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RATING METHODOLOGY

Moody's Global Approach to Rating SME Balance Sheet Securitizations

Table of Contents:

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This rating methodology replaces *Moody's Global Approach to Rating SME Balance Sheet Securitizations* published in May 2020. We edited the "Expected Loss Approach and Use of Model Output" section to provide more information on our modelling approach, and we added a section that mentions our approach to evaluating the risk from environmental, social and governance considerations. We also made limited editorial updates. These updates do not change our methodological approach.

1. Executive Summary

1.1. Scope

This methodology describes our approach to rating securitization transactions backed predominantly by loans granted to microenterprises, small- and medium-sized enterprises (SMEs), self-employed individuals and, to a certain extent, larger corporates in the course of the originator's usual business activities. Typically, the originator is a bank or a specialized finance company or even an alternative lender.

SME Balance Sheet transactions typically securitize loan portfolios[1] and are usually driven by funding needs and/or balance sheet considerations of the originator (e.g., managing regulatory capital, risk management). In other words, the loans have not been originated to be securitized.[2] As such, we refer to these SME transactions as SME balance-sheet securitizations in this methodology report.

[1] The granularity of the securitized portfolios can vary. For portfolios with a lower effective number, we will look for additional borrower and loan level information to assess the risks.

[2] In Japan, some SME-loan securitizations are backed by loans that were originated for the purpose of being securitized under programs sponsored by local governments or other public entities. The methodology described in this report will apply to these transactions, but additional stress scenarios may need to be considered, in particular to address potential issues of alignment of interest or adverse selection.

This methodology applies to transactions backed primarily by medium- to long-term secured and/or short- to medium-term loans to SMEs for working capital or investment purposes. It does not apply to securitizations of receivable portfolios that result predominantly from loans to multi-national corporates, loans to public or non-profit organizations, loans to start-up companies with the exception of venture debt,[3] equipment lease contracts, operating leasing receivables, leveraged loans, subordinated loans, preferred stock and/or loans without recourse to an operating company (e.g., real estate project finance and special purpose vehicles (SPVs)),[4] which require a different analytical approach given the specifics of these borrowers/assets.

1.2. Main Risks of a Typical SME Transaction

This report discusses the main risk drivers of a typical SME transaction, including portfolio credit quality, transaction structure, counterparty risk/operational risk, legal risk and sovereign risk.

Portfolio Credit Quality: An accurate assessment of the collateral credit quality is the first key element to projecting the potential losses on the rated notes. The overall credit quality of a portfolio of SME loan receivables is typically driven by (1) the type of contracts securitized (e.g., loans versus short-term facilities, tenure, repayment profile, etc.), (2) the credit risk related to the obligors (taking into account possible group relationships), (3) the portfolio composition in terms of obligor, regional and industry concentrations, as well as (4) the type and amount of collateral (e.g., real estate properties) securing the loan receivables. Furthermore, the originator's specific underwriting and servicing policies, along with the current and forecast macroeconomic environment, may affect the credit profile of the pools.

Transaction Structure: Specific features such as cash flow allocations, forms of credit enhancement and cash-trapping mechanisms, have an impact on the expected loss (EL) for each tranche of securities. For transactions with a revolving or pre-funding period, the ability to replenish the portfolio with new loans will add some uncertainty to the portfolio composition. When modelling the transaction, we aim to capture the main structural features described in the transaction documentation.

Counterparty Risk/Operational Risk: Our assessment focuses on the risks posed by the main counterparties in a transaction such as servicer, cash manager, swap provider, and any associated structural mitigants, such as counterparty replacement triggers.

Legal Aspects: We analyze the extent of protection for the transaction against the effects of a bankruptcy of the sponsor of the transaction or of the issuer of the securities. Potential effects of a bankruptcy include delays in payments to investors, as well as investors becoming unsecured creditors in the estate of the bankrupt entity and, in some cases, losing some of the cash flows because of amounts set off against funds owed by the bankrupt entity to creditors of the entity.

Sovereign Risk: The country in which the transaction's assets, originator or issuer is located could introduce systemic economic, legal or political risks to the transaction that could affect its ability to pay investors as promised. We usually incorporate such risks into the analysis by applying the local currency ceilings (LCC) in accordance with our sovereign ceiling methodology.[5] In particular, when generating our assumed portfolio loss distribution, we typically define the portfolio credit enhancement as the credit enhancement consistent

3 For more information, see Appendix 12.

4 (1) Some US small balance commercial loan pools may include large investor properties loans where the borrower is typically an SPV, see Appendix 10 for more information. (2) In Japan, a certain portion of house builders who acquire small land and design/build small houses might be included in the portfolio. However, the reimbursement of the loans relies on the cash flow of obligors' business. We will analyze such loans on a case-by-case basis. (3) In Appendix 11, we describe our approach to rating Japanese apartment loan securitizations.

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

with the highest rating achievable in the country (i.e., the LCC). We may also consider modifying appropriate assumptions or defining minimum credit enhancement levels required to achieve a particular rating.[6]

1.3. Overview of the Analysis

Our rating analysis of SME-backed securitizations includes both quantitative and qualitative elements. The main drivers of our quantitative analysis are our projections of the future losses on the underlying assets, which depends on the asset default rate and the recovery rate on assets that default. Typically, we project the probabilities of various pool default rates over the life of the transaction, summarized in a "probability distribution" of asset default rates, with a separate analysis of recoveries.

The approach that we take to determine the probabilities of the asset default scenarios depends largely on the data available and on the granularity and diversification of the pool. For example, when the transaction has a well-diversified pool and we have sufficient historical performance data on similar pools, we typically use a statistical probability distribution (such as the lognormal) to project the pool's defaults. The probability distribution would reflect our projections of the pool's expected default rate and its variance, which are based on the historical data and are adjusted for differences in the characteristics of the pools.

Alternatively, when historical data is limited or when the securitized pool has significant asset concentrations, we usually determine a transaction-specific default distribution by using a Monte Carlo simulation approach. In this case, we typically use individual borrower/loan data (derived from various sources such as credit estimates, mappings of bank's internal ratings, our SME top-down approach or CMBS-type analysis) to determine the default distribution. In some cases, we may approximate the distribution resulting from the simulated loss behavior of the individual assets with a probability distribution such as a normal inverse (or large homogeneous portfolio approximation). We would choose to do so only in cases when the approximation gives results that are close to the distribution resulting from the simulation.

When both types of data are available, we may use both approaches to help validate our analysis.

Using a model of the transaction's structure, we calculate the cash flows that investors would receive in the different scenarios, and weight any shortfalls in investor cash flows (i.e., "investor losses") by the probability of occurrence (from the calculated probability distribution). That is, we base our rating on the "expected" (i.e., probability-weighted) loss to investors.

When determining final ratings, rating committees will consider, where appropriate, additional qualitative and quantitative factors that they deem relevant.

2. Portfolio Credit Quality

2.1. Defining the Pool Default Distribution

For the purpose of modelling SME[7] balance sheet transactions, we must make certain assumptions related to the portfolio and the timing of transaction cash flows. These asset-related assumptions, together with

6 For more information, see section 7 and Appendix 9.

7 In Europe, SMEs are typically defined based on the guidelines of the European Commission (2003/361/CE and its updates) (i.e., companies with less than 250 employees and a yearly turnover below EUR50 million or a total asset below EUR43 million). In Japan, some are defined by Japanese SME Basic Law (i.e., below 300 employees or below JPY300 million in capital for manufacturers). Small balance commercial loans in the US typically have principal balances of less than $1 million, and balances are rarely more than $5 million.

the transaction's liability structure, are then aggregated in a cash flow model to determine the expected loss on the notes.

2.1.1. Deriving a Distribution and Cumulative Default Assumption

The first step in modelling a transaction backed by a portfolio of SME loan receivables is to define the expected default distribution as described below.[8]

For granular pools that consist of a large number of well-diversified assets of similar size, we may assume that the default distribution is consistent with a statistical distribution law (e.g., the lognormal distribution). We would use pool-level historical data (when sufficient and relevant) and/or individual borrower/loan data to estimate the expected pool default rate. We may also choose to determine a transaction-specific default distribution on a diversified pool by using a Monte Carlo simulation approach through an additional analysis that transforms the diversified pool into a smaller pool with similar characteristics.

