio applicable to all countries. We then determine the default probability for each loan in the portfolio based on its loan-to-value (LTV) and the loss severity through applying a house price stress rate and additional loss components and derive the MILAN Stressed Loss. We also evaluate specific risk characteristics that normally deviate from the loan or portfolio benchmark and could lead to a higher or lower MILAN Stressed Loss.

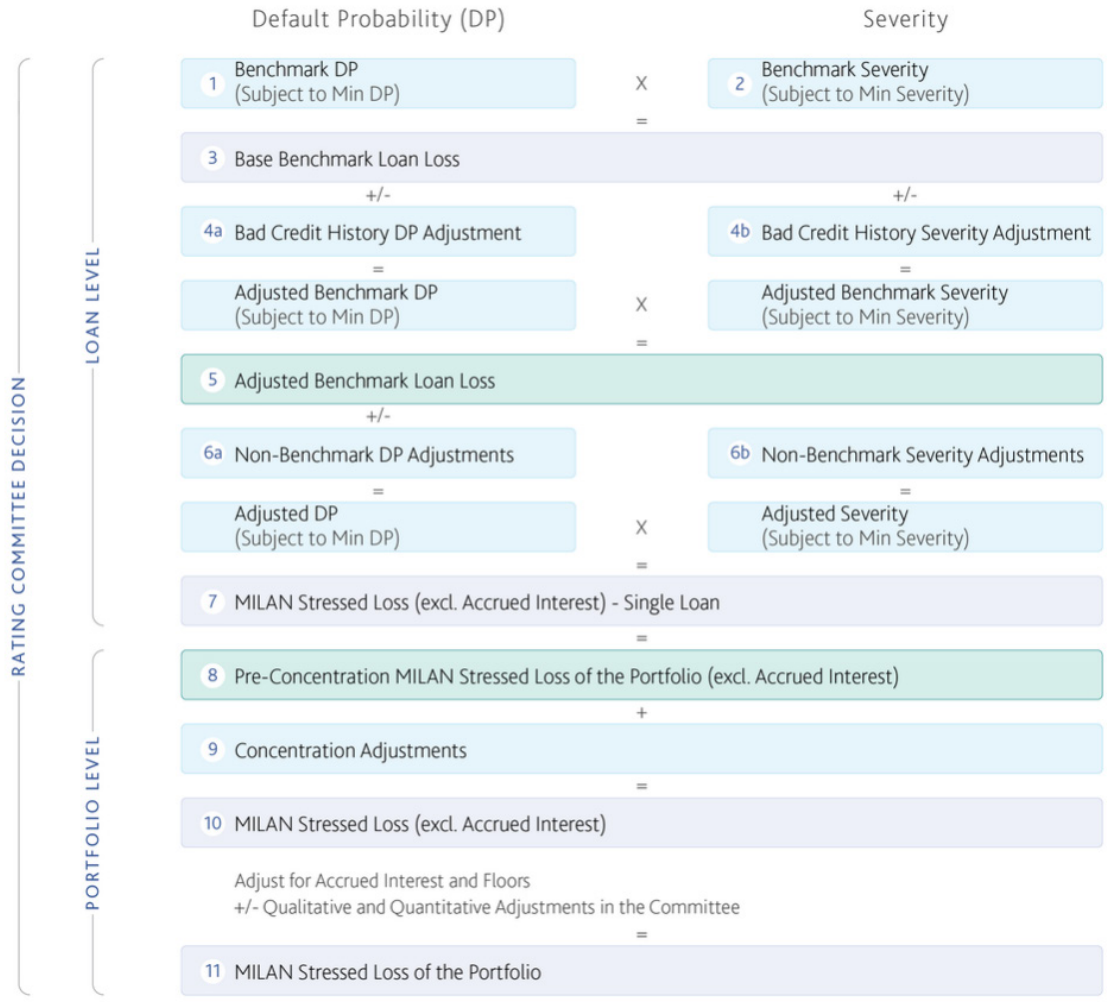
[2] In residential mortgage covered bond programs, we use the MILAN modeling framework to derive a MILAN Stressed Loss which is equivalent to a covered bond collateral score.

[3] For more information, see Appendix 1.

We may refine the quantitative model output based on an analysis of historical performance and benchmarking against comparable portfolios as well as other considerations to derive the MILAN Stressed Loss.

Exhibit 2

MILAN model overview



Source: Moody's Investors Service

Step 1: Benchmark loan default probability

We first determine the default probability for a benchmark loan in a severe economic stress. We base the default probability on the loan's LTV ratio, assuming all other loan characteristics are consistent with the benchmark loan described in Exhibit 3.

Exhibit 3

Benchmark loan and benchmark portfolio characteristics

Borrower Characteristics	Benchmark Value*
Borrower	Private individual
Credit History	No bad credit history
Borrower Residency	Resident
Employment	Employed
Income Verification	Full documentation
Loans to Employees	Not employed by the originator
FICO Score**	780 (included) to 825 (excluded)
Loan Characteristics	**Benchmark Value**
Mortgage Type	First ranking mortgage
Currency	Local currency
Loan Performance Status***	Less than two months in arrears/not restructured
Principal Payment	Annuity loan or linear
Loan Purpose	Purchase, remortgage or renovation
Interest Rate and Time to Reset	Fixed-rate for 60 months
Payment Holiday	Low risk
Social Program	None
Property Characteristics	**Benchmark Value**
Occupancy Type	Owner-occupied
Property Type	House, flat or apartment
Property Valuation	Independent valuation performed by external contractors
Portfolio Characteristics	**Benchmark Value**
Regional Concentration	Regionally diversified
Borrower Concentration	3,000 effective borrowers

* For more details on benchmark values, see following sections.
** Applies to residential mortgage loan portfolios originated in Canada.
*** We may perform an additional analysis if a portfolio includes a substantial portion of loans in arrears for less than two months.

Source: Moody's Investors Service

To derive the LTV, we aggregate the current balances of all loans secured by the same property. Therefore, we consider all prior and equal ranking liens on a property, regardless of whether the loans are securitized.

We typically calculate the LTV ratio using the original property valuation rather than a current indexed property value. In certain countries, originators or issuers provide the property value as the foreclosure or lending value instead of the market value. We adjust the property value for those countries to derive the market value using a country-specific adjustment factor. In limited instances, we may use a transaction-specific adjustment factor.

Default probability (DP) curves and DP floor

For any given LTV ratio, a default probability curve defines the probability of default for a benchmark loan during a severe economic stress. Except for non-recourse markets, we score each country and associate it to one of five DP curves. We use the following economic variables in the scoring process.[4]

» Nonperforming loans. We use the ratio of nonperforming bank loans to total loans to differentiate countries based on loan performance. Countries with low ratios are less vulnerable to a market stress due to higher quality bank loans and lower credit risk. High nonperforming loan ratios indicate a higher risk of losses and increased stress on the banking system.

[4] For more information, see our data report "Residential Mortgage-Backed Securitizations: Default Probability Scoring Approach," 6 March 2023.

- **Asset-weighted average Baseline Credit Assessment of banking systems, adjusted for parent support ("Adjusted BCA").** We use the Adjusted BCA to reflect that if banks' buffers to absorb shocks are low, significant asset impairment may result in bank failures. We calculate the average Adjusted BCAs as an asset-weighted average for Moody's-rated banks by country.
- **Household debt to disposable income ratio**. A high ratio of household debt to disposable income can strain household finances and the ability to meet mortgage loan obligations, especially if households are impacted by unpredictable events such as unemployment, divorce, or occupational disability.
- **Consumer price inflation.** Inflation may affect the borrower's ability to meet their ongoing debt payments. We use a country's inflation index to measure the effects of changing mortgage loan costs.
- **Gross domestic product (GDP) per capita.** GDP per capita is effective for cross-country economic output comparisons and to measure a country's ability to absorb shocks during a severe economic stress.
- **Income inequality.** A prolonged period of higher income inequality in advanced economies could drive intensifying leverage, an overextension of credit and a relaxation in mortgage underwriting standards. We use the Gini index to measure how much income distribution within a country deviates from a perfectly equal distribution.
- **Unemployment.** We use this variable to assess how a country's labor market is affected by severe economic stress. Historical data suggests a high correlation between unemployment and such stress, which could affect borrowers' ability to meet their mortgage payments.
- **Unemployment benefits and employment protection.** We use country-specific information to identify the vulnerability of individual countries' protective mechanisms in case of severe economic stress and the impact on borrowers' ability to meet their mortgage payments. Countries with stronger unemployment benefits and employment protections may be more resilient during a severe economic stress.

For non-recourse markets, we apply a different DP curve because a non-recourse loan permits the lender to seize the collateral specified in the loan agreement, and the borrower is not personally liable for any shortfall between the entire debt and the collateral value. Consequently, we use a more conservative DP curve for non-recourse markets.

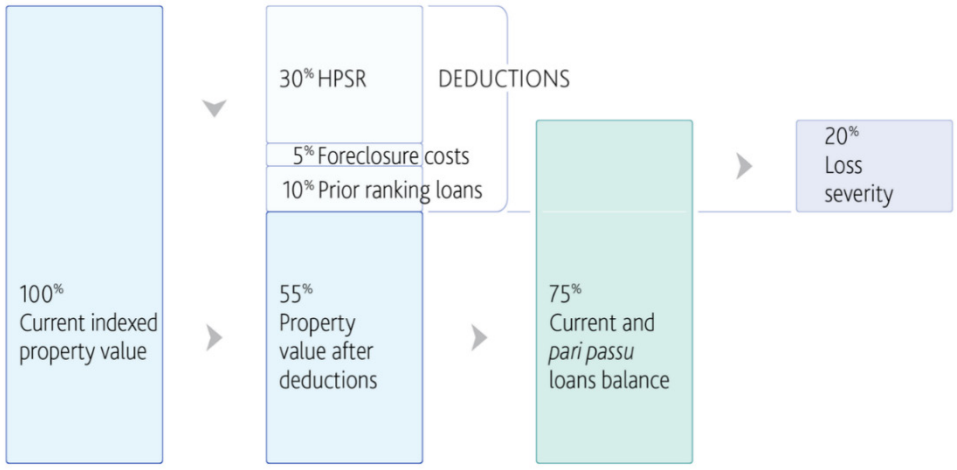
The default probability for a benchmark loan is subject to a floor. We consider six predefined default probability floor assumptions ranging from 4% to 12.5%, one assumption for each DP curve. These levels reflect our expectation that even a loan with low LTV could default under a severe economic stress.

Step 2: Benchmark loan loss severity

The main drivers of loss severity are property value, balance of loans ranking *pari passu* with or prior to the securitized loan, house price stress rate (HPSR) and foreclosure costs. Any accrued interest on the balance of loans ranking *pari passu* with or prior to the securitized loan will also reduce the benefit of the property value (see Exhibit 4).

Exhibit 4

Overview of benchmark loan loss severity



Source: Moody's Investors Service

We first determine a stressed property value to calculate a loan's loss severity. For mortgage loans secured on multiple properties, we stress the value of each property separately by applying the HPSR.

Exhibit 5

Stressed property value

$$PV_{Stressed} = PV_{Unstressed} * (1 - HPSR)$$

Where:

» $PV_{Stressed}$: stressed property value
» $PV_{Unstressed}$: current property value, indexed based on an average house price index over the past six quarters
» $HPSR$: house price stress rate; country- or region-specific

Source: Moody's Investors Service

House Price Stress Rate

Our loss severity depends on the house price evolution in a country or region. For each country, the HPSR is our assumption of how far a current property value may fall as a result of a severe economic stress. The HPSR incorporates a forced sale haircut based on the assumption that, in a stressed scenario, all properties sold are distressed sales.

We consider several variables to determine a country's exposure to a housing market correction, and we assess possible factors that may mitigate or exacerbate such a correction.[5]

» **Real house price growth.** This variable measures whether housing affordability metrics are stretched due to past house price growth. To the extent that expectations of future growth are based on past developments, the more rapid the price increases in recent years, the higher the risk that an adjustment in price expectations would amplify the drop in housing demand.

» **Household debt to disposable income ratio and household debt to disposable income growth ratio.** Heavily indebted households adjust spending in response to income or interest rate shocks. Countries with recent rapid increases in household indebtedness may be more sensitive to changes in conditions and therefore experience a larger house price correction during a severe economic stress.

» **Asset-weighted average Baseline Credit Assessment of banking systems, adjusted for parent support ("Adjusted BCA").** (See the "Default probability (DP) curves and DP floor" section above.)

[5] For more information, see our data report "Residential Mortgage-Backed Securitizations: House Price Stress Rate Approach," 6 March 2023.

For the HPSR, we periodically evaluate the levels and changes in these variables.

Foreclosure costs

We derive the costs associated with legal proceedings and auction sales in a country using market data. When market data is unavailable, we use generic data to determine foreclosure costs. We calculate the foreclosure cost using the formula in Exhibit 6.

Exhibit 6

Foreclosure cost

$$FC = PV_{Stressed} * Foreclosure\ Cost\ (\%)$$

Where:

» $PV_{Stressed}$: stressed property value as of the transaction's analysis date
» *Foreclosure cost* (%): either 6%, 10% or 15% depending on the efficiency of each country's legal system

Source: Moody's Investors Service

We use a cost assumption of, for example, 6% when we deem a country's legal system efficient.

MILAN Time to Foreclosure

We use market or generic information to determine the time needed to foreclose a property in a country (MILAN Time to Foreclosure). In certain countries, such as Italy, time to foreclosure may vary by region. In some cases, such as pools comprising retirement interest only mortgages, we may apply a longer MILAN Time to Foreclosure.

MILAN Interest Rate

We use mortgage lending rates to determine our long-term accrued interest rate assumption for each country (MILAN Interest Rate). We apply the MILAN Interest Rate to the balance of loans ranking *pari passu* or prior to the securitized loan, even if not securitized.

Loan loss severity and floor

We derive the loss severity of a particular loan using the formula in Exhibit 7.

Exhibit 7

Loan loss severity

$$L_i = \text{Max}\,[0, CB_i + PP_i - PV_{Stressed} + FC + (PR_i + PR_i * AI * FP)]$$

Where:

» L_i : loss severity of loan i
» CB_i : current balance of loan i
» PP_i : current balance of loans ranking pari passu with loan i, regardless of whether they are securitized
» $PV_{Stressed}$: stressed property value as of the transaction's analysis date
» FC : foreclosure cost
» PR_i : current balance of loans ranking prior to loan i, regardless of whether they are securitized
» AI : accrued interest rate per annum
» FP : MILAN Time to Foreclosure, in years

Source: Moody's Investors Service

Step 3: Base Benchmark Loan Loss

The Base Benchmark Loan Loss represents the loss on a benchmark loan occurring in a severe economic stress. We define the Base Benchmark Loan Loss as the product of its default probability and loss severity (see Exhibit 8).

Exhibit 8

Base Benchmark Loan Loss

$$Base\ Benchmark\ Loan\ Loss_i = Max[DP_i * SF, (DP_i * L_i)/(CB_i + PP_i)]$$

Where:

» *Base Benchmark Loan Loss*$_i$: base benchmark loss for loan i
» *DP*$_i$: default probability of loan i (subject to floor)
» *SF*: minimum loan loss severity floor
» *L*$_i$: loss severity of loan i (subject to floor)
» *CB*$_i$: current balance of loan i
» *PP*$_i$: current balance of loans ranking pari passu with loan i, regardless of whether they are securitized

Source: Moody's Investors Service

As indicated in Exhibit 8, the loss severity for a benchmark loan is subject to a floor. We apply a minimum loss severity to each loan in the portfolio to reflect our expectation that even a loan with low LTV could default and incur a loss in a severe economic stress.

Step 4: Bad Credit History adjustment

We apply an adjustment depending on the characteristics of a borrower's credit profile, such as county court judgments (CCJ) in the UK. Based on the type of credit profile information and, for some countries, the number and amount of adverse credit registrations, we apply a borrower Bad Credit History adjustment to the Base Benchmark Loan Loss to reflect any previous adverse credit characteristic or event (see Exhibit 9).

Exhibit 9

Bad Credit History adjustment

$$Bad\ Credit\ History\ Adj_i = Base\ Benchmark\ Loan\ Loss_i * AdjFactor_{BCH}$$

Where:

» *Bad Credit History Adj*$_i$: borrower bad credit history adjustment for loan i
» *Base Benchmark Loan Loss*$_i$: base benchmark loss for loan i
» *AdjFactor*$_{BCH}$: borrower bad credit history adjustment factor

Source: Moody's Investors Service

We show the categories and related adjustment factors we apply in our MILAN model for borrower credit profiles deviating from the benchmark loan definition in Exhibit 10.

Exhibit 10

Bad Credit History adjustment

Category	Description	Adjustment Factor
No risk	No bad credit history (benchmark)	0%
Low risk	Live or satisfied unit of adverse credit for the UK (<=£500 & nb = 1)*	50%
	Adverse credit for Australia (<=$1000 & nb =1) *	
Medium risk	Live or satisfied unit of adverse credit for the UK (>£500 or nb > 1)	150%
	Adverse credit for Australia (>$1000 or nb > 1)	
	Any other adverse credit event	
	Prior litigation, prior repossession, prior missed payments >3	
High risk	Individual voluntary arrangement or prior personal bankruptcy	250%

* We typically apply the medium risk adjustment if the balance or number of court orders against a borrower (for example, CCJ in the UK) are unavailable.

Source: Moody's Investors Service

The MILAN model allocates 50% of the Bad Credit History adjustment to the default probability of each loan and the remaining 50% to its loss severity.

Step 5: Adjusted Benchmark Loan Loss

The Adjusted Benchmark Loan Loss for each loan in the portfolio aggregates the Base Benchmark Loan Loss and the borrower Bad Credit History adjustment. This aggregation allows us to differentiate between mortgage loan products targeted at borrowers with varying credit profiles by capturing the resulting risk layering. We derive the Adjusted Benchmark Loan Loss for each loan in the portfolio as indicated in Exhibit 11.

Exhibit 11

Adjusted Benchmark Loan Loss

$$Adjusted\ Benchmark\ Loan\ Loss_i = Base\ Benchmark\ Loan\ Loss_i + Bad\ Credit\ History\ Adj_i$$

Where:

» *Adjusted Benchmark Loan Loss*$_i$: adjusted benchmark loss for loan i
» *Base Benchmark Loan Loss*$_i$ *: base benchmark loss for loan i*
» *Bad Credit History Adj*$_i$: borrower bad credit history adjustment for loan i

Source: Moody's Investors Service

Step 6: Non-benchmark DP and severity adjustments

We adjust the Adjusted Benchmark Loan Loss for each loan in the portfolio to account for higher- or lower-risk features compared to the benchmark loan. Certain adjustments, such as the employment type adjustment, affect the default probability of the loan without impacting its loss severity. Others, such as the loan purpose adjustment, affect the default probability of the loan and its loss severity with equal weight.

Unless indicated otherwise, we define single loan-level adjustments as shown in Exhibit 12.

Exhibit 12

Single loan-level adjustments

$$Adjustment_{k,i} = Adjusted\ Benchmark\ Loan\ Loss_i * AdjFactor_k$$

Where:

» *Adjustment*$_{k,i}$: adjustment type k to loan i
» *Adjusted Benchmark Loan Loss*$_i$: adjusted benchmark loss for loan i
» *AdjFactor*$_k$: adjustment factor for characteristic k

Source: Moody's Investors Service

We describe the characteristics we consider and our assumptions regarding the impact of deviations from the benchmark loan below. If data on a certain characteristic is unavailable, we may use the highest adjustment factor or overwrite the highest adjustment factor based on the proportion of loans with that specific characteristic. We assess these instances on a case-by-case basis.

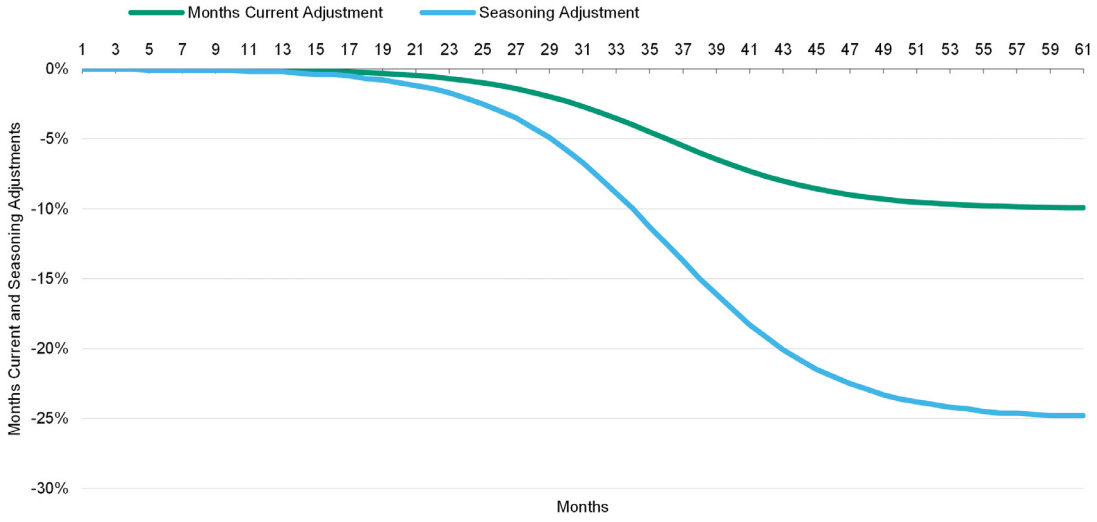
Loan-related adjustments

We adjust the Adjusted Benchmark Loan Loss when, for example, Principal Payment Type, Loan Purpose, Time to Reset, Payment Holiday and Social Programs deviate from the benchmark loan definition.

As part of our asset analysis, we also consider how long a loan has been current and how seasoned it is throughout its life. We usually give benefit to the period during which a loan has been current (months current) and its seasoning and apply two standard adjustments because both characteristics indicate a strong performance. Specifically, we apply a maximum benefit adjustment of -10% and -25% for months current and loan seasoning, respectively (see Exhibit 13).

Exhibit 13

Months current and loan seasoning adjustments



Source: Moody's Investors Service

We give partial seasoning benefit of 60% to interest-only (IO) loans since borrowers pay a lower instalment during the IO period than annuity loans, so this does not reflect the borrower's capacity to fully repay the mortgage loan. Moreover, to account for a loan's historical payment performance, we give no seasoning benefit to loans in arrears.

We apply an adjustment in the form of a default probability floor to restructured loans. The default probability floor considers the time since a loan has been restructured and its performance status. Similarly, we apply a default probability floor to delinquent loans based on the months the loan has been in arrears (see Exhibit 14). For example, a loan restructured 10 years ago and currently two months delinquent will have a default probability not lower than 50%.

Exhibit 14

Default probability floor for restructured and delinquent loans

Time Since Restructured	< 2 months in arrears*	Arrears ≥ 2 and < 3 months	Arrears ≥ 3 months
Restructured < 2 years ago	50%	80%	100%
Restructured ≥ 2 and < 4 years ago	30%	60%	100%
Restructured ≥ 4 and < 8 years ago	20%	50%	100%
Restructured ≥ 8 years ago	10%	50%	100%
Delinquent (not restructured) loans/ No data for restructured loans	0%	50%	100%

* We may perform an additional analysis if a portfolio includes a substantial portion of loans in arrears for less than two months.

Source: Moody's Investors Service

Exhibit 15 shows the categories for **principal payment type** and the related adjustment factors. The MILAN model allocates 50% of the principal payment type adjustment to the default probability of each loan and the remaining 50% to its loss severity.

Exhibit 15

Principal Payment Type adjustment

Category	Description	Adjustment Factor
Annuity, linear, fixed installments with structural protection, bullet plus saving deposits*	Benchmark	0%
Bullet plus life insurance** or investment portfolio***	Loans where the payment of the entire principal balance is due at the term of the loan	15%
Fixed installments without structural protection, initial interest-only < 5 years, other	Floating rate mortgage loans with fixed installments or mortgage loans making only interest payments for less than 5 years	25%
Initial interest-only 5-10 years	Mortgage loans making only interest payments for more than 5 years and less than 10 years	35%
Initial interest-only >10 years, increasing installments	Mortgage loans making only interest payments for more than 10 years or mortgage loans with increasing installments	50%
ND	No data	Case-by-case

* The category "Bullet plus saving deposits" includes, for example, bank savings mortgage loan which is interest-only combined with a savings account.
** The category "Bullet plus life insurance" includes, for example, life mortgage loan which is interest-only combined with a life insurance policy.
*** The category "Bullet plus investment portfolio" includes, for example, investment mortgage loan which is interest-only combined with an investment fund.

Source: Moody's Investors Service

Exhibit 16 shows the categories for **loan purpose** and the related adjustment factors. The MILAN model allocates 50% percent of the loan purpose adjustment to the default probability of each loan and the remaining 50% to its loss severity.

Exhibit 16

Loan Purpose adjustment

Category	Description	Adjustment Factor
Purchase, remortgage, renovation	Benchmark	0%
Remortgage with equity release	Borrower who refinances the existing loan and increases the loan balance by a small amount	25%
Construction, debt consolidation, equity release, other	"Other" includes, for example, investment mortgage, combination mortgage	50%
ND	No data	Case-by-case

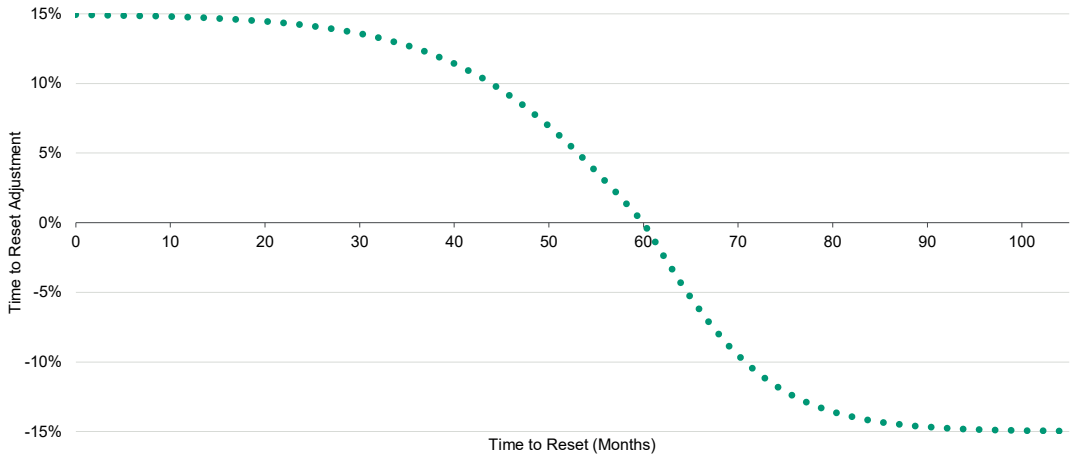
Source: Moody's Investors Service

Construction loans attract a 50% adjustment because a house price decrease will negatively impact properties under construction compared to fully constructed properties. We apply this adjustment when the pool has a minor portion of construction loans (e.g., less than 10%). However, we typically use a transaction-specific approach, which may result in a larger adjustment, for pools with significant exposure to properties under construction since such pools are more exposed to a house price decline in an economic downturn.