For non-granular pools, in particular those with significant asset concentrations,[9,10] we usually determine a transaction-specific default distribution by using a Monte Carlo simulation approach. In that case, we typically use individual borrower/loan data to derive the default distribution.

We may also approximate the Monte Carlo-based distribution with a probability distribution such as a normal inverse.[11]

8 For more information on certain sub-segments, see Appendices 11, 12 and 13.

9 See Appendix 1 for more information for e.g. borrower, regional or industry concentrations.

10 For example, SME balance sheet securitizations might be exposed significantly to the real estate market depending on (1) the portion of borrowers active in the real estate industry and (2) the portion of mortgage secured loans in the portfolio. For more information, see Appendix 8.

11 The normal inverse is also called the LHP distribution (or large homogeneous portfolio approximation). It was introduced by Oldrich Vasicek's Probability of Loss on Loan Portfolio, Whitepaper, Moody's Analytics 12 February 1987. See Box 1 for more information.

Box 1: Characteristics of a Normal Inverse Distribution and a Monte Carlo Simulated Default Distribution

Modelling defaults of a granular portfolio via a normal inverse distribution (also known as the Large Homogeneous Portfolio Approximation) is the extension of the factor model concept to an infinite portfolio of identical assets because the normal inverse distribution is the limit of the default probability distribution for a portfolio with an infinite number of assets, which are homogeneous in size and default probability and whose default behavior is driven by a single-factor model with the same pair-wise correlation. Hence, the consistency of the analysis across the full spectrum of portfolios is ensured: less granular portfolios are modelled based on the Gaussian copula concept with the use of Monte Carlo simulations like Moody's CDOROM™ (CDOROM), while granular pools can be modelled based on the Gaussian copula concept via a normal inverse distribution.

The normal inverse distribution is determined using two parameters: the mean and standard deviation.

On a cumulative basis, the normal inverse distribution is given by the following formula (Φ being the cumulative standard normal distribution describing the probability that the random variable D (representing actual defaults) is not greater than a cumulative default rate of q):

(1) $P(D \leq q) = \Phi[\frac{\sqrt{(1-\rho)} * \Phi^{-1}(q) - \Phi^{-1}(p)}{\sqrt{\rho}}$, where p is the mean and ρ is the asset correlation

Interestingly, an explicit relationship exists between ρ and the standard deviation of the distribution, which is given by the following formula:

(2) $\sigma(D) = \sqrt{N_2(\Phi^{-1}(p), \Phi^{-1}(p), \rho) - p^2}$, where N_2 is the standard bivariate normal cumulative distribution function

Formula (2) thus links the level of standard deviation with the level of asset correlation in a normal inverse distribution. As a result, when we benchmark portfolios, we might convert the level of standard deviation into asset correlation using formula (2). In this case, we refer to the resulting level of correlation as "implied asset correlation" since it represents the single level of asset correlation implied by a given level of standard deviation.

In order to determine the cumulative default rate for the default distribution of an SME loan portfolio, we start with an analysis of the historical performance data of the originator's loan book and/or previously securitized portfolios. As such, historical data is an integral part of our portfolio credit analysis.

However, available historical data can sometimes be limited, and securitized pools often include some concentrations (e.g., industry concentrations). As a result, we usually complement this analysis with our top-down approach, as described in this section, or with other methods, such as credit estimates or a third party's scoring system, to estimate the default probability of individual obligors.

For replenishable transactions we may use separate assumptions for the initial and the replenished portfolios, reflecting potential changes in the pool composition over time based on concentration limits applicable during the replenishment period.

2.1.2. Historical Data Analysis

A key element of our analysis is projecting the expected default/recovery and, finally, loss, which is the projected amount of cumulative net losses on the pool of SMEs loans over the life of the pool.[12] To project those losses, when available, we examine historical data from the originator and adjust this data for factors that can drive differing behavior in the future (see Box 2).

> **Box 2: Historical Data Is Important in Our Rating Approach**
>
> For each securitized pool, we typically receive historical performance data in the form of dynamic delinquency, default and prepayment ratios and/or static cumulative default, as well as recovery and/or net losses ratios by vintage of origination/vintage of default (usually on a quarterly basis).
>
> We consider the historical data (inter alia, but not limited to, default and recovery information) provided by the originator as well as the performance of previously closed transactions of the respective originator/servicer, in order to:
>
> 1) estimate the expected probability of default or losses of well-diversified pools, when sufficient relevant data is made available
> 2) assess the originator/servicer quality and differentiate between originators and/or servicers (this assessment finally affects our adjustments in Step (2.1) of the top-down approach to derive our expected default rate assumption and our servicer quality adjustment when determining our recovery rate assumption)
> 3) benchmark with our standard assumption on default timing (i.e., constant over the portfolio WAL) and timing of recoveries (jurisdiction specific)
> 4) compare to the originator's internal default probability estimates over the long term and to our rating factors (over one year) obtained with the top-down approach.

However, to be representative, the historical vintage data should 1) cover a full economic cycle and, ideally, the longest maturity horizon of the securitized product, 2) reflect the underwriting/servicing criteria applied by the originator/servicer for the securitized portfolio and 3) be granular. Moreover, recovery rate data should cover a full economic / real estate cycle and consider both open positions (i.e., work-out process still ongoing) and closed positions (i.e., workout process finalized).[13]

2.1.2.1. Type of Data

The data that originators provide cover typically 1) the originator's entire SME banking sub-portfolio (applying the same selection criteria as used for the securitized portfolio) and 2) a particular set of loans originated during a common period (i.e., vintage or static pool data).

2.1.2.2. Extrapolation

In practice, it is often the case that only some, if any, of an originator's prior static pools may have gone through their entire life cycle. However, even for incomplete pools, data will still contain useful information on likely lifetime defaults based on defaults to date. To use such data in our collateral analysis, we extrapolate defaults to date on the incomplete pool for the remainder of the pool's life. For the missing periods, the extrapolation typically relies on average changes in the cumulative default rate, either on an

[12] In some cases, data on defaults and recoveries are not available separately, but are combined in a single asset loss measure. In those cases, we focus our analysis on projecting the probabilities of future scenarios of that asset loss measure.

[13] For more information on specific limitations of recovery rate data, see Box 4.

absolute or percentage basis, in similar pools during those periods (see Appendix 4). When only static data on cumulative net losses rate is available, we may extrapolate the net loss rate instead of the cumulative gross default rate.

2.1.2.3. Adjustment for Seasoning

For a new securitization of a pool of "seasoned" loans, we typically incorporate another adjustment to historical static pool performance data.[14] We do this because vintage static pool performance is generally presented from the origination of the vintage, while our default projection is concerned with the expected performance only during the remaining life of the securitized pool. Therefore, we make an adjustment to exclude from our projection of lifetime cumulative defaults those defaults that would have occurred while the loans became "seasoned" prior to the securitization closing (i.e., during the period from origination of the loan until the start of the securitization).[15]

2.1.2.4. Adjustment to Reflect Securitized Pool Characteristics

The credit characteristics of the loans are important determinants of the loans' performance. Therefore, we adjust our historical vintages analysis for any material difference between the credit characteristics of the static pools and those of the pool being securitized. To make those adjustments, we compare the overall characteristics (typically in the form of the average value of the characteristic for the pool, or distributional statistics) of the historical vintages to those of the securitized pool.[16]

In cases where we find significant differences between the historical pools and the pool being securitized, we may eliminate the dissimilar pools from consideration completely. In other cases, we may make qualitative or quantitative adjustments. In particular, when stratified data (i.e., static pool data split by credit characteristics of the pool) is provided, we would project the defaults of the securitized pool based on the performance of the disaggregated buckets, weighted by the bucket-mix of the securitized.[17]

2.1.3. Estimating Single Borrower Default Probability

When historical data is limited or not relevant to our analysis, or when the securitized pool has some asset concentrations, we look at obtaining data on individual assets in the pool. We can use our published ratings when trying to estimate the default probability of the underlying borrowers. However, most of the borrowers in the SME securitized pools are usually unrated. In that case, we can analyze the originating bank's internal estimates for the one-year default probability,[18] or use our credit estimates and/or our Moody's Analytics RiskCalc™ (RiskCalc) expected default frequencies or other third-party-developed scoring systems.[19]

For large single-borrower concentrations (i.e., a single borrower accounts for more than 3% of the total portfolio), we would typically use either our public rating (if the entity is rated) or a credit estimate[20] to assess the borrower's probability of default. If insufficient individual borrower data is available on a small

[14] We typically consider a pool to be "seasoned" if the weighted average age of the pool since origination is at least twelve months.