We incorporate **an interest rate type (fixed or floating) in the Time to Reset adjustment**. We base our considerations regarding interest rates on the length of the fixed-rate period. A fixed-rate loan or a loan with a longer period until interest rate reset can be considered less risky than a floating-rate loan and we give benefit of up to -15% in our MILAN model. Conversely, a floating-rate loan will attract the higher penalty of up to +15%. The benchmark is a loan that is fixed rate for 60 months. Exhibit 17 shows the Time to Reset adjustment applied by the MILAN model.

Exhibit 17

Time to Reset adjustment



Source: Moody's Investors Service

The MILAN model attributes this adjustment entirely to the default probability of each loan.

We modify the Adjusted Benchmark Loan Loss to account for borrowers that have the option to request a **payment holiday** during the life of their mortgage loans. We apply a Payment Holiday adjustment when: (1) the payment holiday is not at the servicer's discretion; (2) it is a contractual right at the time of loan origination; (3) there is no stringent criteria that the borrower must meet for payment holiday eligibility; and (4) the payment holiday is not a standard feature in loan contracts. Exhibit 18 shows the categories for payment holiday and the related adjustment factors.

Exhibit 18

Payment Holiday adjustment

Category	Description	Adjustment Factor
Low risk	Benchmark: Borrowers have the option to take a payment holiday for less than 12 months. A payment holiday is granted to performing borrowers who continue to make at least interest payments.	0%
Medium risk	Borrowers have the following options: Request a payment holiday for 12-24 months. A payment holiday is granted to performing borrowers who continue to make at least interest payments, or Request a payment holiday for less than 12 months. A payment holiday is granted to performing borrowers who make no payments.	15%
High risk	Borrowers have the following options: Request a payment holiday for 12 months or more. A payment holiday is granted to performing borrowers who make no payments, or Request a payment holiday for more than 24 months. A payment holiday is granted to performing borrowers who continue to make at least interest payments.	25%

Source: Moody's Investors Service

The MILAN model allocates 50% of this adjustment to the default probability of each loan and the remaining 50% to its loss severity.

In certain mortgage markets, governments, regions, cities or other public bodies may offer **social programs**, for example, to allow qualifying social tenants to purchase their rented home at a discount. We assess new programs that are part of a transaction portfolio on a case-by-case basis.

Exhibit 19 shows the categories for social programs and the related adjustment factors. The MILAN model allocates the Social Program adjustment entirely to the default probability of each loan.

Exhibit 19

Social Program adjustment

Category	Description	Adjustment Factor
No social program	Benchmark	0%
Shared ownership (UK)	Scheme that offers first-time buyers the opportunity to buy a share of their home and pay rent on the remaining share	50%
Right-to-buy (UK)	Scheme that allows qualifying social tenants to buy their rented home at a discount	
Tenant purchase (Ireland)	Scheme that offers qualifying tenants in a local authority home, the opportunity to buy their home from the local authority at a discounted rate	
Help-to-buy (UK)	Government scheme to help first-time buyers get a property with just a 5% deposit	100%
Other	Other types of social programs	Case-by-case

Source: Moody's Investors Service

Property-related adjustments

We modify the Adjusted Benchmark Loan Loss when occupancy and property types deviate from the benchmark loan definition. The MILAN model allocates 50% of this adjustment to the default probability of each loan and the remaining 50% to its loss severity.

Exhibit 20 shows the categories for occupancy type and the related adjustment factors.

Exhibit 20

Occupancy Type adjustment

Category	Description	Adjustment Factor
Owner-occupied	Benchmark	0%
Non-owner occupied, second home	Non-owner occupied or second home where the owner is not a professional landlord or the origination may rely more on the owner's income rather than the rental income	25%
Professionally let, commercial use, other	Buy-to-let products where the origination may rely more on the rental value of the property	50%
ND	No data	Case-by-case

Source: Moody's Investors Service

Exhibit 21 shows the categories for property type and the related adjustment factors. The MILAN model allocates 50% of this adjustment to the default probability of each loan and the remaining 50% to its loss severity.

Exhibit 21

Property Type adjustment

Category	Description	Adjustment Factor
New flat/apartment, new house, old flat/apartment, old house	Benchmark	0%
Multi-family, partial commercial use	Residential property containing more than one housing unit or semi-commercial use properties	25%
Vacant land, commercial use, other	Land without building or unused or properties for commercial use	50%
ND, other with no recourse	No data or properties with no recourse to the borrower that are considered riskier	Case-by-case

Source: Moody's Investors Service

We may apply a haircut to the property value for the severity and the LTV calculations used to determine a loan's default probability. For example, if the valuation provided is not a full valuation but a valuation obtained through an automated valuation model (AVM), we typically apply a property value haircut. We determine the haircut by analyzing such models' accuracy and associated confidence levels. The confidence levels used by AVM providers indicate the precision of their valuations.

Exhibit 22 shows the haircut we typically apply to a property value based on the accuracy of the valuation method. Specifically, we analyze data supplied by an AVM provider for its respective AVM. We assess the data and group the AVM providers based on their

confidence levels into one of three accuracy categories based on the average and standard deviation of the estimation error[6] between the AVM valuation and data from independent appraiser valuations. We use the average of the AVM sample as the variable for deriving the property value haircut.

In cases where data supplied by an AVM provider is insufficient or outdated, we may consider grouping the AVM provider in an accuracy category associated with a higher property value haircut.

Exhibit 22

Property value haircut

Accuracy Category	Valuation Type*	Property Value Haircut
High	Full valuation Full, only external inspection Purchase price (excluding fees) AVM (high confidence level) Certain qualified AVM providers in Canada Desktop valuation in Japan and Hong Kong	0%
Moderate	AVM (moderate confidence level) Other AVM providers in Canada and Australia with unknown confidence level Value of immovable property for tax purposes (e.g., WOZ valuations**) Drive-by by qualified appraiser Desktop by qualified appraiser	5%
Low	AVM (low confidence level) AVM with no data on confidence level AVM with unknown provider in UK and Australia Desktop with undefined method	10%

* Indexed property valuations typically do not attract a haircut.
** WOZ: Waardering Onroerende Zaken (Valuation of Immovable Property).

Source: Moody's Investors Service

Borrower-related adjustments

Borrower-related adjustments include Borrower Residency, Employment Type and Income Verification. We also apply an adjustment for borrower age when there is a substantial concentration of borrowers older than 60 years in the portfolio and limited-to-no mitigants to reduce mortality risk. We assess the risks associated with borrower age on a case-by-case basis.

We expect that loans granted to borrowers who purchase a property in a country where they lack residency status are usually riskier than loans granted to residents.

Exhibit 23 shows the categories for borrower residency and the related adjustment factors. The MILAN model allocates 50% of this adjustment to the default probability of each loan and the remaining 50% to its loss severity.

Exhibit 23

Borrower Residency adjustment

Category	Description	Adjustment Factor
Resident	Benchmark	0%
Not resident	Borrowers who lack residency status in the country where their financed property is located	200%
ND	No data	Case-by-case

Source: Moody's Investors Service

[6] Estimation error = (appraiser valuation – AVM valuation) / AVM valuation. The risk is quantified assuming the estimation error is normally distributed.

Exhibit 24 shows the categories for employment type and the related adjustment factors. The MILAN model allocates this adjustment entirely to the default probability of each loan.

Exhibit 24

Employment Type adjustment

Category	Description	Adjustment Factor
Protected lifetime support	Borrowers employed by the government or civil servants	-25%
Employed	Benchmark	0%
Pensioner	Borrowers not employed, but benefit from a stable income, such as a pension	25%
Self-employed, other* with support	Borrowers that do not work for a specific employer	50%
Company, other without support	Borrowers that are not private individuals	100%
ND	No data	Case-by-case

* Other: Student, temporary worker, unemployed.

Source: Moody's Investors Service

Exhibit 25 shows the categories for income verification and the related adjustment factors. For example, loan products with "low documentation," such as fast-track and self-certification loans attract a 150% adjustment factor. The MILAN model allocates 50% of the income verification adjustment to the default probability of each loan and the remaining 50% to its loss severity.

Exhibit 25

Income Verification adjustment

Category	Description	Adjustment Factor
Full documentation	Benchmark	0%
Alternative documentation*	Recent income documentation only, such as the most recent six months of business activity statements	50%
Low documentation	Income information may be provided but is not considered in the underwriting process	50%
No documentation	No income verification or information provided	300%
ND, other	No data or other types of documentation	Case-by-case

* Loans underwritten based on a debt service coverage ratio (DSCR) rather than a debt-to-income (DTI) ratio may fall into this category.

Source: Moody's Investors Service

Combination of characteristics

We apply an additional adjustment to borrowers or loans with more than one adverse characteristic, such as a borrower who is both not employed and has a bad credit history. This adjustment reflects the incremental risk that arises with credit-impaired borrowers and allows us to consider any potential risk layering.

Exhibit 26 shows the combination of adverse risk characteristics and the related adjustment factor. The MILAN model allocates 50% of this adjustment to the default probability of each loan and the remaining 50% to its loss severity.

Exhibit 26

Combination of Characteristics adjustment

Combination	Description	Adjustment Factor
Combination 1	Low documentation/no documentation and bad credit history	50%
Combination 2	Not employed* and bad credit history	
Combination 3	Debt consolidation or equity release and bad credit history	
Combination 4	Not first lien loan and bad credit history	

* "Not employed" includes a pensioner, self-employed, other with support, other without support or a company.

Source: Moody's Investors Service

Originator and servicer-related adjustments[7]

We further modify the Adjusted Benchmark Loan Loss to reflect our assessment of the quality of origination and underwriting and the servicing of residential mortgage loan portfolios. We apply the Originator and Servicer Strength adjustments to the sum of the Adjusted Benchmark Loan Loss and all single loan-level adjustments described above, as shown in Exhibit 27.

Exhibit 27

Originator and Servicer Strength adjustment

$$Adj_{Strength,i} = (Adjusted\ Benchmark\ Loan\ Loss_i + \sum Adjustment_{k,i}) * AdjFactor_{Strength}$$

Where:

» $Adj_{Strength,i}$: originator or servicer strength adjustment for loan i
» $Adjusted\ Benchmark\ Loan\ Loss_i$: adjusted benchmark loss for loan i
» $\sum Adjustment_{k,i}$: aggregation of all single loan-level adjustments for loan i
» $AdjFactor_{Strength}$: adjustment factor reflecting the strength of an originator or servicer

Source: Moody's Investors Service

The Originator and Servicer Strength adjustments are static and generally range between -10% to 50%. We also assess whether the originator and servicer are experienced entities and apply an adjustment to the sum of the Adjusted Benchmark Loan Loss and all single loan-level adjustments as indicated in Exhibit 27. Unlike the strength adjustment, the Originator and Servicer Experience adjustments decrease as the transaction seasons, and phase out 10 years after the transaction closing.

Lastly, we use a transaction-specific adjustment to reflect the presence and strength of representations and warranties provided by an originator and the data quality (R&W and Data Quality adjustment). The R&W and Data Quality adjustment is dynamic and decreases as the transaction seasons and more performance data becomes available. It also phases out 10 years after the transaction closing. This reduction applies to transactions with a revolving period from the end of the revolving period.

Unlike the strength and experience adjustments, we apply the R&W and Data Quality adjustment to the Adjusted Benchmark Loan Loss as indicated in Exhibit 28. The MILAN model allocates 50% of the originator and servicer adjustments to the default probability of each loan and the remaining 50% to its loss severity.

Exhibit 28

R&W and Data Quality adjustment

$$Adj_{R\&W,i} = Adjusted\ Benchmark\ Loan\ Loss_i * AdjFactor_{R\&W}$$

Where:

» $Adj_{R\&W,i}$: originator adjustment for loan i
» $Adjusted\ Benchmark\ Loan\ Loss_i$: adjusted benchmark loss for loan i
» $AdjFactor_{R\&W}$: adjustment factor reflecting the strength of R&W and data quality

Source: Moody's Investors Service

Step 7: MILAN Stressed Loss (excl. AI) – single loan

After applying all single loan-level adjustments, we derive the total MILAN Stressed Loss for each loan in the portfolio as the sum of the Adjusted Benchmark Loan Loss and all adjustments. The MILAN Stressed Loss for each loan excludes accrued interest (AI).

[7] See Appendix 2 for further details.

Exhibit 29

MILAN Stressed Loss (excl. AI) – single loan

$$MILAN\ Stressed\ Loss\ Loan_i(excl.\ AI) = Adjusted\ Benchmark\ Loan\ Loss_i + \sum Adj_{k,i}$$

Where:

» *MILAN Stressed Loss Loan$_i$ (excl. AI)* : MILAN Stressed Loss for loan i excluding accrued interest
» *Adjusted Benchmark Loan Loss$_i$* : adjusted benchmark loss for loan i
» *$\sum Adj_{k,i}$* : aggregation of all single loan-level adjustments for loan i

Source: Moody's Investors Service

Step 8: Pre-concentration MILAN Stressed Loss of the portfolio (excl. AI)

We determine the MILAN Stressed Loss of the portfolio, which excludes interest accrued on defaulted loans during the foreclosure period, before accounting for any regional or borrower concentration, as indicated in Exhibit 30. We multiply regional and borrower concentration adjustments to the Aggregated MILAN Stressed Loss (excl. AI).

Exhibit 30

Aggregated MILAN Stressed Loss of the portfolio (excl. AI)

$$Aggregated\ MILAN\ Stressed\ Loss\ (excl.\ AI) = \sum(MILAN\ Stressed\ Loss\ Loan_i(excl.\ AI) * W_i)$$

Where:

» *Aggregated MILAN Stressed Loss (excl. AI)* : sum of the MILAN Stressed Loss for each loan in the portfolio excluding accrued interest
» *MILAN Stressed Loss Loan$_i$ (excl. AI)* : MILAN Stressed Loss for loan i excluding accrued interest
» *W_i* : weight of the total exposure to loan i in the portfolio

Source: Moody's Investors Service

Step 9: Concentration adjustments

We apply further adjustments at the portfolio level. These adjustments depend on regional and borrower concentration compared to the benchmark portfolio.

Regional Concentration adjustment

We compare a residential mortgage loan portfolio's regional concentration with the benchmark portfolio's population density. In cases where population density data is unavailable, we may use, for example, property density or GDP data as a proxy for the benchmark portfolio. We generally allow for 75% excess concentration within each region in a country. The sum of concentration above that excess concentration threshold bears a country-specific adjustment of 50% for regional concentration on the portfolio.

Exhibit 31

Regional Concentration adjustment

$$Regional\ Adj = 1 + Regional\ AdjFactor * \sum \left[Max\left(0, \left(W_{Region} - Density_{Region} * (1 + Excess)\right)\right)\right]$$

Where:

» *Regional AdjFactor* : adjustment for excess regional concentration
» *W_{Region}* : weight of loans secured against properties in a region versus the total portfolio
» *$Density_{Region}$* : population density in a specific region for the benchmark portfolio
» *Excess* : excess concentration threshold of 75%

Source: Moody's Investors Service

Borrower Concentration adjustment

We address a portfolio's lack of diversification by applying a Borrower Concentration adjustment. Residential mortgage loan portfolios are usually highly diversified in terms of borrowers and single loan sizes. However, a low average loan size could result from an extreme portfolio, with a few large and many small loans. Alternatively, a few borrowers may have many small loans resulting in less diversification.

We assess borrower or loan concentration by calculating the effective number of borrowers in the portfolio. The calculation uses an adjusted Herfindahl-Hirschman Index based on the aggregated borrower exposure. We interpret it as the number of equally weighted borrowers in a theoretical portfolio. For example, we assume a pool with 500 borrowers and an effective number of 300 borrowers with the same borrower concentration risk as a pool with 300 borrowers with the same outstanding amount. The benchmark portfolio typically has an effective number of borrowers of 3,000, equivalent to a 0.033% exposure to each borrower.

Exhibit 32

Effective number of borrowers

$$Effective\ Borrowers = 1/\sum(W_m)^2$$

Where:

» *Effective Borrowers* : effective number of borrowers for the portfolio
» W_m : weight of the total exposure to borrower m in the portfolio

Source: Moody's Investors Service

As shown in Exhibit 32, larger borrower concentrations result in a lower effective number of borrowers, indicating less diversity. We calculate the Borrower Concentration adjustment as described in Exhibit 33.

Exhibit 33

Borrower Concentration adjustment

$$Borrower\ Adj =$$

$$Aggregated\ MILAN\ Stressed\ Loss\ (excl.AI)^{\{Borr\ AdjFactor\ *\ Max(0,LN(Bench\ Borrowers)-LN(Effective\ Borrowers))\}}$$

Where:

» *Borr AdjFactor* : adjustment factor for borrower concentration
» *Bench Borrowers* : effective number of borrowers for the benchmark portfolio (3,000)
» *Effective Borrowers* : effective number of borrowers for the portfolio

Source: Moody's Investors Service

For small portfolios with significant borrower and regional concentration, we may determine that credit enhancement cannot mitigate the regional and borrower concentration risk. In this case, we may decide to cap the ratings of the transaction's securities below the maximum rating achievable in the country.

Loans to employees

When a mortgage portfolio includes loans to employees of the originator and structural mitigants are not available, we reflect the higher risk that stems from the potential collective layoff of the employees of the issuer or originator upon its insolvency. We derive a portfolio-level adjustment as indicated in Exhibit 34.

Exhibit 34

Loans to Employees adjustment

$$Loans\ to\ Employees\ Adj = DP\ Floor * 50\% * LTEs\ (\%) * Portfolio\ Level\ WA\ Benchmark\ Loss\ Severity$$

Where:

» *DP Floor* : default probability floor of 100%
» *LTEs (%)* : share of loans to employees in the portfolio
» *Portfolio-level WA Benchmark Loss Severity* : WA loss severity of the portfolio before applying all loan- and portfolio-level adjustments and before the application of the minimum loan loss severity floor

Source: Moody's Investors Service

For RMBS transactions, we account for the expected incremental loss due to loans to employees in our cash flow analysis, considering both the exposure to loans to employees in the portfolio (as derived with the formula in Exhibit 34) and the default probability inherent in the originator's rating.

Step 10: MILAN Stressed Loss (excl. AI)

To determine the MILAN Stressed Loss (excl. AI) for a portfolio, we aggregate all calculations made within MILAN and adjust for regional and borrower portfolio concentrations (see Exhibit 35). The MILAN Stressed Loss (excl. AI) is a principal loss expressed as a percentage of the portfolio balance.

Exhibit 35

MILAN Stressed Loss (excl. AI)

$$MILAN\ Stressed\ Loss\ (excl.\ AI) = Loans\ to\ Employees\ Adj + Aggregated\ MILAN\ Stressed\ Loss\ (excl.\ AI) * Regional\ Adj * Borrower\ Adj$$

Source: Moody's Investors Service

Step 11a: MILAN Stressed Loss

Our cash flow model consumes the MILAN model output as a portfolio loss incorporating interest accrued on defaulted loans during the foreclosure period (MILAN Stressed Loss). To obtain the MILAN Stressed Loss incorporating accrued interest, we use the MILAN Interest Rate assumption and a discount period equal to the MILAN Time to Foreclosure assumption.

Exhibit 36

MILAN Stressed Loss

$$MILAN\ Stressed\ Loss = (MILAN\ Stressed\ Loss\ (excl.\ AI) + \left(\frac{MILAN\ Stressed\ Loss\ (excl.\ AI)}{1 - MILAN\ Recovery\ Rate}\right) * MILAN\ Interest\ Rate * MILAN\ Time\ to\ Foreclosure)/(1 + MILAN\ Interest\ Rate * MILAN\ Time\ to\ Foreclosure)$$

Where:

» *MILAN Stressed Loss:* MILAN Stressed Loss of the portfolio incorporating accrued interest

Source: Moody's Investors Service

Besides the MILAN Stressed Loss, our MILAN model determines a MILAN Recovery Rate assumption, representing the portfolio's principal recovery rate we expect in a severe economic stress. We obtain the MILAN Recovery Rate assumption after applying all loan- and portfolio-level adjustments described above to the severity of each loan.

RMBS transactions with revolving or prefunding periods and further advances

For transactions with revolving or prefunding periods, we typically generate a new loan-level portfolio based on the transaction covenants to assess the impact on the portfolio characteristics. We then run the MILAN model considering the new loan-level portfolio.

Specifically, for revolving transactions we follow the steps below.

» We first run the MILAN model based on the current loan-level portfolio to determine each loan's MILAN Stressed Loss and rank order loans by their implied credit risk.

» We consider the length of the revolving period, the portfolio's scheduled amortization and expected prepayments to determine the amount of replenished assets.

» Considering their risk profile, we remove loans from the portfolio (up to the amount of replenished assets) and ensure that loans from all LTV buckets are taken out.

» We use a logistic function to derive a conservative LTV distribution that we apply only to a portion of the replenished assets (replenishment weight).

» We consider transaction covenants, such as a maximum weighted-average (WA) LTV and LTV bucket thresholds to determine a post-replenishment LTV distribution.

» We generate a new loan-level portfolio reflecting a deterioration of the portfolio quality based on the LTV, pool, borrower, loan and property covenants.

» We run the MILAN model using the new loan-level portfolio to derive an updated MILAN Stressed Loss.

For transactions with prefunding periods, we follow the approach described above, except that we do not remove loans from the portfolio. Additionally, when further advances are allowed, we do not adjust the MILAN Stressed Loss of the portfolio if: (1) the further advances amount does not exceed 20% of the initial portfolio; and (2) the WA LTV increase due to further advances is limited to 2%. Otherwise, for transactions where further advances are allowed, we will follow the approach for revolving transactions.

In master trust structures, due to ongoing replenishment, the master trust documentation typically contains criteria to restrict poorer-quality assets from being added to the pool. We consider the criteria in our portfolio analysis. The criteria can, for example, include loan-level eligibility criteria, limits on the portfolio's LTV distribution or the use of Moody's Portfolio Variation (MPV) test. The MPV test compares the pool quality at two points in time through the MILAN model and typically includes a tolerance allowing a maximum increase in the MILAN model output. This tolerance is incorporated into the model result before the application of floors such as the Minimum Portfolio EL Multiple and Minimum Portfolio MILAN Stressed Loss. The MPV test then compares the final MILAN Stressed Loss model output after application of the floors described below.

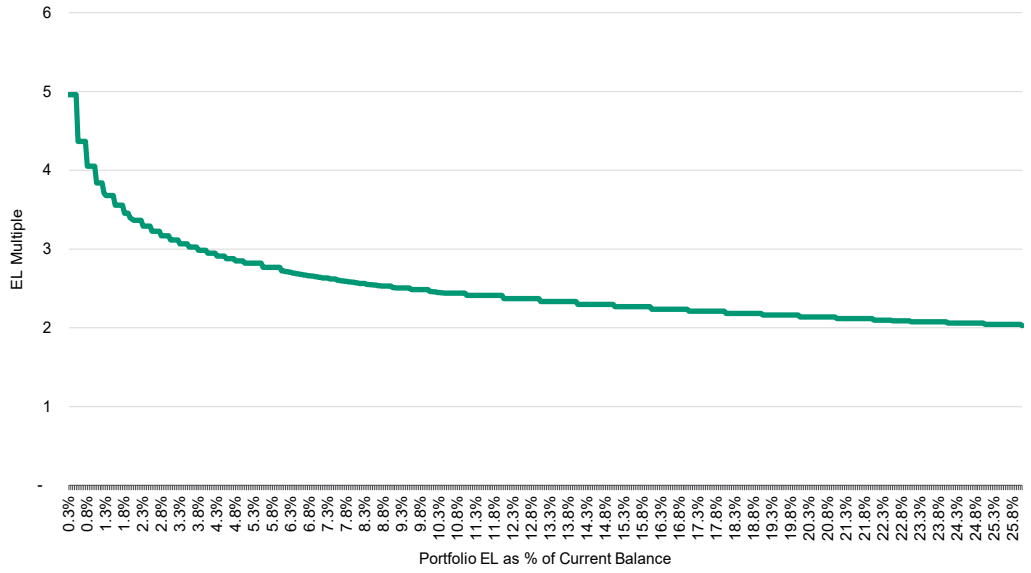
Step 11b: Minimum Portfolio MILAN Stressed Loss

The MILAN Stressed Loss is subject to a floor, namely the Minimum Portfolio EL Multiple. For countries where the availability of information limits the predictability of severe stress scenarios, we may apply an additional floor to the MILAN Stressed Loss, the Minimum Portfolio MILAN Stressed Loss. This floor will reflect risks such as uninsurable natural risk; potential weakness in the legal and regulatory system; borrowers' credit behavior; and limited performance data covering periods of severe economic stress or volatile historical performance data.

» **Minimum Portfolio EL Multiple:** In RMBS transactions, we apply a Minimum Portfolio EL Multiple for all countries to ensure that extreme loss scenarios have an adequate probability of occurrence in our analysis. We typically determine a Minimum Portfolio EL Multiple as a multiple of the Portfolio EL to maintain a minimum coefficient of variation for the lognormal distribution used to simulate losses incurred by the securitized portfolio. This is particularly important for a high Portfolio EL or when we expect an adverse portfolio performance, which is not yet reflected in the arrears levels but is already qualitatively incorporated into the Portfolio EL assumption. The multiples differ based on the level of the Portfolio EL assumed, and vary between 2x (for high Portfolio EL assumptions) and 5x (for low Portfolio EL assumptions). We apply multiples ranging from 2x to 5x for most RMBS transactions (see Exhibit 37). We use a case-by-case assumption for very high Portfolio EL.

Exhibit 37

Typical EL multiples



Source: Moody's Investors Service

» **Minimum Portfolio MILAN Stressed Loss:** We apply a Minimum Portfolio MILAN Stressed Loss of 3% to static transactions and 4% to revolving or evergreen transactions, such as master trusts. However, for countries with limited through-the-cycle market data, lack of data transparency, or volatile historical performance data, we typically apply a more conservative Minimum Portfolio MILAN Stressed Loss of 10%. Moreover, in RMBS transactions backed by good-quality assets (e.g., with high credit bureau scores) or pools with low WA LTV, the MILAN model output may correspond to the Minimum Portfolio MILAN Stressed Loss.

Lastly, the rating committee determines the MILAN Stressed Loss, taking into account the calculated model output and any other qualitative and quantitative aspects of the portfolio. The result is the MILAN Stressed Loss for the portfolio.

Probability loss distribution

We use the Portfolio EL (excl. AI) and the MILAN Stressed Loss (excl. AI) determined in Step 10 to calibrate the lognormal loss distribution, among other parameters.