[15] In some cases, the impact of seasoning can be removed by analyzing only the performance of prior securitizations that have similar pool characteristics and similar seasoning to those of the securitized pool being analyzed. However, for small balance commercial real estate loan transactions, we typically do not receive sufficient data for that type of analysis.

[16] To assist in our understanding of the characteristics of the securitized pool and of the quality of underwriting, we may review detailed loan-by-loan information in the form of a loan 'tape' and loan-level underwriting files for a selection of loans (typically 10 to 20 loans).

[17] We refer to the re-weighting of disaggregated performance data based on the bucket-mix of the securitized pool as a "mix-neutral analysis," as the re-weighting neutralizes the impact of differences in the mix of the variables.

[18] For more information, see Appendix 6.

[19] In Asia Pacific, when a considerable amount of historical performance data is provided and the transaction portfolio is viewed as homogeneous, we may estimate the portfolio probability of default from this data and use the same rating equivalent for all borrowers in our cash flow model (see Appendix 2).

[20] For more information, see our approach to the usage of credit estimates in rated transactions. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

portion of the pool, we may assume a conservative adjustment to the default probability (e.g., adjust the probability to be consistent with the low B to Caa-rating category) for such borrowers.

Moreover, and especially if the effective number[21] at borrower and/or borrower group level is small, we investigate whether an adverse selection has taken place when the securitized portfolio was selected. In particular, we compare the securitized portfolio with the overall SME loan book of the bank with regard to the distribution of, for instance, internal ratings, industries, borrower size or weighted average life (WAL).

For large investor properties loans where the borrower is typically an SPV, the loan probability of default will usually be property driven rather than borrower driven. In that case, the approach is close to the one used in our CMBS analysis.[22]

2.1.4. Top-Down Approach

In many SME-backed transactions, the underlying pool consists of well-diversified assets for which we have data on some key characteristics of the individual assets but we do not have individual credit assessments on each asset.[23] In those situations, and when sufficient market data is available, we typically use a top-down approach to estimate the individual asset probability of default (see Exhibit 1).

EXHIBIT 1

SME Top-Down Approach at a Glance – An EMEA Example

Roadmap for PD assumption in rating SME balance sheet securitizations	Potential impact of each step on single loan level	Average impact on standard EMEA portfolio
Step (1): Define Country-Specific Base Assumption for Standard SME	**Ba2-Ba3 in EMEA**	
Step (2): Portfolio Quality Adjustment	**[-4 / +4] notches**	**[-2 / +1] notches**
Step (2.1): Underwriting /origination quality adjustment		
Step (2.2): Portfolio borrower composition adjustment		
Step (2.3): Loan-specific adjustments		
Step (2.4): Past performance / seasoning adjustments		
Step (3): Outlook Adjustment	**[-3 / +2] notches**	**[-2 / +1] notches**
Step (3.1): Macro-cycle adjustment		
Step (3.2): Sector-specific cycle adjustment		

Source: Moody's Investors Service

The top-down approach is applied on a loan-by-loan basis.[24] Below is a summary of each step taking EMEA as an example:[25]

Step (1): As a starting point, we assume a country-specific through-the-cycle rating assumption for standard SMEs within that specific country.

[21] To effectively discriminate non-granular, granular and intermediate portfolios, we will calculate the Effective Number of Obligors (in line with the Basel II terminology), using the inverse of the Herfindahl index. The Herfindahl index is described by the formula $H=\sum_{i=1}^{n} s_i^2$, where s_i is the relative exposure of obligor "i" in the portfolio and "n" is the number of obligors. A small index indicates granularity with no relevant concentration. When obligors all have the same exposure, the reciprocal of the index indicates the "effective" number of obligors in the portfolio. For the definition of the effective number, see Appendix 1.

[22] For some US small balance commercial loans, see Appendix 10 for more information.

[23] In particular, most of the underlying obligors are usually unrated.

[24] We do not apply the top-down approach to borrowers that are public entities or non-profit organizations, loans without recourse to an operating company (e.g., project finance loans, including real estate projects), subordinated debt claims and loans that were not originated by the securitizing bank.

[25] For more information in EMEA, see Appendix 5.

Step (2): The base probability of default (PD) assumption as derived under Step (1) may be adjusted within a range of -4 and +4 notches[26] on a single-loan basis by taking into account the characteristics of the securitized loan. On average, Step (2) typically results in an overall adjustment to the pool within a range of -2 and +1 notches.[27]

» **Step (2.1)** adjusts for the quality of the underwriting/servicing carried out by the originator/ servicer of the portfolio. Amongst others, to assess the credit culture and risk appetite of the originator historical data (as available from a representative portfolio of the bank and/or the bank's existing transactions) are benchmarked against the performance data obtained for other originators.

» **Step (2.2)** adjusts for certain characteristics of the borrowers, such as borrower size and industry.

» **Step (2.3)** considers the type of securitized product[28] and other specific loan-level information (e.g., bullet and balloon loans, payment frequencies and loans with a grace period).

» **Step (2.4)** considers the past behavior of the borrowers. Specifically, we judge positively the seasoning of the loans (especially if they are originated more than five years ago and are still performing). However, we consider delinquent borrowers, either with the originator and/or the entire banking system, or renegotiated loans to be riskier.

Step (3): At country level, under Step (3.1), we further extend our quantitative analysis by taking into account the macroeconomic situation for the portfolio's jurisdiction at the transaction's inception (i.e., the current position in the business cycle) as well as our overall forecasts for the main macroeconomic indicators in such jurisdiction over the expected average life of the securitized portfolio. In particular, we may look at data such as GDP history and our GDP forecast over the next few years for a given country due to the pro-cyclicality of the corporate (and SMEs) default rates.

Finally, under Step (3.2) we make sector-specific cycle adjustments to the base PD assumption by including, amongst others, our industry outlooks or past observed cyclicality of sector-specific delinquency and default rates. These overall adjustments might change the previously adjusted assumption again within a range of -3 to +2 notches at the loan-by-loan level. Step (3) typically results in an overall adjustment to the pool within a range of -2 and +1 notches.

Having applied the top-down approach on a loan-by-loan level, a loan specific cumulative PD can be determined based on the determined loan-specific rating and the loan's WAL, using our Idealized Default Rates.[29] Ultimately, our weighted-average cumulative default rate assumption for the securitized portfolio is the exposure weighted average of the loan-specific cumulative default rates.[30]

26 The notching adjustments are indicative and represent aggregated adjustments (i.e., assuming that for a single loan the following adjustments are made for example: -1/+1 notches for originator adjustment, -2/+1 notches for industry sector adjustment, -1/+1 notches for borrower size, +1 notches for short-term credit facilities). In specific circumstances, we can decide to increase such adjustments.

27 A one-notch adjustment would typically represent an increase or decrease in PD of around 30% to 40% for a weighted average life of five years.

28 For more information, see Appendix 5.

29 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.

30 For more information on the three steps to determine our default rate assumption in EMEA, see Appendix 5.

2.1.5. Standard Deviation, Coefficient of Variation (CoV) and Correlation

For transactions modelled with a Monte Carlo simulation approach[31] (based on the actual or compressed pool), the pool default distribution will depend on the default assumptions of the underlying SME obligors as well as the correlation framework that is used for such SME portfolios. The coefficient of variation (CoV) and standard deviation of the resulting pool default distribution can then be calculated. A higher CoV implies a "fatter tail" of the distribution (i.e., a higher likelihood of extreme default scenarios materializing).