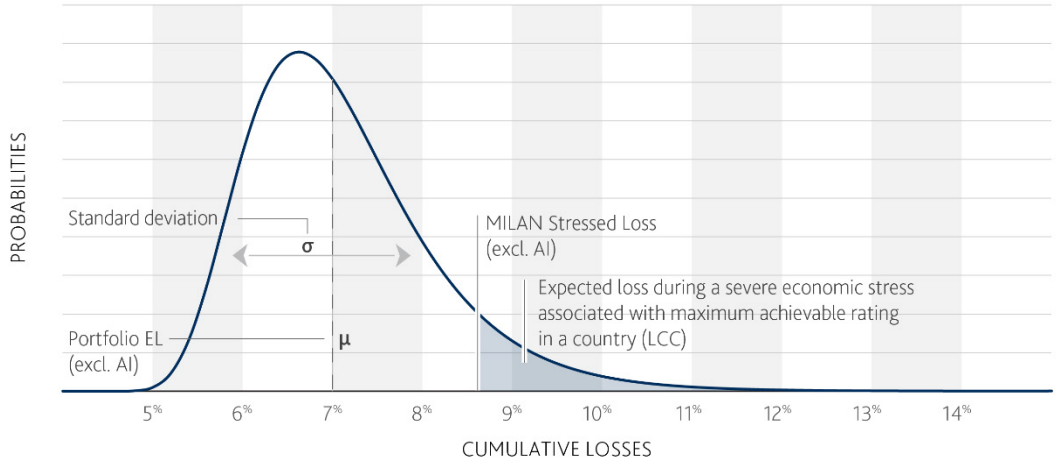
Both the Portfolio EL (excl. AI) and the MILAN Stressed Loss (excl. AI) do not include accrued interest because we consider accrued interest in our cash flow modeling. To remove accrued interest from the Portfolio EL, we use the MILAN Recovery Rate, the MILAN Interest Rate and the base-case time to foreclosure (equivalent to 40% of the MILAN Time to Foreclosure assumption).

The lognormal loss distribution is calibrated such that the loss sustained by a theoretical senior tranche sized as 100%, minus the MILAN Stressed Loss (excl. AI), for example 10%, is equal to the idealized loss from Moody's Idealized Cumulative Expected Loss table.[8] The loss is associated with this tranche's weighted average life and the maximum rating achievable in the country.

[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.

Exhibit 38

General shape of the lognormal loss distribution

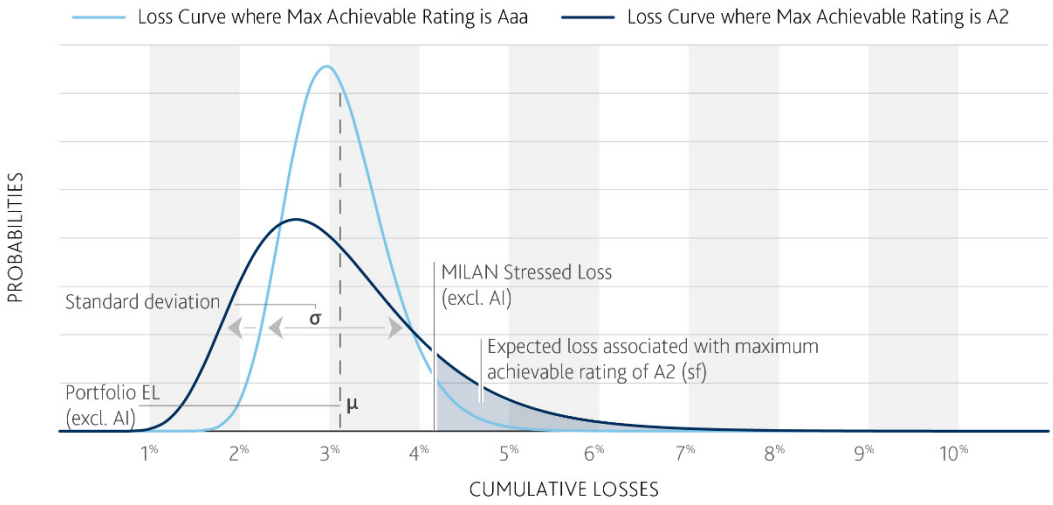


Source: Moody's Investors Service

As shown in Exhibit 39 below, two loss distributions reflecting the same MILAN Stressed Loss (excl. AI) with different maximum achievable ratings will have different shapes, meaning the losses and their associated probabilities differ. The loss distribution for a maximum achievable rating of Aaa (sf) has a lower probability of very high loss scenarios than the loss distribution of a maximum achievable rating of A2 (sf).

Exhibit 39

Calibration of lognormal loss distribution to Aaa (sf) vs. A2 (sf)



Source: Moody's Investors Service

Under this approach, if we lower the maximum achievable ratings for structured finance transactions in a country, we will not necessarily decrease the MILAN Stressed Loss (excl. AI). For example, if a maximum achievable rating of Aaa (sf) previously corresponded to 10% MILAN Stressed Loss (excl. AI), a new maximum achievable rating of A2 (sf) may also correspond to 10% MILAN Stressed Loss (excl. AI), to account for the risk of a higher probability of high loss.

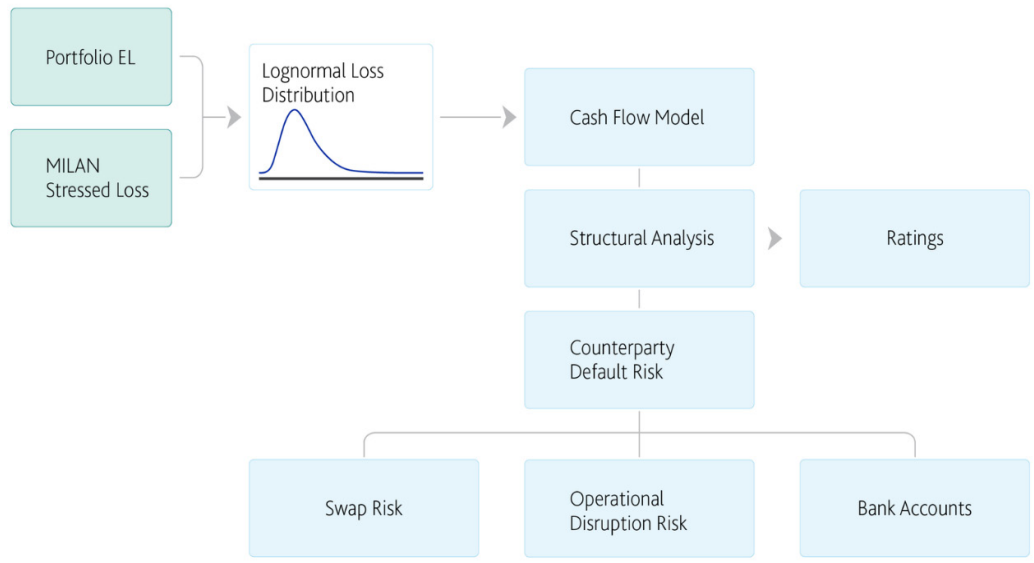
Calculating the loss distribution using the same loss amount but a lower rating results in a fatter tail on this curve, which considers the higher probability of high losses on the rated security in a country with a lower country ceiling.

Structural analysis and liability modeling

Overview

Once we complete our asset analysis, we analyze the transaction structure, cash flow waterfall, and level of credit protection available to the securities to determine their ratings. We use a cash flow model to assess the characteristics of a transaction's assets and liabilities and their impact on the potential losses to investors. The model calculates a tranche's expected loss, which we use in conjunction with the tranche's weighted average life as the basis for a model output. As necessary, we adjust the model output when assigning a rating to incorporate factors not explicitly analyzed in the cash flow model, such as the transaction's counterparty default risks and legal risks. We may also consider the sensitivity of the model assessment to alternative Portfolio EL and MILAN Stressed Loss assumptions.

Exhibit 40
Structural Analysis



Source: Moody's Investors Service

Cash flow model and assumptions

We use a comprehensive cash flow model, ABSROM™, which enables us to model transaction cash flows derived from residential mortgage loan portfolios and the associated liability structure. The model produces a series of loss scenarios, with outputs for each security, including the expected loss, weighted average life and default probability. The cash flow model incorporates transaction-specific structural features, such as tranching, priority of payments, performance triggers, and servicing fees.

We base our ratings of RMBS securities on the expected losses (Tranche EL) that investors could incur by the legal final maturity date. The Tranche EL considers the probability and the severity of credit losses that investors could incur.

To determine the Tranche EL, ABSROM calculates the loss to investors resulting from each portfolio loss scenario of the portfolio loss distribution. The model then weights each loss with the corresponding probability of the loss scenario and aggregates the weighted losses to calculate the Tranche EL. We combine the Tranche EL with an estimate of the weighted average life of the tranche to derive the model output from Moody's Idealized Cumulative Expected Loss table.

Modeling assumptions

In analyzing the structure of an RMBS transaction, we consider the following elements. We may also run sensitivities to assess the volatility of the model output.

Cap of the tranche life (WAL cap)

We typically do not assume a WAL cap to determine a security's rating. In countries such as the UK, where we observe significant exposure to long-term interest-only loans, we may apply a WAL cap to derive the model output.

Default timing

The default timing curve is typically a sine curve. The timing depends on the periodicity, default definition and transaction characteristics. We may, for example, set the first point of the curve at or around year 1, the midpoint at or around years 2 or 3 and the maximum at or around years 4 to 8. We usually shift the default timing curve forward if a pool, for example, includes arrears and defaults, so the curve starts at period zero.

Default definition

The default is the point in time when borrowers fail to repay their mortgage loan and can be referred to as "defaulted." We use a transaction-specific default definition. For transactions without default definition and with a significant proportion of loans in arrears, we may use a longer default definition to reflect the longer period over which borrowers do not make interest payments.

Varying time to foreclosure

Our time to foreclosure assumption varies by loss scenario. Specifically, for each country, the time to foreclosure corresponds to: (1) 40% of the MILAN Time to Foreclosure for scenarios up to and including the median scenario (our Portfolio EL); (2) the MILAN Time to Foreclosure for scenarios including and beyond the stressed scenario (MILAN Stressed Loss); and (3) a linear interpolation between 40% of the MILAN Time to Foreclosure and the MILAN Time to Foreclosure for all remaining scenarios.

Constant prepayment rate (CPR)

We use a constant prepayment rate (CPR) assumption in ABSROM. We derive this assumption from historical market data, characteristics of the mortgage products, evolution of interest rates (for example, pools that have already reverted to a long-term rate could inform a lower lifetime CPR), benchmarking against comparable portfolios and transaction features. We typically use a 15% CPR assumption and incorporate sensitivity analysis with higher or lower assumptions when appropriate, e.g., for very seasoned portfolios with low prevailing CPRs. In certain countries like Australia, we typically use a higher standard CPR assumption of 20%.

Principal amortization vector

We use a principal amortization vector in ABSROM. This vector normally represents the aggregate scheduled principal amortization per period and is based on the underlying portfolio as a percentage of the modeled portfolio balance.

Portfolio yield vectors

We typically determine two portfolio yield vectors: a base-case yield vector and a stressed yield vector. To derive our stressed yield vector, we stress the portfolio yield to account, for example, for prepayments, possible yield compression during a revolving period, basis risk and any other unhedged interest rate exposures. Conversely, our base-case yield vector represents our expected portfolio yield without applying any stress.

In our cash flow model, we will use: (1) the base-case yield vector for loss scenarios up to and including the median scenario (our Portfolio EL assumption); (2) the stressed yield vector for loss scenarios including and beyond the stressed scenario (our MILAN Stressed Loss assumption); and (3) a linear interpolation of the base-case yield vector and the stressed yield vector for all remaining scenarios.

MILAN Interest Rate

We normally use a constant reference rate assumption over the life of an RMBS transaction, which represents our long-term assumption for the relevant rate paid on the portfolio and liabilities (MILAN Interest Rate). Our MILAN Interest Rate assumption for a country corresponds to the interest rate we apply in our asset analysis to derive the amount of interest accrued on defaulted loans during the time to foreclosure.

Interest on cash: Guaranteed investment contracts

We typically model interest on cash in transactions with a guaranteed investment contract (GIC) in place. In certain instances, we may consider a stressed assumption rather than the actual GIC rate to account for future reductions in the GIC rate.

Transaction fees

Fees are transaction-specific assumptions. Our fees analysis may include stressed assumptions for potential deviations from contractual terms. For example, when the servicer is not highly rated, we may assume a higher servicing fee than the contractual fee, especially if the contractual fee is below the market rate. Our servicing fee assumption typically reflects servicing fees observed in a country. It may be higher if the underlying portfolio has unique features, making it difficult or expensive to service if a replacement servicer becomes necessary.

We typically apply a market-specific minimum amount as a standard fixed fee and an annualized minimum fee ranging from 0.20% to 0.50% as standard variable fee, depending on the complexity of the servicing of the securitized portfolio. We may adjust these assumptions based on transaction-specific considerations, such as the credit quality of the relevant servicer and the nature of the assets.

MILAN Recovery Rate

We model both defaults and recoveries for all countries. To derive defaults from the loss assumption on the lognormal distribution, we apply the MILAN Recovery Rate in our cash flow analysis.

Arrears

When appropriate, we incorporate in the cash flow model assumptions regarding the level of arrears that a portfolio may suffer. The aggregate amount of loans assumed to be in arrears in a period, along with the MILAN Recovery Rate, impacts the interest and principal proceeds on the portfolio.

Swaps

If an RMBS transaction is not fully hedged and there are no other structural mitigants, we generally stress the interest payable on the securities or haircut the available cash flows from the assets. For this purpose, we may size the stress or haircut following the principles in our approach to assessing the impact of linkage to swap counterparties,[9] with adjustments as necessary to address the nature of the unhedged risk.

Revolving and prefunding periods

In our structural analysis of a transaction with a revolving period, we may model the revolving period using separate assumptions for the initial and the replenished pools. We also consider the length of the substitution period and any anticipated changes to the asset yield, which may result from new assets being added to the portfolio.

Liability cash flow modeling

The key parameters of our ABSROM model typically include the following:

» default definition and default timing assumption

» constant prepayment rate assumption

» principal amortization vector

» base-case and stressed yield vectors

» MILAN Interest Rate

» interest on cash

» transaction fees

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

» MILAN Recovery Rate

» interest rates on the securities, including the impact of any interest rate swaps

» reserve amount, including the conditions under which the amount will change

» transaction's allocation of cash flows and losses among the various transaction parties, including different classes or tranches of securities

» triggers that can change those allocations

Loss benchmarks

In evaluating the model output for RMBS transactions subject to this methodology, we select loss benchmarks referencing the Idealized Expected Loss table[10] 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 the formulas in Exhibit 41:

Exhibit 41

Standard asymmetric loss benchmark boundaries

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

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

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

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

Other considerations

Counterparty risks

We consider various counterparty-related risks at different stages throughout our credit analysis. More specifically, we consider include operational risks, commingling risk, account banks and set-off risk.[11] We may adjust our assumptions, inputs or model results based on our review. If information is limited, we may also adjust the rating level.

[10] 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.

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

Hedge counterparties

We analyze the rating impact of exposures to hedge counterparties including assessing the probability of a transaction becoming unhedged and deriving additional potential losses. As part of our analysis, we may conclude that we adjust the ratings to reflect the linkage and additional loss.

Operational risk

Operational risks can arise from various potential sources, including disruption to cash flows caused by the financial distress of a service provider to an RMBS transaction. As part of our analysis, we consider the financial disruption risk and the roles of servicers, cash managers, calculations agents, trustees and similar parties. We perform a step-by-step analysis to determine rating caps, if any, that we would apply to reflect operational risks. More specifically, when applicable, we assess the likelihood of a financial disruption, the transferability of a role from one counterparty to another party, and the mitigants and ratings caps.

Commingling risk

In RMBS transactions, funds owed to investors may be "commingled" with funds of another transaction party prior to the funds' transfer to the issuer's account. If that other party becomes bankrupt, it may be difficult to determine the source and ownership of the commingled funds, resulting in an additional loss for investors. Our analysis captures whether commingling risk exists in a transaction, determines the credit quality of the party and the exposure, and incorporates the additional loss.

Account banks and investments

Generally, our analysis of account banks and temporary investments consists of three steps: (1) we assess the "rating uplift" to the account bank's rating to obtain an "adjusted" rating; (2) if the adjusted rating is below a certain threshold, we assess the exposure of the transaction and categorize the risk into either "standard" exposure or "strong" exposure; and (3) we determine rating caps to the transaction ratings subject to other quantitative and qualitative factors.

Set-off risk

In RMBS transactions, set-off could, for example, arise when a borrower sets off a deposit balance against an outstanding loan amount following a default of the (originating) bank. The risk is typically small in instances of retail deposits covered by a deposit insurance mechanism. However, the risk can be larger in jurisdictions that do not have deposit insurance systems and for corporate and public sector obligors.

RMBS transactions could be exposed to set-off risk arising from contractual claims other than deposits. In such cases, we will also evaluate mitigating factors and, if considered insufficient, determine any expected incremental loss from set-off.

Legal analysis

We assess legal risks that may impact the expected losses posed to investors. In particular, we consider the potential legal consequences of whether the issuer is bankruptcy remote. We review legal opinions at closing to inform our views on the key legal risks identified in a transaction.

Bankruptcy remoteness of the special purpose entity

We analyze whether the special purpose entity (SPE) is bankruptcy remote such that the likelihood of (1) a bankruptcy filing by or against it; or (2) substantive consolidation – that is, the pooling of the issuer's assets and liabilities with those of a bankrupt affiliate – is so low that it has no rating impact. If we determine that the SPE is not bankruptcy remote, we assess the potential rating impact on a case-by-case basis according to the likelihood of bankruptcy and the possible negative consequences for investors.[12]

Bankruptcy of the originator

We analyze whether (1) the originator has sold the receivables (in what is often referred to as a "true sale"); (2) a court would consolidate the owner of the assets with the originator, if the originator declares bankruptcy (substantive consolidation); and (3) the

[12] For more information, see our methodology on bankruptcy remoteness criteria in structured finance transactions. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's related publications" section.

securitization trustee can enforce its ownership or security interest in the collateral once the originator has filed for bankruptcy protection (referred to as "perfection" of the security or ownership interest).

Our legal analysis of these risks depends on the jurisdiction and applicable securitization laws. Additionally, in some circumstances, the bankruptcy of the originator can pose other risks that could reduce the cash flow available to repay the securities such as set-off risk and cash commingling risk, as described above.

Data quality evaluation

We assign ratings to securities issued by an RMBS transaction when we have sufficient information from reliable sources. Data quality is also important throughout the life of an RMBS transaction, as described in the "Monitoring" section.[13]

Sovereign risks

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, affecting its ability to pay investors as promised. We usually incorporate such risks into the analysis by applying our local currency ceilings (LCC). For further details, see the section "Probability loss distribution."

Redenomination risk

Residential mortgage loans denominated in a foreign currency different from a country's local currency may face redenomination risk. For example, a government may choose to redenominate foreign currency mortgage loans into the local currency when its currency significantly depreciates. A redenomination may occur at unfavorable exchange rates for an RMBS transaction, resulting in additional losses and ongoing losses if the transaction is unhedged. We may therefore put a cap on the maximum rating achievable for securities backed by foreign currency denominated mortgage loans in a particular country.

Environmental, social and governance considerations

Environmental, social and governance (ESG) considerations may impact the ratings of securities backed by a portfolio of residential mortgage loans. For information about our approach to assessing ESG issues, please see our methodology that describes our general principles for assessing these risks.[14]

Monitoring

We generally apply the key components of the approach described in this report when monitoring transactions, except for those elements of the methodology that could be less relevant over time, such as originator assessment or the structural and legal analysis. We expect to receive loan-level data and servicer reports, including periodic and cumulative performance information, regularly during a transaction's life.

Transaction performance

A substantial change in a transaction feature prompts a reassessment of the transaction. Absent any substantial change, we typically reassess each transaction annually.

Performance data

For the portfolio analysis, we usually receive data on transaction-specific performance to revise our Portfolio EL assumption during a transaction's life. In the early months of a transaction's life, we normally maintain our initial Portfolio EL assumption unless we observe immediate signs of a substantial deviation in the transaction's expected performance, such as early defaults. We generally give more weight to the performance data as a transaction seasons because this data becomes a better indicator of a transaction's future

[13] For more information, see our approach to evaluating data quality in structured finance transactions. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's related publications" section.

[14] 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.

performance. When significant transaction-specific performance data is available, the portfolio's payment patterns can be more reliable performance predictors than loan-level or portfolio characteristics, in particular when projecting defaults considering our country-specific RMBS collateral performance forecast.

Portfolio EL

For the performing part of the portfolio, we typically analyze the performance data to extrapolate future defaults. For loans that are delinquent or have been delinquent in the recent past, we generally calculate the default probability on the delinquent loans by applying roll rates to the loans based on their delinquency status: the more severe the loan's delinquency status, the higher the default probability. We then obtain the loss estimates by multiplying the total default probability by our loss severity expectation considering transaction-specific data. We estimate future defaults, roll rates, loss severity and loss timing, prepayment rates and prepayment timing, and, where applicable, modification adjustments by considering projections from our macroeconomic outlook report and other available sources. The final future loss estimate combines the performing and delinquent loans analysis. We will typically maintain our existing Portfolio EL assumption if the future loss estimate does not deviate substantially. For example, in EMEA[15] RMBS, a future loss estimate within a 30% deviation of the current assumption may be considered performing within expectations given the volatility of such number.

MILAN Stressed Loss

When we review a transaction, we consider the MILAN model output[16] when updated and reliable loan-level information is available. For loans that are in arrears or have been in arrears or restructured, the updated MILAN Stressed Loss incorporates a delinquent loan analysis similar to that described above. We typically review the MILAN Stressed Loss annually and may revise a transaction's MILAN Stressed Loss assumption when the latest MILAN model output deviates by more than 10% proportionally from the current assumption for the transaction.

When a transaction's performance deviates significantly from our expectation, there is a higher likelihood that the EL multiples we apply will drive the MILAN Stressed Loss.

For revolving RMBS transactions where the flexibility to add new assets has decreased, for example, as a result of the shorter remaining replenishment period, we may revise the MILAN Stressed Loss assumption.

Structural and cash flow analysis

We typically perform a structural analysis considering the cash flow model result using the updated capital structure. However, monitoring certain transactions may not always warrant updated cash flow model analysis.[17] For instance, model results would not normally change if the portfolio analysis were in line and the transaction's capital structure has not materially deleveraged. Alternatively, if the transaction's security ratings are limited to the lowest rating levels, due to very weak performance or sovereign risk, for example, we may instead perform a more ad hoc analysis comparing our Portfolio EL assumption to each security's total credit enhancement ("loss coverage ratio analysis"). We may instead perform a loss coverage ratio analysis in instances where securities are rated at the maximum achievable rating (or below, considering any applicable counterparty-related rating caps) and benefit from strong loss coverage multiples.

Pool size

In assessing pool diversity for 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-

[15] Europe, the Middle East and Africa region.

[16] We may reassess the MILAN model result using (and performing a data quality assessment on) the latest loan-level information for certain key dynamic mortgage loan characteristics, such as current loan balance and arrears status. The majority of the mortgage loan characteristics would typically be considered as static and therefore unchanged from the information provided when initial ratings are assigned.

[17] 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.

sized exposures, using the formula in Exhibit 32. We typically use loan-level information to calculate the effective number of borrowers or loans.

We do not assign nor maintain ratings on securities backed by pools of residential mortgage loans with the following characteristics:

» Transactions 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.

» Transactions 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,[18] or for securities that benefit from full cash collateralization.

[18] 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 1: Historical data extrapolation

We generally use the growth rate extrapolation approach to extrapolate vintage data series when available. We use this approach consistently across a market or country to allow for a better comparison between RMBS transactions.

For a given vintage, we can derive the historical cumulative default (or loss curve) representing the cumulative amount of defaulted loans over time divided by the aggregate original outstanding amount of the loans included in the vintage. For recently originated vintages that do not offer extensive historical data, we extrapolate default rates following the historical pattern observed on older vintages.

We calculate the growth rate of the average cumulative defaults observed during prior periods. If we consider the percentage increase in average cumulative defaults from period to period after origination (using a comparable amount of data points), we can estimate future growth rates of cumulative defaults for each period. We obtain extrapolated default data by multiplying the last historical data point of a specific vintage by one plus the growth rate of the average cumulative defaults of the specific period (and so on with the subsequent growth rates and the resulting extrapolated data).

When the period with historical data is shorter than the average loan maturity, we may extend the observed default curves to capture the impact of potential defaults after the observation period and build a full default curve. To derive unobserved defaults, one approach is to extrapolate the default rate of the longest observed period to the weighted average maturity of each vintage, at a rate equal to the last observed growth rate.

We may exclude younger or older vintages or may make other changes to data or results capturing additional qualitative considerations including seasoning, trends or macroeconomic environments. We also derive additional results including the distribution of cumulative defaults.

Appendix 2: Originator and servicer adjustments

We perform originator and servicer assessments as part of our credit analysis of RMBS transactions and covered bonds backed by pools of residential mortgage loans. These assessments include qualitative analyses of an originator's and servicer's strengths and experience. For originators, we also evaluate the strength of their representations and warranties (R&W) and data quality.

The results of our originator and servicer quality analysis lead to three adjustments for the originator and two adjustments for the servicer, which we input into the MILAN model. These adjustments may positively or negatively impact the MILAN Stressed Loss. For an average originator and servicer, we will typically not apply any adjustments.

We apply the originator and servicer adjustments to the sum of the Adjusted Benchmark Loan Loss and all loan-level related adjustments, as described in Exhibit 27. Conversely, we apply the R&W and Data Quality adjustment only to the Adjusted Benchmark Loan Loss, as indicated in Exhibit 28.

Originator adjustments

Originator strength

The Originator Strength adjustment primarily captures whether (1) the origination, underwriting, and closing practices applied by an originator are in line with our expectations for good loan quality; and (2) an originator is acting as a prudent mortgage lender within its stated risk/reward strategy. The originator strength assessment focuses solely on the effect of the originator's policies and practices on the loan performance distinct from other factors such as the macroeconomic environment and servicer performance.

The originator strength analysis also considers the portfolio composition, the origination vintages and the types of mortgage loans. For example, we may assign more than one originator strength adjustment if the lender originates mortgage loans across different product types, for example, prime, buy-to-let, and non-conforming. The Originator Strength adjustment is a static adjustment that generally spans from -10% to 50% (see Exhibit 42).

Exhibit 42

Originator Strength adjustment

Originator Strength	Adjustment Factor
Above Average	-10%
Average	0%
Slightly Below Average	10%
Below Average	25%
Weak	50%

Source: Moody's Investors Service

The adjustments vary depending on the divergence of originator standards, and for an average originator, we will typically not apply any adjustment. A negative Originator Strength adjustment reduces the MILAN Stressed Loss, while a positive adjustment increases the MILAN Stressed Loss. We may decide to revise the Originator Strength adjustment during the transaction's life if, for example, the originator performs significantly better than expected.

For transactions that involve multiple originators, we may determine the Originator Strength adjustment for each originator. We thereby assess an originator strength at a loan-level basis. We will use this approach to capture our analysis originator-by-originator.

Originator experience

The Originator Experience adjustment captures whether (1) an originator is a recently established entity or a smaller entity by market standards, with limited experience and expertise in underwriting mortgage loans (typically less than 10 years); (2) an originator cannot provide sufficient historical performance data through a full credit cycle; or (3) an entity has been originating mortgage loans for at least 10 years but only recently ramped up a portfolio.

Unlike the Originator Strength adjustment, the Originator Experience adjustment is dynamic and decreases as the transaction seasons, and phases out 10 years after the transaction closing. This reduction also applies to transactions with a revolving period. Originators with limited or no experience will attract a positive adjustment (see Exhibit 43) thus increasing the MILAN Stressed Loss.