Additionally, especially for granular and diversified portfolios, a benchmarking approach is conducted taking into account (1) the implied asset correlation, (2) the standard deviation from historical vintage data (if available), and (3) the "portfolio credit enhancement"[32] applicable to this portfolio (see Box 3).

Box 3: Inferring the Standard Deviation from Expected Loss and Credit Enhancement Levels

In situations where there is a sufficiently large set of comparable rated transactions in the country (or in comparable countries), we may infer an estimation of the variability of pool losses from (1) our expected loss estimate and (2) the level of credit enhancement that the rating committee would deem to be consistent with a Aaa (sf) rating for a security (or the highest achievable rating for a security in the country, i.e. the local currency ceiling or LCC, if such LCC is below Aaa) with a simple cash flow structure[33] backed by the given pool (i.e., the "portfolio credit enhancement"). The estimation is done by "solving" for the standard deviation of the probability distribution that produces a bond expected loss that is commensurate with a Aaa rating (or the highest achievable rating in the country if the LCC is below Aaa) when the credit support for the bond is set equal to the portfolio credit enhancement.

We derive the portfolio credit enhancement from (1) credit enhancement levels of the existing comparable transactions, and (2) judgmental adjustments to account for differences between the given pool and the comparable transactions in the factors affecting variability. Such factors could include expected default levels, the quality, quantity and relevance of the historical data, as well as originator and servicer experience or pool characteristics. For a given loss estimate, the higher the portfolio credit enhancement, the higher the implicit variability of the loss distribution.

If the default rate is derived by our top-down approach, a loan/borrower specific rating factor equivalent is used in the Monte Carlo simulation, whereas when the default rate of the portfolio is derived using historical data, the same rating factor equivalent for all borrowers is used in the Monte Carlo simulation.

Our correlation framework for a SME portfolio (typically concentrated in one country and originated by a single lender) is characterized by:

» an inter-industry asset correlation assumption[34] of a three-point distribution with the following values:
  – for investment-grade credits, inter-industry correlations are {5%, 10%, 20%} with probabilities equal to {70%, 20%, 10%}, respectively
  – for Ba-rated credits, inter-industry correlation are {3%, 9%, 12%} with probabilities equal to {70%, 20%, 10%}, respectively

31 We typically use a Monte Carlo simulation model, such as CDOROM.

32 The "portfolio credit enhancement" is an optimized credit enhancement that allows, from a pure quantitative perspective, the most senior note in a simple cash flow structure to achieve a Aaa rating (or the highest achievable rating in a country, when the country's local currency ceiling is below Aaa), considering (1) the pool's loss distribution (taking into account defaults and expected recoveries), and (2) the expected average life of the senior note. See section 7 and Appendix 9 for information on the incorporation of country risk in the calibration of the loss distribution.

33 For example, a simple senior/subordinate capital structure with a sequential waterfall, before any adjustment for any transaction-specific structural features.

34 In Japan, we may use higher inter-industry asset correlations, considering the regional concentration in certain transactions with regional bank originators.

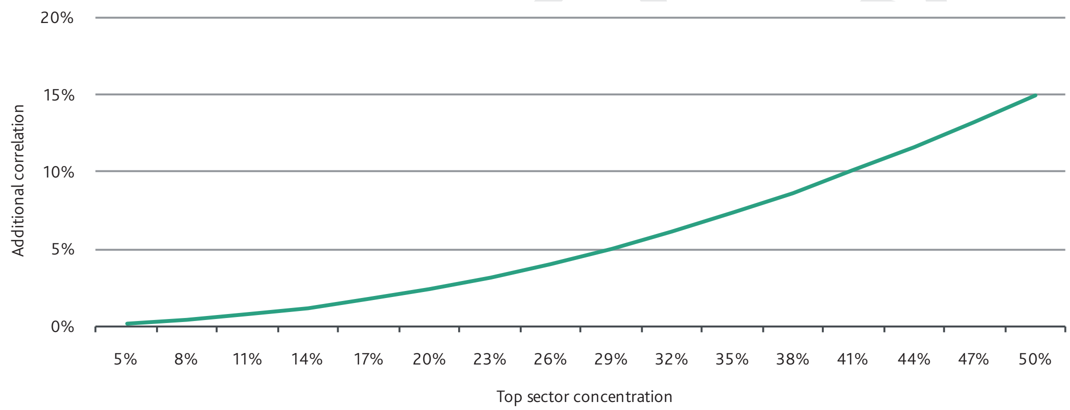
   – for B-rated credits and below, inter-industry correlation are {3%, 7%, 10%} with probabilities equal to {70%, 20%, 10%}, respectively[35]

» an intra-industry asset correlation of 12% is added on top to the inter-industry correlation if such borrowers are active in the same sector

» the pairwise correlation is stressed further depending on (1) the overall portion of borrowers active in a given industry sector and (2) the cyclicality of such sector.[36] As a result, a maximum additional asset correlation of 15% is usually applied to SME portfolios where one sector represents almost 50% of the total portfolio and is very cyclical. For an SME portfolio with a single-industry concentration of above 50%, the correlation framework is decided on a case-by-case basis (see Exhibit 2).

EXHIBIT 2

Indicative Over-Concentration Stress for Portfolios Consisting of SME Loans



Source: Moody's Investors Service

2.2. Deriving the Recovery Rate Assumptions

2.2.1. Recovery Rate Assumption

Most SME term loans are secured by collateral (e.g., mortgages, pledges on financial instruments and pledges on equipment). We use collateral-specific and related loan-by-loan[37] information as well as historical recovery data[38] (as provided by the originator) to determine our recovery rate assumption. Specifically, we evaluate the collateralization ratio of the securitized portfolio, the type of security backing the loans, the originator's valuation guidelines and the eligibility criteria for new loans with regard to these aspects (ensuring that the same, and not a lower, standard applies). Additionally, we assess the servicer's general recovery procedures.

To determine our recovery rate assumption for a granular SME portfolio, we analyze in detail any real estate collateral securing (a certain portion of) the loan receivables included in the portfolio. Note that all real estate properties that may collateralize the SME loans are completed.[39] As such, the loan receivables

35 In line with the assumptions described in our methodology for rating corporate synthetic collateralized debt obligations. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

36 For example, we may apply increased correlation assumptions to the real estate sector in transactions backed by real estate collateralized SME loans, considering the historical cyclicality of such sector.

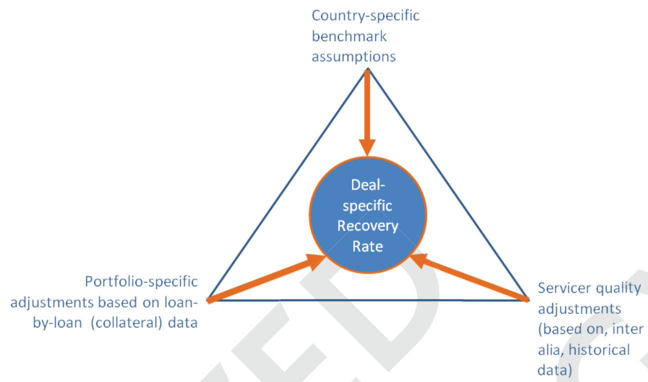
37 Banks that have developed internal models to estimate their own loss given default estimations under the Basel II Internal Rating Based (IRB) advanced approach on their SME portfolio will be encouraged to add this information to the data book, as it could provide a useful indication for the assessment of future recoveries.

38 Historical recovery rate data is ideally provided on a static cohort basis. Therefore, it is important that the recovery data matches the static default data provided.

39 All properties used as collateral have an "occupancy license" if the property is residential or a "start of activity" license if the property is commercial. This is also valid for loans to real estate developers (REDs), whose purpose is to develop a real estate project. REDs frequently use existing properties as collateral to obtain new loans.

included in SME transactions are typically not exposed to construction risk.[40] Loans secured by other types of collateral are usually treated similarly to unsecured loans, as described below (see Exhibit 3).

EXHIBIT 3
Factors Considered in Determining our Recovery Rate Assumptions



Source: Moody's Investors Service

We usually consider some of the following factors to determine our recovery rate assumptions:

» Country-specific factors that may influence the recovery rate and that are external to the borrowers, such as the bankruptcy regimes in each jurisdiction (which also impact the asset foreclosure costs) and the macroeconomic environment.

» Portfolio loan-by-loan analysis (when available) to better understand the collateral characteristics of the securitized portfolio, such as the economic lien,[41] the type of collateral, the region in which the property is located, the property value, the loss given default estimations, and the loan balance.[42] We typically assume a higher stress on the valuation of commercial real estate properties given their higher cyclicality compared to residential assets. We also treat second (or higher) lien mortgage loans, undeveloped urban land, and loans guaranteed by personal guarantee in a similar way to unsecured loans, for which we usually assume a limited recovery rate.[43] Our CLO recovery rate assumptions (which vary by type of loan) can also provide a helpful benchmark.[44] The portfolio's weighted-average stressed recovery rate is the weighted average of the stressed recovery rates of the single loans in the portfolio, weighted by the outstanding amount of each loan.

» Originator/servicer's past performance (i.e., historical data - see also Box 4) and overall quality assessment (e.g., considering inter-alia work-out procedures that are applied to non-performing loan receivables, property valuation standards, servicer's strategy through the real estate cycle, etc.).

[40] See Appendix 8 for information on the treatment of loans exposed to construction risk. Construction risk includes the risk of (1) a postponement of the termination date of the construction due to, for instance, technical or administrative issues (e.g., the discovery of geographic obstacles or denial of the occupancy license due to non-compliance with the regulations), or adverse weather conditions; and (2) jeopardizing the project's economic viability due to adverse market development for the construction costs.

[41] A first economic lien results either from being the first ranking mortgage in the mortgage register or from a second (or lower) ranking mortgage in the register, if all loans secured by such higher ranking mortgages have been repaid and, hence, property proceeds would be available to secure the mortgage with first economic lien.

[42] This loan-by-loan and collateral-specific analysis has some similarities with the stressed house prices framework that is applied in Moody's Individual Loan Analysis (MILAN) when rating RMBS transactions. For more information, see our methodology for rating residential mortgage-backed securities. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

[43] In Japan, we typically use a 0% recovery assumption because the defaulted receivables are used as payment in kind for dividends on the Subordinated Beneficial Interests.

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

Box 4: Limitations of Historical Recovery Rate Information

Similar to historical default information, we typically receive historical performance data in the form of cumulative recovery ratios by vintage of entry into default for each securitized (sub-) portfolio. However, historical recovery data (both, vintage data related to the originator's overall loan book and recovery performance data observed in previously closed SME transactions of the same originator) may have some limitations:

1) Generally, recovery vintage data display a lower granularity compared to the cumulative default rate vintages, because the number of defaults (as a base for recovery vintages) is naturally a (much) smaller portion of the overall portfolio (as a basis for default vintages), making them less representative of the securitized portfolio.

2) The type and level of collateral for the defaulted loans covered by historical recovery vintage data are not necessarily comparable to those of the securitized pool because the underwriting/servicing criteria applied by the originator can vary over time, particularly when vintages have a low granularity.

3) The observation period is (potentially) short and does not always cover a full business and real estate cycle.

4) The default definition considered in the historical vintage data may deviate from the default definition applied in the transaction (for example, 90 days past due versus defaults according to regulatory reporting requirements).

5) Recovery information may only be available for defaults for which the work-out process has finished ("closed files"). This availability further limits the granularity of the data set and may bias the historical performance observed.

6) Full recovery is often recorded for defaulted loans that have been cured, refinanced or restructured (although the borrower has not yet fully repaid the outstanding amount).

7) The servicer's recovery strategy (on real estate collateral) may have changed over the observation period depending on, for instance, the macroeconomic environment.[45] Such a change would be reflected in varying historical recovery data.

Because of the potential limitations of historical recovery rate information, we also consider other factors such as portfolio-specific collateral characteristics and comparable transactions benchmarks to derive our recovery rate assumption.

The recovery rate assumption is also a function of the specific transaction's default definition, which generally varies across jurisdictions. For instance, a shorter definition of default (e.g., 90 days past due) would typically be associated with a higher recovery rate, as opposed to a longer definition of default (e.g., 18 months past due or internally written off loans). "Early defaults" may indeed be driven by temporary payment disruptions (often caused by borrowers' temporary liquidity shortfalls), and the defaulted loans may return to performing again, or the servicer may effectively recover the position through debt restructuring. This is less likely for "late delinquent loans".

[45] For example, a bank strategy used to be the enforcement (i.e., sale) of the property provided by the borrower as loan collateral. However, because of deteriorating property markets, the enforcement proceeds might decline (significantly), and so the open market actions do not ensure a minimum recovery rate any longer. This could cause a change in the banks' enforcement strategy towards buying the properties themselves (and hopefully selling them at a later stage for a better price). This development has been observed for the Spanish market since the beginning of the financial crisis in Europe.

2.2.2. Fixed or Stochastic Recovery Rate Assumption

We either use our stressed recovery assumption as a fixed recovery rate in our modelling or model stochastic recoveries, particularly when using a Monte Carlo simulation to simulate a pool-specific default distribution. We derive the recovery rate distribution using the expected recovery rate, estimates of the variability of recovery rates, correlations across recovery rates, and an assumption about the general shape of the distribution (typically a "normal" distribution).[46] Stochastic recoveries reflect the range of possible recoveries given the various types of collateral in an SME-backed transaction. The two approaches are similar in the sense that a fixed recovery rate assumption represents a certainty-equivalent to the recovery distribution. Thus, the stressed recovery rate assumption is typically lower than the mean of the recovery rate distribution for high target ratings.

2.2.3. Recovery Lag

We consider the amount of time needed to realize the assumed recovery rate ("recovery lag"), which is typically determined based on various factors such as the transaction-specific default definition, the country tiers, the assumptions used for comparable collateral,[47] and the historical data provided by the originator. For loans to SMEs backed by real estate assets, we typically assume an average recovery lag of a minimum of 18 months to three years (typically distributed over several years). These values are adjusted on a case-by-case basis by taking into account (1) historical data (e.g., the performance of previous transactions), (2) vintage recovery rate data split by the source of cash flow (e.g. re-performing loans, out-of-court settlements and legal proceeds), and (3) country-specific aspects (e.g., typical length of insolvency proceedings).

3. Modelling the Transaction Structure

3.1. Purpose of the Model and Typical Structural Features

Looking at the universe of SME balance sheet securitizations, transaction structures vary across countries. A typical SME balance sheet transaction has the following structural features:

» risk transfer via true sale[48] or a synthetic transaction[49] (see Box 5)

» monthly, quarterly or semi-annually paying notes with fixed or variable interest rates

» two distinct waterfalls (interest and principal) with sequential allocation of cash flows and the involvement of a spread capture mechanism[50] or a combined interest and principal waterfall

» a cash reserve, to ensure a liquidity buffer and/or credit support

» hedging mechanism to cover for potential interest rate (and seldom currency) mismatches.

[46] In EMEA, we typically calibrate the normal distribution for the portfolio recovery rate with a 20% standard deviation and a correlation of 10% between recovery rates. This assumption may evolve over time should more empirical evidence on SME recovery behavior become available. In addition, we typically use a correlation of 5% between defaults and recoveries for SME portfolios that are well diversified in terms of industry, whereas we generally use a correlation of 10%-15% for SME portfolios that are highly exposed to a single sector, such as the real estate market.

[47] For more information, see our time to foreclosure assumptions in the various country settings of our RMBS methodology. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

[48] Risk transfer is effected via true sale if the transaction is motivated by the originator's need to obtain funding.

[49] In cases where a bank's aspiration to manage its regulatory capital drives the transaction, the assets are typically not physically sold. Instead, credit protection is bought on a reference portfolio by means of credit default swaps (see Box 5). However, changes to the regulatory environment for banks influence the level of attractiveness of synthetic transactions over time. For instance, while the implementation of Basel II made the economics of synthetic structures less attractive for banks and, consequently, there have been only very few newly issued synthetic transactions, the implementation of Basel III might change the picture again.