Exhibit 43

Originator Experience adjustment

Originator Experience	Adjustment Factor
Experienced Entity	0%
Entity with Limited Experience	15%
Inexperienced Entity	30%

Source: Moody's Investors Service

Representations and warranties (R&W) and data quality

This adjustment is transaction-specific and reflects the presence and strength of any R&W provided by an originator and data quality.[19] We typically analyze the scope of R&W, the mechanisms to identify breaches of R&W and the procedures to enforce remedies in the event of breaches. For example, cases where an originator has limited to no obligations to repurchase loans in breach of any R&W, may result in a positive R&W adjustment.

Originators typically provide us with reports describing the integrity of data used as part of our credit analysis. Any inconsistency identified in a third-party report (TPR) could indicate either errors in reported asset characteristics or other originator-specific factors, such as weaknesses in the origination or quality control process not reflected in the asset characteristics. This may result in a positive R&W and Data Quality adjustment (see Exhibit 44).

Exhibit 44

R&W and Data Quality adjustment

		Data Quality	
		Average	Weak
R&W Strength	Average	0%	15%
	Below Average	15%	30%
	Weak	30%	Case-by-case

Source: Moody's Investors Service

A strong R&W framework could in some cases mitigate weak TPR elements and strong TPR scope and findings could also offset some weaker elements in a R&W framework. Where a weak R&W framework is combined with weak TPR scope or results, we will typically use an R&W and Data Quality adjustment on a case-by-case basis.

Similar to the originator experience adjustment, the R&W and Data Quality adjustment is dynamic and reduces as the transaction seasons and more performance data becomes available, phasing out 10 years after the transaction closing. However, for transactions with a revolving period, this reduction applies from the end of the revolving period.

Servicer adjustments

Similarly, we perform a servicer quality analysis and assign a servicer's strength and experience adjustments. The Servicer Strength adjustment primarily reflects the servicer's underlying processes, procedures, governance and servicing ability. The experience adjustment captures whether (1) a servicer is a recently established entity or smaller entity by market standards, with limited experience and expertise in servicing mortgage loans (typically less than 10 years); or (2) a servicer does not provide sufficient historical performance data through a full credit cycle.

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

We adopt the same adjustments in Exhibits 41 and 42 to evaluate a servicer's strength and experience. While the Servicer Strength adjustment is static, the Servicer Experience adjustment is dynamic and reduces as the transaction seasons, phasing out 10 years after the transaction closing.

Appendix 3: Approach to assessing mixed-pools

We define a "mixed-pool" as a portfolio with two sub-pools of mortgage loans made to individuals and small and medium-sized enterprises (SMEs). To assess a mixed-pool portfolio, we first split the portfolio into sub-pools and analyze each sub-pool separately to derive each loss distribution, as described in the respective sector rating methodology. We then merge the loss distributions associated with the sub-pools. In instances where one of the sub-pools is very small (typically less than 10% of the outstanding portfolio balance), we adopt a simpler approach, applying the methodology of the main asset type.

Splitting the portfolio into sub-pools

We typically divide a portfolio of mortgage loans by borrower and property type to create the two sub-pools. Below is an illustrative example of mixed-pool portfolio.

Exhibit 45

Illustrative example of mixed-pool portfolio

Sub-pool Type	Description
RMBS Sub-pool	This sub-pool typically includes loans to individual borrowers or small unlimited liability companies that have taken out a mortgage loan to acquire a residential property. In these cases, commercial borrowers are generally artisans or self-employed professionals purchasing their house with full recourse to the shareholders.
SME Sub-pool	This sub-pool includes (1) loans to limited liability companies (no recourse to the shareholders) with mortgage loans on either a residential or commercial property; and (2) loans to small unlimited liability companies with a mortgage loan on a commercial property or residential property to finance the business activity of the borrower.

Source: Moody's Investors Service

Merging the loss distributions of the sub-pools

Once we have determined the loss distribution for each sub-pool, we merge the two distributions to derive the loss distribution of the mixed-pool portfolio. The approach we use to merge the two loss distributions follows these steps:

1. We determine a loss distribution for the RMBS sub-pool using a lognormal distribution.
2. We determine a loss distribution for the SME sub-pool depending on the granularity of the sub-pool.
3. We merge the two loss distributions assuming they are fully correlated. For each given probability scenario across the two loss distributions, we take the weighted average of each loss scenario based on the contribution of each sub-pool.
4. Finally, we use the merged distribution as an input into our cash flow analysis.

Appendix 4: Collateral score determination for residential cover pools

This appendix describes our approach to determining the collateral score for cover pools, or portions of cover pools, consisting of residential mortgage loans. In addition, we provide details on the LTV calculation, the Minimum Portfolio MILAN Stressed Loss and our assessment of cover pools comprising employee loans.

A collateral score measures the credit deterioration of the assets in the cover pool in a severe economic stress in the relevant jurisdiction. The higher the credit quality of the cover pool, the lower the collateral score.

We derive collateral scores for cover pools consisting of residential mortgage loans following the principles set out in this methodology. Specifically, we use the MILAN model for residential cover pools to derive the MILAN Stressed Loss, equivalent to a covered bond collateral score. When we receive a loan-level portfolio from covered bond issuers, our MILAN model will consume the data provided as usual. However, for jurisdictions where we receive stratified data for the cover pool, we use an approach to generate a loan-level portfolio based on the stratified data received, before running the MILAN model.

Generating a loan-level portfolio from stratified data

We use an approach to generate a loan-level portfolio based on a set of matrices (stratification tables) provided by covered bond issuers. For each matrix, the columns show the LTV buckets (for example, 50% to 60%), the rows represent the categories of a certain characteristic (for example, property type) and the elements of the matrix indicate the current balance of loans within the corresponding LTV bucket and with the corresponding category for that characteristic.

Exhibit 46 provides an example of a matrix for the property type characteristic.

Exhibit 46

Illustrative example: Matrix for property type characteristic

Category / LTV Bucket	0% – 40%	40% - 50%	50% - 60%	60% - 70%	...	...
House	...	...	200	200	...	...
Flat > 4 units	...	...	800	100	...	...
...	...	...	...	...	...	...

Source: Moody's Investors Service

The LTV buckets are the starting point for the relevant calculations. The approach maps the categories for each loan, property and borrower-related characteristic from the stratification tables to those in this methodology, reflecting the same LTV distribution and characteristics from the stratification tables. Based on this information, the approach then parts the current loan balances into equally sized loans. By so doing, we apply a conservative approach to ensure a clustering of high-penalty categories.

Exhibit 47 shows an illustrative example of the clustering approach.

Exhibit 47

Illustrative example of clustering approach

Stratification Tables

STRATIFIED DATA

	0-40%	40-50%	50-60%	60-70%	LTV Bucket
Loan Amount	...	...	1,000	300	...
Number of Borrowers	...	...	5	3	...
...	...	...	...	...	...

PROPERTY TYPE

Category	0-40%	40-50%	50-60%	60-70%	LTV Bucket
House	...	...	200	200	...
Flat > 4 Units	...	...	800	100	...
...	...	...	...	...	...

OCCUPANCY TYPE

Category	0-40%	40-50%	50-60%	60-70%	LTV Bucket
Owner-occupied	...	...	600	100	...
Non owner-occupied	...	...	400	200	...
...	...	...	...	...	...

LOAN-LEVEL DATA

Loan ID	Balance	LTV	Property Type	Occupancy Type
1	200	55%	House	Owner-occupied
2	200	55%	Flat > 4 Units	Owner-occupied
3	200	55%	Flat > 4 Units	Owner-occupied
4	200	55%	Flat > 4 Units	Non owner-occupied
5	200	55%	Flat > 4 Units	Non owner-occupied
6	100	65%	House	Owner-occupied
7	100	65%	House	Non owner-occupied
8	100	65%	Flat > 4 Units	Non owner-occupied
...	...	...	...	...

Source: Moody's Investors Service

LTV ratio

In certain EMEA covered bond programs, issuers may provide LTV ratios based on the latest full property valuation when the original property valuation is unavailable. Moreover, issuers may provide LTV ratios based on updated rather than original property valuations. In these rare instances, we normally apply a haircut adjustment to the property value of either 0%, 5% or 10% on a case-by-case basis.

Minimum Portfolio MILAN Stressed Loss

We typically apply a Minimum Portfolio MILAN Stressed Loss of 4% to mortgage covered bonds. However, for countries with limited through-the-cycle market data, lack of data transparency, or volatile historical performance data, we normally apply a more conservative Minimum Portfolio MILAN Stressed Loss of 10%. These floors will reflect risks such as uninsurable natural risk; potential weakness in the legal and regulatory system; borrowers' credit behavior; and limited performance data covering periods of severe economic stress or volatile historical performance data.

When cover pools consist of multiple sub-pools, we typically determine the average of the collateral scores of each sub-pool weighted by the respective pool balance (blended collateral score) and apply the Minimum Portfolio MILAN Stressed Loss to the blended collateral score.

Loans to employees

When a residential cover pool includes loans to employees of the originator and structural mitigants are not available, we reflect the higher risk that stems from the potential collective layoff of the employees of the issuer or originator upon its insolvency. We derive a portfolio-level adjustment as indicated in Exhibit 34.

To account for the expected incremental loss due to employee loans, we typically sum the adjustment derived with the formula in Exhibit 34 to the MILAN Stressed Loss (excl. AI) determined in Step 10 (see Exhibit 35).

Appendix 5: Revising assumptions for EMEA RMBS

Overview

When monitoring EMEA RMBS transactions, we use transaction-specific performance data to revise our expected portfolio default or loss assumptions during the transaction's life. Transaction-specific data we consider generally includes:

» delinquency rates and trends

» observed periodic and cumulative default or loss rates[20]

» historical portfolio redemption rates, which can often be separated into scheduled redemption and prepayments

We use two approaches to revise expected portfolio default assumptions: a trend analysis and a roll rate analysis. We consider the results of both approaches when revising our assumptions.[21] The roll rate analysis, which uses a more static approach, provides a simpler assessment than the trend analysis. The trend analysis becomes more relevant for seasoned portfolios because it leverages on a transaction's performance data to project future defaults. However, the trend analysis could also produce more volatile results because it is more reactive to temporary changes in performance trends.

In the early months of a transaction's life, we typically maintain our initial expected default or loss assumption unless we observe signs of material deviation in performance. More weight may be given to the results of these approaches the more the transaction is seasoned. When significant transaction-specific performance information is available, the payment patterns exhibited by the portfolio can be better performance predictors than loan-level or portfolio characteristics, when forecasting future defaults considering our country-specific RMBS collateral performance forecast.

We also incorporate benchmarking analysis and other qualitative considerations when reassessing our expected default or loss estimates. For example, we may complement our analysis by reviewing performance indicators, such as the evolution of the securitized portfolio delinquency trend or the distance between the observed defaults or losses and our expected default or loss assumption for the transaction's life. In case of significant deviation of observed defaults or losses to our assumed level, we would adjust our expected loss or default assumption considering the two broad approaches described below and may adjust further to acknowledge the observed deviation.

Trend analysis

Our trend analysis considers two elements: a short-term projection and a long-term projection. The two elements are then added together. We may then convert the projected default rate to a projected loss using a transaction and country-specific severity assumption.

Short-term projection

We apply roll rates (probability of default) to the nonperforming parts of the portfolio, with higher rates applied to loans in later stages of delinquency. Unlike the roll rate analysis below, the short-term projection for the trend analysis considers only the nonperforming part of the portfolio to which it may apply more refined roll rates.

Long-term projection

We forecast future default frequency rates from recent default trends and extrapolate the future amortization of the portfolio from recent redemption data. Default frequency rates and portfolio redemption rates typically slowly increase through at least part of the transaction's life. Therefore, we apply growth rates to project the future expected default frequency rates and the expected amortization of the portfolio. In addition, as increasing arrears often translate (with some lag) into increasing default frequency rates, we also consider a delinquency trend coefficient to reflect any possible predictive trend in arrears.

[20] Sometimes loss rates are reported instead of default rates. The entire approach to revise the expected default assumption described in this report also applies to revise the expected loss assumption, although the exact modeling approach is not identical.

[21] For example, we may consider a simple average of the two results or the roll rate analysis if the trend analysis results in very low projected default rate.

Collateral performance forecast adjustment

To account for our country-specific RMBS collateral performance forecasts, we may adjust our roll rate analysis and trend analysis. Adjustments may be applied to roll rates, severity assumption, as well as to the growth rates applied to future default frequency rates and portfolio redemption rates. We may also adjust qualitatively our Portfolio EL assumption to account for collateral performance forecasts.

Roll rate analysis

The roll rate analysis is a simpler static approach which applies default probabilities for the life of a transaction to the performing pool, early, mid- and late-stage arrears. We calculate the default probability on the delinquent loans by applying roll rates to the loans based on their delinquency status: the more severe the loan's delinquency status, the higher the default probability. We also apply a lifetime default rate to the performing part of the portfolio based on the quality of the pool. A pool of lower-credit-quality loans will have a higher lifetime default rate applied to the performing loans.

We estimate our standard asset class and country-specific roll rates and default rates based on observed historical data for the sectors. If a transaction is sufficiently seasoned, we may estimate transaction-specific roll rates from the past default and delinquency performance of the transaction, replacing our standard estimates. As described above under the trend analysis, we may also adjust the roll rate and severity assumptions to account for our country-specific RMBS collateral performance forecasts.

Exhibit 48

Illustrative example of roll rate analysis

Portfolio Buckets	Proportion of the portfolio	Example roll rates	Projected defaults
31-90 days	5%	50%	2.5%
90+ days	1%	100%	1.0%
Performing pool	94%	3.5%	3.3%
Total future defaults			**6.8%**

Source: Moody's Investors Service

When converting our expected default assumption to an expected loss we also apply a severity assumption derived from transaction- and country-specific data.