[50] Some structures may contemplate a pro-rata payment feature, which would revert into sequential structure upon portfolio performance deterioration. In addition, certain structures have a unified waterfall.

More specifically, differing structural features within an SME transaction can have a significant effect on the ratings of the issued notes and/or the level of credit enhancement that supports a certain target rating. Structural features that typically have a significant rating impact include:

» replenishable portfolios versus static portfolios

» availability of excess spread

» spread capture mechanism

» structural mitigants for set-off and/or commingling risks (if any).

Replenishable versus Static Portfolios: Many SME loans have a relatively short-term horizon (i.e., typically up to five years). As a result, and depending on the originator's motivation, certain SME balance sheet transactions may have a replenishment period of 12-36 months, during which incoming principal collections are used to purchase new receivables rather than to amortize the notes. Adding new receivables to the pool can result in portfolio credit deterioration if riskier assets are added. The replenishment period usually starts on the closing date and lasts for a pre-defined time horizon unless the occurrence of certain events triggers an early termination of such a replenishment period. Additionally, a transaction might face negative carry issues in case the originator does not use its replenishment option, but rather holds the cash (that results from the amortization of the underlying portfolio assets) in an account while the notes' principal balance remains unchanged.

Tight Eligibility Criteria and Concentration Limits: Tight eligibility criteria and concentration limits may partly mitigate the additional risk resulting from replenishable portfolios by ensuring that the quality of the portfolio remains in line with that of the original portfolio. Amongst others, they may (1) exclude the addition of delinquent receivables; (2) stipulate limits to borrower, industry and /or geographical concentrations (including concentrations in lower bank internal rating categories),[51] and remaining term; and/or (3) ensure a certain proportion of secured loans, minimum seasoning, and a weighted average rating of the portfolio after replenishment of the newly added loans.[52] The tighter the eligibility criteria and portfolio limits are defined, the lower the originator's flexibility to change important portfolio characteristics during the replenishment period. We address potential changes in the portfolio quality by either modelling replenished portfolios separately from the initial portfolio or stressing the initial portfolio based on the eligibility criteria in place in the transaction. We apply specific default assumptions that are derived based on the worst possible portfolio compositions for the replenished pools.

Early Amortization Triggers: Early amortization triggers terminate the replenishment period upon a trigger breach and hence may mitigate investors' exposure to certain risks resulting from the replenishment period.[53] Typical triggers relate to performance (such as maximum cumulative default levels and/or delinquency levels), events affecting the originator's credit standing (such as rating triggers), and portfolio-related triggers (such as breach of concentration limits).

Availability of Excess Spread: Excess spread is typically calculated and modelled as interest collections net of senior expenses (e.g., servicing fees and bank account fees) and interest paid on the notes. Excess spread

[51] One problem with weighted-average rating criteria is the prospect of "barbelling," whereby a portion of the portfolio may be of very good credit quality whilst the remaining portion may be quite poor.

[52] With respect to the rating, typical replenishment criteria include (1) the weighted-average rating of the portfolio after replenishment must be equal to or better than the weighted average rating of the portfolio at closing, (2) the weighted-average rating of the replenished portfolio must be equal to or better than the weighted average rating of the portfolio at closing, and (3) the weighted-average rating of the portfolio after replenishment must be equal to or better than the weighted average rating of the portfolio before replenishment. The first criterion is the strongest in avoiding the adverse selection for the replenished portfolio and negative rating migration during a deteriorating economic period.

[53] Most effective triggers are usually net excess spread triggers, unpaid PDL triggers and triggers linked to arrears levels.

is often an important source of credit enhancement, whereby the level of excess spread varies across transactions and depends on the underlying portfolio but might also be subject to changes during the transaction's lifetime.[54] In certain transactions, excess spread is guaranteed via specific interest rate swap mechanisms.

The benefit to noteholders provided by excess spread will vary depending on the timing of defaults that is modelled. In order to test the robustness of ratings, we typically run model sensitivities with different timings of default.

Spread Capture Mechanism[55]: In securitizations with a spread capture mechanism built into the structure (either implicitly by having a single waterfall or explicitly in the case of two separate priorities of payments), defaults experienced on the principal portion of the portfolio (which would potentially reduce repayment amounts to the noteholders) could be offset by excess spread collected via the interest collections of the portfolio. In contrast, in transactions without such spread capture mechanism, excess spread may leak out of the structure despite the fact that defaults have occurred. The spread capture mechanism can be structured for the entire transaction or separately for each class of notes. In the latter case, the more senior ranking classes are more protected because the excess spread available at each level includes potential interest amounts to be paid on the more junior ranking classes of notes.

Box 5: Specific Risk in Synthetic SME Transactions

When the credit risk is transferred synthetically (e.g., through credit default swaps), we focus our analysis on (1) the specific credit event definition[56] (e.g., failure to pay, bankruptcy and some restricted restructuring or loss definitions); (2) the counterparty risk with regard to the originator as credit protection buyer (typically mitigated by advance payments depending on the originator's creditworthiness); (3) the loss allocation mechanism;[57] (4) the synthetic excess spread mechanism, if any;[58] and (5) potential moral hazard problems resulting from the reliance on the credit protection buyer to (a) provide notification of a credit event (as public information is usually not available) and (b) calculate the loss amounts in its capacity as calculation agent (typically mitigated by a verification process performed by an independent third party).[59]

54 Excess spread may vary over time in a transaction because of, inter alia, changes in pool composition (with regard to interest rate payable), renegotiations agreed with borrowers, adjusted fee composition, and changing interest rate risk (which is especially relevant in unhedged transactions).

55 Also called a principal deficiency ledger (PDL) mechanism.

56 A definition may be considered tighter or looser depending on the number and type of contingencies that will trigger a protection payment and on the level of subjectivity in their quantification.

57 The loss amount is generally defined as the credit protection payment (i.e., the payment made by the issuer/seller to the originator/buyer that is triggered by the occurrence of a credit event). Notes to which losses are allocated are partially written down in the amount of such loss amount.

58 Typically, the excess spread is either available on (1) a use-it-or-lose-it basis (i.e., at a fixed amount, generally a percentage of the non-written off note balance or of the performing portfolio) for a given period (generally one quarter or one year), making it sensitive to the timing of defaults; or (2) a trapped basis (i.e., at a fixed amount, generally a percentage of the non-written off notes or of the performing portfolio). In each period, to the extent not used before, excess spread is accumulated in a specific ledger.

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

3.2. Integrating the Default Distribution and Other Asset Parameters

3.2.1. Default Timing

In our cash flow analysis, we typically assume a timing of default curve that is either (1) constant (i.e., equally distributed) over the life of the portfolio, (2) derived from historical data (if sufficient relevant data is available), or (3) in the absence of adequate data from the sponsor, derived from historical industry data. We usually also perform sensitivities with regards to different default timings, such as default timing curve implied by our Idealized Default Probability rates or derived from historical static cohort default data.

3.2.2. Prepayment Rate and Asset Yield

The constant prepayment rate (CPR) assumption is derived from the originator's historical dynamic prepayment data on its total SME portfolio and / or (if available) from specific prepayment data on previous SME loan receivable securitizations of that originator. If neither of this is available, we use a country-specific average SME prepayment rate based on a benchmarking approach.[60]

High levels of prepayments may depress the yield received in a transaction (and hence decrease available excess spread), especially if higher yielding loans prepay first. In our view, debtors of high-yielding loans have greater incentives to prepay because of their elevated debt burden or competitors offering cheaper financing options. The higher the dispersion of interest rates in the portfolio, the higher the impact of high-yielding loan prepayments on the available excess spread. Therefore, we typically stress the available excess spread in transactions, particularly if the portfolio has a widely dispersed interest profile. However, prepayments also have a positive credit effect. For example, borrowers who prepay their debt in full cannot default any longer. In any case, we take into account any specificity of the market under analysis.

Typically, we are provided with an initial portfolio yield vector based on the portfolio's scheduled amortization. To take into account the yield compression from prepayments, we examine the dispersion of interest rates within the pool and assume that prepayments result from the highest yielding assets. If the highest yielding assets prepay first, the yield on the remaining portfolio will decrease. Hence, we determine a haircut reflecting the potential yield reduction due to prepayments and reduce the yield vector accordingly. Because of the assumed stressed yield vector, we stress the available excess spread. For replenishable transactions, whose eligibility criteria require a minimum level of yield on purchasable receivables, we may use this minimum level of yield as input for the cash flow model.

The yield vector might be stressed further for, inter alia, the following aspects:

» (partially) un-hedged transactions

» potential changes in the yield vector because of renegotiation options allowed on the loans during the transaction's lifetime.

Similar to the default timing, the yield vector and CPR assumption are particularly relevant if structural features (e.g., principal deficiency ledgers, excess spread and any type of performance-related triggers) are in place. Hence, we also run some sensitivity analysis on these factors during the rating process.

3.2.3. Portfolio Scheduled Amortization

The final asset-based key model input is the portfolio amortization profile. The initial portfolio amortization schedule is provided by the originator and modelled accordingly. If subsequent portfolios are sold, we may either use the same amortization profile as per the initial pool or simulate different amortization schedules

60 For EMEA, prepayment rates are typically low for SME loans, varying between 0% and 10%.

based on eligibility criteria. These vectors determine the principal cash flows to be received by the issuer in the absence of defaults and prepayments.

Legal final maturity of the transaction is given by the issuer. It usually falls some years after the scheduled maturity date of the longest maturing loan depending on the assumed recovery timing.

3.3. Other Input Parameters

Once we have determined the asset side modelling assumptions, other transaction-specific inputs need to be inserted into the cash flow model.

Transaction Expenses: These include (1) fees to be paid to transaction parties such as the trustee, cash manager and servicer; and (2) note coupons. We stress the charged servicing fee upwards if the level is not in line with market rates, and we generally use a minimum servicing fee assumption. This is to ensure that the transaction can withstand paying a market rate servicing fee, if the original (and cheaper) servicing contract were to be terminated over the life of the transaction.

Hedging: Swaps and risks associated with swap counterparties are assessed, as relevant, and may impact our yield, excess spread assumptions and rating considerations.[61]

In the absence of hedging agreements, a transaction may be exposed to interest rate risks and, less frequently, to cross currency risks during its lifetime. We would then incorporate these additional risks imposed on noteholders into our analysis.

Triggers: A transaction might incorporate several triggers, which are usually formulated as performance based (i.e. asset related) triggers or counterparty (mainly, servicer or originator) related triggers. In our modelling, we concentrate on the performance-based triggers, specifically, where the triggers are linked to variables that are included in our cash flow model (e.g., defaults, notes outstanding amount or reserve fund levels). When breached, these portfolio performance-based triggers usually result in (1) the termination of the replenishment period and early amortization of the notes, (2) a stop of the reserve fund amortization, (3) an alteration of the priority of payments (such as the issuer's payment priorities changing from a pro-rata to a sequential payment structure), or (4) the deferral of interest payments on the junior notes.

3.4. Expected Loss Approach and Use of Model Output

We typically use a comprehensive cash flow model, ABSROM™, which enables us to model transaction cash flows derived from portfolios of loans to SMEs and the associated liability structure. The model produces a series of loss scenarios, with outputs for each security that include the expected loss, weighted average life and default probability.[62]

In addition, we identify the default scenario, under the current modelling assumptions, under which each rated tranche suffers its first loss. An illustrative example is shown in Box 6.

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

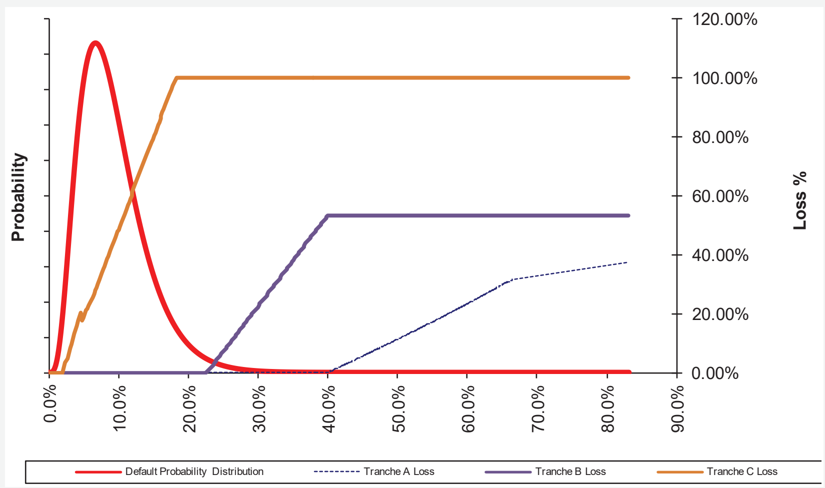
62 In EMEA, we typically replicate the transaction structure in a cash flow model.

Box 6: First Loss Suffered by Each Tranche

The rating of each class of notes indicates the expected loss level for the relevant class of notes over the WAL life of the notes.

As a further step, it is useful to ascertain the lowest default scenario in which each class of notes suffers its first loss, as well as at what speed the loss increases in each subsequent default scenario. This can be illustrated in Exhibit 4, which associates the default scenario with the level of losses of each class of rated notes.

EXHIBIT 4
Default Distribution and Expected Loss Level for Each Tranche



Source: Moody's Investors Service

We usually run sensitivities to a variety of key asset inputs (e.g., expected PD, CoV, recoveries and prepayments) and structural features (e.g., turning triggers on and off) in order to test the sensitivities of note ratings.

3.5. Determining the Final Rating through the Rating Committee Process

The output indicated by our quantitative modelling is an important input to our rating committee process. However, the ratings the committee assigns incorporate numerous other factors, including the result of sensitivity analyses to default and recovery timing assumptions, and qualitative analysis relating to factors such as:

- » idiosyncratic structural features that are not explicitly modelled
- » underwriting and servicing practices
- » the incentives of key third parties to the transaction to perform as specified in the transaction documents
- » the risk of disruption in the transaction's cash flows that could result from a disruption in a key third party's operations (operational risk)
- » counterparty risk
- » legal considerations
- » sovereign-related risk.

Some of these qualitative factors are further detailed below.

4. Operational and Counterparty Risks

The performance of a securitization transaction depends not only on the creditworthiness of the underlying portfolio, but also on:

1) the effective performance by various parties such as servicers, calculation agents, trustees and cash managers (i.e., operational risk)
2) the creditworthiness of the issuer's account bank(s) and the quality of issuer's investments (if any)
3) the creditworthiness of hedge counterparties (if any).

In case the operational risks are not adequately addressed in a transaction structure, this may preclude the transaction from achieving the highest rating.[63]

SME Balance sheet transactions in which an issuer account bank holds or has invested a substantial amount of the transaction's cash relative to the bond liabilities, are potentially subject to rating volatility if the bank or eligible investment defaults. The cash or the investments would not be recoverable quickly, with ultimate recoveries uncertain, and could lead to additional losses for investors.[64]

In case the transaction is exposed to the credit risks resulting from the hedge counterparty, noteholders might be exposed to additional losses.[65]

4.1. Bankruptcy of the Originator

With regard to the potential bankruptcy of an originator, our analysis takes into consideration the following factors:

» whether the originator has actually sold the receivables, known as "true sale"

» whether, in the event of the sponsor's bankruptcy, a court would consolidate the owner of the assets and the securitization trust with the sponsor, known as "substantive consolidation"

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

Our analysis also takes into account jurisdiction and applicable securitization laws.

The bankruptcy of an originator can also pose other risks that could reduce the cash-flow available to repay the notes, such as set-off risk, and when the originator is also the servicer, cash commingling risk.

4.2. Cash Commingling Risk

Commingling risk occurs when the servicer is declared insolvent and the money in the collection accounts is temporarily or permanently commingled with the bankruptcy estate of the bank. If the commingling is temporary, this may lead to liquidity risk in the transaction, which can be mitigated by a liquidity

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

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

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

arrangement. If, on the other hand, the commingling loss is permanent (i.e., the money in the collection account may be lost by the issuer), this would lead to a credit loss in the transaction.