Appendix 6: Lender's mortgage insurance

This appendix describes how we evaluate lender's mortgage insurance (LMI) when rating RMBS.[22] LMI can provide a critical first layer of credit protection in RMBS transactions. If a borrower defaults and a loss occurs after the sale of the security property, the lender may file a claim under the LMI policy for the loss amount. The policy typically covers 100% of the principal, accrued interest and reasonable expenses incurred in the enforcement of the mortgage.

LMI policies do not generally constitute guarantees. They are normally subject to terms and conditions that include, among others, a lender's compliance with agreed underwriting policies and the relevant procedures and loan management process. While mortgage insurers must pay valid claims, they have the right to reduce or deny claims that breach the terms and conditions under the policy.

A summary of our approach follows.

Overview of LMI benefit

The LMI benefit is the measure by which the presence of LMI results in a transaction needing less credit enhancement from other sources in order to achieve a target rating.

The LMI benefit is primarily a function of (1) the insurer's claim-paying ability, which we express as its IFSR; and (2) a discount to account for loan losses that the insurers will not cover (the discount is the loss adjustment rate or LAR). To address the risk of loss adjustments, we typically use a LAR ranging from 10% to 25%. We determine a LAR on an RMBS program or transaction basis.

LMI benefit for Aaa (sf) senior-ranking securities

Exhibit 49 details the LMI benefit for senior-ranking securities with Aaa (sf) ratings. We calculate the benefit as a percentage of the MILAN Stressed Loss. We incorporate the benefit into our cash flow analysis to arrive at a credit enhancement commensurate with the target Aaa (sf) rating on the securities.

Exhibit 49

LMI benefit for Aaa (sf) senior-ranking securities

Mortgage Insurer IFSR Rating	Claim-Paying Ability Benefit	Overall Benefit after LAR of 10%-25%
Aa1	70%	63%-53%
Aa2	60%	54%-45%
Aa3	50%	45%-38%
A1	40%	36%-30%
A2	35%	32%-26%
A3	30%	27%-23%
Baa1	20%	18%-15%
Baa2	10%	9%-8%
Baa3	5%	5%-4%

Source: Moody's Investors Service

LMI benefit for non-Aaa(sf) senior-ranking securities

Exhibit 50 details the LMI benefit for senior-ranking securities whose rating is below Aaa (sf). We may reduce the LMI benefit below to account for LAR. LAR typically ranges from 10% to 25%.

[22] The approach applies only to private mortgage insurers. Our approach to a highly rated government-owned or government-supported mortgage insurance provider would be different, to account for a much lower correlation between the mortgage market and financial strength of a highly rated government.

Exhibit 50

Claim-paying ability benefit for non-Aaa (sf) senior-ranking securities

Mortgage Insurer's IFSR Rating	Securities Ratings								
	Aa1 (sf)	Aa2 (sf)	Aa3 (sf)	A1 (sf)	A2 (sf)	A3 (sf)	Baa1 (sf)	Baa2 (sf)	Baa3 (sf)
Aa1	100%	100%	100%	100%	100%	100%	100%	100%	100%
Aa2	80%	100%	100%	100%	100%	100%	100%	100%	100%
Aa3	70%	80%	100%	100%	100%	100%	100%	100%	100%
A1	60%	70%	80%	100%	100%	100%	100%	100%	100%
A2	45%	60%	70%	80%	100%	100%	100%	100%	100%
A3	40%	45%	60%	70%	80%	100%	100%	100%	100%
Baa1	30%	35%	40%	55%	65%	75%	100%	100%	100%
Baa2	15%	20%	25%	35%	45%	55%	75%	100%	100%
Baa3	10%	15%	20%	30%	40%	50%	65%	80%	100%
Ba1	5%	10%	15%	25%	40%	45%	60%	70%	75%
Ba2	-	5%	10%	20%	25%	40%	45%	60%	65%
Ba3	-	-	5%	15%	20%	20%	35%	40%	55%
B1	-	-	-	10%	15%	15%	20%	30%	35%
B2	-	-	-	-	10%	10%	15%	15%	25%

Source: Moody's Investors Service

Impact of LMI on junior-ranking securities

The rating on the junior securities will correspond to the IFSR of the lowest-rated mortgage insurer in the transaction, if structural protections, other than non-retainable excess spread, are in place to cover loss adjustments.

Junior securities lacking structural protections are exposed to losses not covered by the LMI. We measure the probability of incurring a loss on these junior ranking securities by considering, among other factors, (1) the credit quality and performance to date of the underlying mortgage pool; and (2) the LAR in our cash flow analysis.

Claim-paying ability benefit

The claim-paying ability benefit is based on the mortgage insurer's IFSR. The level of benefit depends on the securities' target rating relative to the mortgage insurer's IFSR. The benefit takes into account:

1. Correlation: The correlation between mortgage insurers and RMBS portfolios is usually very high because both are exposed to the local mortgage market. In addition, insuring RMBS portfolios usually constitutes a material proportion of the mortgage insurers' business. The claim-paying resources and financial strength of the mortgage insurers will be challenged in an event of material losses arising in RMBS portfolios and in the non-securitized segment of the mortgage market covered by mortgage insurance.
2. Timing of loss uncertainty: A mortgage insurer's claim-paying resources are available to cover losses on its entire portfolio and can be used on a "first-in, first-served" basis. As such, there is uncertainty about the timing of losses on the mortgage insurer's overall portfolio relative to a specific portfolio of mortgage loans, whether they are securitized or not. This could mean that in a stressed scenario, a mortgage insurer's claim-paying resources could be substantially depleted prior to losses materializing in a specific securitized pool.

Loss adjustment rates

We may reduce the LMI benefit to account for LAR if we expect that there is a risk of the mortgage insurer rescinding claims. Our LAR assumption typically ranges from 10% to 25%. We determine a LAR on an RMBS program or transaction basis.

We incorporate loss adjustments into our analysis because the benefit of LMI in RMBS can be substantially diluted if there is a material level of loss adjustments.

Loss adjustments encompass any LMI claim adjustments, such as claim reductions, or denials or rescissions of non-claimable amounts.

Loss adjustments also cover any loss amounts that are not submitted to a mortgage insurer. In some cases, lenders voluntarily do not submit loss amounts, partial or full, if they know that the amounts would not constitute a valid claim. However, it is still important to consider such a loss amount because it represents an economic loss to the RMBS.

Historical LAR range for RMBS can vary

For each RMBS transaction, we calculate the observed LAR as the amount of all claim adjustments, plus loss amounts not submitted as claims, divided by the total loss amount after the sale of security property (i.e., losses incurred prior to submitting LMI claims).

Increases in claims lead to higher claim scrutiny and adjustments. Increases in the frequency and magnitude of LMI claims will lead to greater scrutiny by mortgage insurers of the claim process, leading to a higher risk of claim adjustment.

Reasons for loss adjustments vary. Loss adjustments generally occur when the lender fails to comply with the terms and conditions of the LMI policy, or the type of loss incurred is not covered by the policy.

Determining LAR

In determining the LAR for each lender/servicer, we consider, among other factors, the following:

Contractual arrangement for the insurance agreement

We consider the contractual arrangements and whether the insurance agreement allows for rescission, and under what criteria. In some countries, the determination of compliance is made ex ante, and as such limits the ability for the insurer to rescind a claim made against it. Furthermore, the specific contractual arrangement may not insure all losses incurred.

Originator underwriting arrangements with mortgage insurers

Underwriting arrangements generally fall into three categories:

Category 1: Full underwriting by mortgage insurers. This type of underwriting substantially reduces the risk of claim adjustment caused by irregularities in loan underwriting or misrepresentations. Mortgage insurers typically review all information necessary to underwrite the loan, including income verifications, valuations, evidence of serviceability calculations, and credit bureau checks. In some jurisdictions, the insurer may only review a sample of the loans in the pool, however, the subsequent contractual arrangements exclude rescission for non-compliance for all loans in the insured pool. We will typically assign a lower LAR under this category, provided other criteria are satisfactory.

Category 2: Delegated underwriting authority (DUA). Lenders themselves underwrite mortgage loan insurance policies under DUAs issued by the mortgage insurers. The mortgage loans must be underwritten in line with the criteria agreed to with the mortgage insurers. The risk of claim adjustments under such an arrangement is typically higher than in Category 1, because it leaves the mortgage insurers with grounds to adjust the claims based on deficiencies in underwriting practices.

Category 3: Pool insurance. Pool insurance is normally taken out at the time of securitization. The risk of claim adjustment under such arrangements is higher than with the other two types, because the mortgage insurers rely heavily on lenders' underwriting processes and because any deficiency may lead to claim denials.

Under Categories 2 and 3, the mortgage insurers typically audit a sample of loans to ensure that they were underwritten in line with agreed criteria. While the audits help the mortgage insurers mitigate the risk of deficiency in the lenders' underwriting processes, the risk remains because the mortgage insurers perform the audits themselves and are not independent parties. The timing and scope of the audits are also set by the mortgage insurers at their own discretion.

Lenders' underwriting controls

Tight underwriting standards are crucial to minimize the risk of loss adjustments. We will assign a higher LAR if a lender falls short of the underwriting criteria, which include:

» A clear separation between loan origination/sales and loan approvals

- Verification of critical information, such as employment and income, is not delegated to brokers or staff involved in the loan origination/sales process
- Settlement review process is in place to ensure all relevant loan assessment information is obtained
- Lenders perform comprehensive hindsight reviews to ensure loans are underwritten in line with their underwriting policies

Historical LAR experience

LARs vary by lender and provide an important insight into an individual lender's underwriting controls and its ability to efficiently manage the foreclosure process. We will generally consider historical loss rates as a floor for our assumptions on stressed loss adjustment rates for each lender/servicer. If a lender's historical claim adjustments are mainly caused by foreclosure expenses above the limits specified in the LMI policy, we will consider a LAR of 10% or 15% as appropriate, assuming other criteria are satisfactory.

Historical LARs due to excessive foreclosure expenses are typically below 5% when calculated as total loss adjustments divided by the total amount of loss experienced after the sale of the security property (i.e., amount of loss prior to submitting any claim to mortgage insurers).

If historical experience shows loss adjustments because of misrepresentation by a lender or deficiencies in the underwriting process, we will apply a LAR of at least 20%. Additionally, we assume a higher claim adjustment rate if a lender fails to provide us with reliable historical data on LARs but there are historical losses on its RMBS portfolio, or if it is a new issuer.

Scale of servicing operations and servicer's financial strength

We apply a higher LAR if a lender's servicing capacity is limited by its scale and financial strength. Efficient servicing of mortgage loans through the foreclosure process is critical to minimizing claim adjustments, particularly during economic stress.

Alignment of interest

We apply a higher LAR if the lender's interest is inadequately positioned to mitigate risks during the origination and servicing process.

Most bank lenders originate loans on their balance sheets, and only securitize a small proportion of the loans. Since most of the risk remains on their balance sheets, the incentives of these lenders are generally well aligned with the need to maintain robust origination and servicing practices.

In cases where the origination model is predominantly for the purposes of securitization, we may apply higher LARs. However, we will consider low historical LARs as a positive factor.

Based on the factors outlined, LARs are typically 15% or 20% for most lenders. Refer to Exhibit 51 below for a summary of the above factors.

Representations and warranties

Additionally, we may reduce assumed LARs for some transactions in the context of junior securities, depending on the representation and warranties provided by the lender regarding compliance of the mortgages with the terms and conditions of the LMI policies. We will consider giving any benefit to such representations and warranties if:

- they are tightly construed.
- adequate and timely indemnities are in place in case of any loss to the transaction caused by a breach of representation and warranties.
- the lender is rated investment grade.

Exhibit 51

Loss adjustment rate guidance

LAR	Guidance
10%	» Loans are underwritten by mortgage insurers themselves. » In case of pool insurance, the lender obtains an external audit covering whether underwriting is in line with underwriters' policies and procedures. » Negligible historical loss adjustment rates are mainly caused by foreclosure expenses exceeding a mortgage insurer's allowable limit. » Lender has strong internal and external underwriting controls. » Servicer has adequate operational capacity.
15%	» Lender has DUA subject to regular audits (in the context of rewriting loans) by mortgage insurers. » Median historical loss adjustment rates are below 5% and are mainly caused by foreclosure expenses exceeding a mortgage insurer's allowable limit. » Lender has adequate internal and external underwriting controls. » Servicer has adequate operational capacity.
20%	» Lender has DUA, which is subject to regular audits (in the context of rewriting loans) by mortgage insurers. » Median historical loss adjustment rates are 5% to 10%, and some are caused by deficiencies in the underwriting process or misrepresentations. » Lender has adequate internal and external underwriting controls. » Servicer has adequate operational capacity.
25%	» Lender has DUA, which is subject to regular audits (in the context of rewriting a loan) by mortgage insurers. » Median historical loss adjustment rates are above 10%, or are mainly caused by deficiencies in the underwriting process or misrepresentations. » Verification of critical information, such as employment and income, is delegated to brokers/staff involved in the loan origination/sales process. » Financially weak servicer. » Lender's interest is inadequately positioned to mitigate risk during the origination and servicing process, and this is reflected in high claim adjustment rates.
> 25%	» There are systematic issues with the underwriting/high level of claim reductions emerging.

Source: Moody's Investors Service

Appendix 7: Settings for countries using the MILAN framework

Please click here to access a list of countries where we use the MILAN framework as described in this methodology. The list includes links to each country's methodology supplement in which we describe the parameters and inputs we use in the MILAN and ABSROM models when analyzing residential mortgage loan portfolios originated in those countries that are part of a securitization or a covered bond program.

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.

Comprehensive descriptions of (1) our approach to estimating house price stress rates, and (2) the scoring approach we use to associate countries with a default probability curve can be found in the following data reports: *Residential Mortgage-Backed Securitizations: House Price Stress Rate Approach* and *Residential Mortgage-Backed Securitizations: Default Probability Scoring Approach*.

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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