In our analysis of the commingling risk, we would take into account various structural mitigants, such as (1) frequent transfers from the collection account to the issuer account (typically with a highly rated bank) and (2) rating or financial performance triggers that would lead to notification of the borrowers and transfer of collection accounts from the servicer to a higher rated institution prior to servicer bankruptcy.[66]

4.3. Set-off Risk

In certain jurisdictions, set-off risk arises when, in addition to loans, borrowers have deposits or derivatives with the originator or invest in bonds issued by the originator. In case, the originator were to go bankrupt, borrowers could potentially set off the amounts of deposits that the originator owes to them against amounts that they owe to the originator and the SPV. In some jurisdictions, set-off risk either crystallizes or is eliminated following the notification of the borrowers regarding the sale of the loans to the SPV. In some jurisdictions, deposit set-off is further mitigated through the relevant deposit guarantee schemes.

However, in the event set-off risk cannot be eliminated fully, we typically incorporate it as an additional asset loss in our analysis.[67]

5. Sovereign Risk

The country in which the transaction's assets, originator, or issuer is located could introduce systemic economic, legal or political risks to the transaction that could affect its ability to pay investors as promised. We usually incorporate such risks into the analysis by applying our local currency country ceilings (LCC) in accordance with our sovereign ceiling methodology.[68] In particular, when generating our assumed portfolio loss distribution, we typically define the portfolio credit enhancement consistent with the highest rating achievable in the country (i.e., the LCC). A rating committee may also consider modifying appropriate assumptions or defining minimum credit enhancement levels required to achieve a particular rating.[69]

6. Environmental, Social and Governance Considerations

Environmental, social and governance (ESG) considerations may affect the ratings of securities backed by a portfolio of loans granted to SMEs. We evaluate the risk following our cross-sector methodology that describes our general principles for assessing these ESG issues[70] and may incorporate it in our analysis.

7. 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

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

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

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

69 For more information, see Appendix 9.

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

originator assessments, underwriting standards for static pools or review of the legal structure. We also typically receive periodically data on transaction-specific performance which we use to monitor transactions. We may give more weight to performance information for seasoned transactions, in particular when defaults and losses are higher or lower than expected. When monitoring the performance of outstanding SME balance sheet transactions, we track the characteristics and performance of the underlying collateral, any material developments regarding the originator, servicer and other participants in the transaction, the amount and form of credit enhancement, and factors that may significantly affect the integrity of the legal structure. The starting point is typically the monitoring of the collateral performance relative to our initial expectations.

The key performance metrics we track are the transaction's delinquency rate and the cumulative net loss rate, or the cumulative default and recovery rates. When loan portfolios are secured over commercial properties as collateral, we may also look for additional information such as vacancy rates or rent levels.[71] We combine the loss rate with the issuer's history of losses to update our estimate of the ultimate lifetime net loss rate on the SME pool.

Updated individual loan data, when available, also allow us to derive updated estimates of individual asset defaults or losses. Such loan-by-loan data is particularly important when the pool has concentrations. In addition, we take into account any material changes in the macroeconomic environment that could affect future performance. If, by using this approach, we conclude that the current transaction's ratings need to be reviewed, we would then use a similar approach to the one used to assign the initial ratings (assuming similar ongoing data is received on the pool). We also review the evolution of the portfolio composition in terms of borrower concentration and may run sensitivity scenarios based on credit enhancement coverage of largest borrowers in the pool.[72]

With regard to counterparty risk, our monitoring analysis also includes an assessment of the stability of the originator, servicer, swap counterparties and credit support providers. If these entities become unable to fulfill their obligations to the transaction, the risk of a decline in the cash flows to investors increases. Thus, changes to the financial stability of an entity that has a weight in the rating of the securities can result in a rating action on the securities.

When the sovereign risk component changes over the life of a SME transaction, we will assess the impact on the rating of notes following the approach described in Appendix 9. We will adjust the maximum achievable rating based on the then current LCC and may adjust the key collateral assumptions to reflect the change in the sovereign risk.[73]

7.1. Pool Size

During the life of the transaction, as pool sizes decrease to a small fraction of their initial sizes, credit risk exposure to individual borrowers may increase significantly. As part of our monitoring of SME balance sheet transactions, we track the evolution of borrower concentration risk and verify that the amount of credit enhancement under a given class of notes always protects this class from the risk of a default by the largest

71 See for example the approach on "Japanese apartment loan securitizations" discussed in Appendix 11.

72 For example, in methodologies where models are used, modelling 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.

73 In some instances, the maximum achievable rating for the most senior outstanding notes may be lower than the local currency ceiling if for example operational or counterparty related risks limit the note ratings.

borrowers. More specifically, information about the remaining loans and borrowers[74] such as updated loan-by-loan data covering industry sectors and nature of the loans (e.g. secured/unsecured) becomes important for us to assess whether the pool concentrations are in line with the rating of the notes. As the number of borrowers decline significantly and the notes exposure to the pool's concentrations increases, we may overlay our parameters with an additional stress.

Unless we have detailed information on at least 95% of the borrowers (by loan balance) (for example, ratings, credit estimates, using the mapping approach), we will not assign or maintain ratings on securities from SME securitizations under certain conditions:[75]

» for transactions, that do not have support mechanisms, such as credit enhancement floors or reserve fund floors, once the underlying pool has decreased to an effective number[76] of borrowers of 50[77] or below; and

» for transactions with reserve fund or credit enhancement floors that partially compensate for the increased exposure to single borrowers, when the underlying pool has decreased to an effective number of borrowers of 30[78] or below.

However, we will continue to monitor ratings that do not rely on assessment of individual obligor's credit worthiness, such as those that benefit from a full and conditional third-party guarantee, whether at pool or tranche level,[79] or for securities that benefit from full cash collateralization.

8. Loss Benchmarks

In evaluating the model output for SME securitizations,[80] we select the loss benchmarks referencing the Idealized Expected Loss table[81] 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:

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

75 This does not apply to transactions where we receive frequently updated and detailed property-level cash flows and valuations such as Japanese apartment loan securitizations (see Appendix 11) or venture debt securitizations (see Appendix 12).

76 The effective number is a measure of the pool diversity that looks beyond the nominal number of borrowers in a pool to take into account the actual size of their loans and express this number in terms of equally sized exposures.

$Effective\ Number\ of\ n\ Borrowers = 1/\sum_1^n (Wi)^2$,

Where: W is the weight of borrower i in the total pool.

77 If we cannot obtain the effective number, we will use a threshold of 90 borrowers instead. If we cannot obtain the effective number of borrowers, we will use the effective number of loans instead.

78 If we cannot obtain the effective number, we will use a threshold of 45 borrowers instead.

79 For structured finance securities, the ratings applied will be the higher of the support provider's rating and the published or unpublished underlying rating. In the event of a downgrade of a financial guarantor's rating to below investment grade, we expect to withdraw the rating for instruments that do not have published underlying ratings.

80 The analysis of SBCRE securitizations originated in the US in or before 2011 does not rely on a model, for more information see Appendix 10.

81 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.

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

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

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

Where:

- *Rating Lower Bound*$_R$ means the lowest Idealized Expected Loss associated with rating *R* and the expected loss range of rating *R* is inclusive of the *Rating Lower Bound*$_R$.
- *Initial Rating Upper Bound*$_R$ means the highest Idealized Expected Loss associated with rating *R* that is either initially assigned or upgraded and the expected loss range of rating *R* is exclusive of the *Rating Upper Bound*$_R$.
- *Current Rating Upper Bound*$_R$ means the highest Idealized Expected Loss associated with rating *R* that is currently outstanding and the expected loss range of rating *R* is exclusive of the *Rating Upper Bound*$_R$.
- *R-1* means the rating just above *R*.
- *R+1* means the rating just below *R*.
- The Rating Lower Bound for Aaa is 0% and the Rating Upper Bound for C is 100%. These are not derived using the formula.

Appendix 1: Concentration Risk

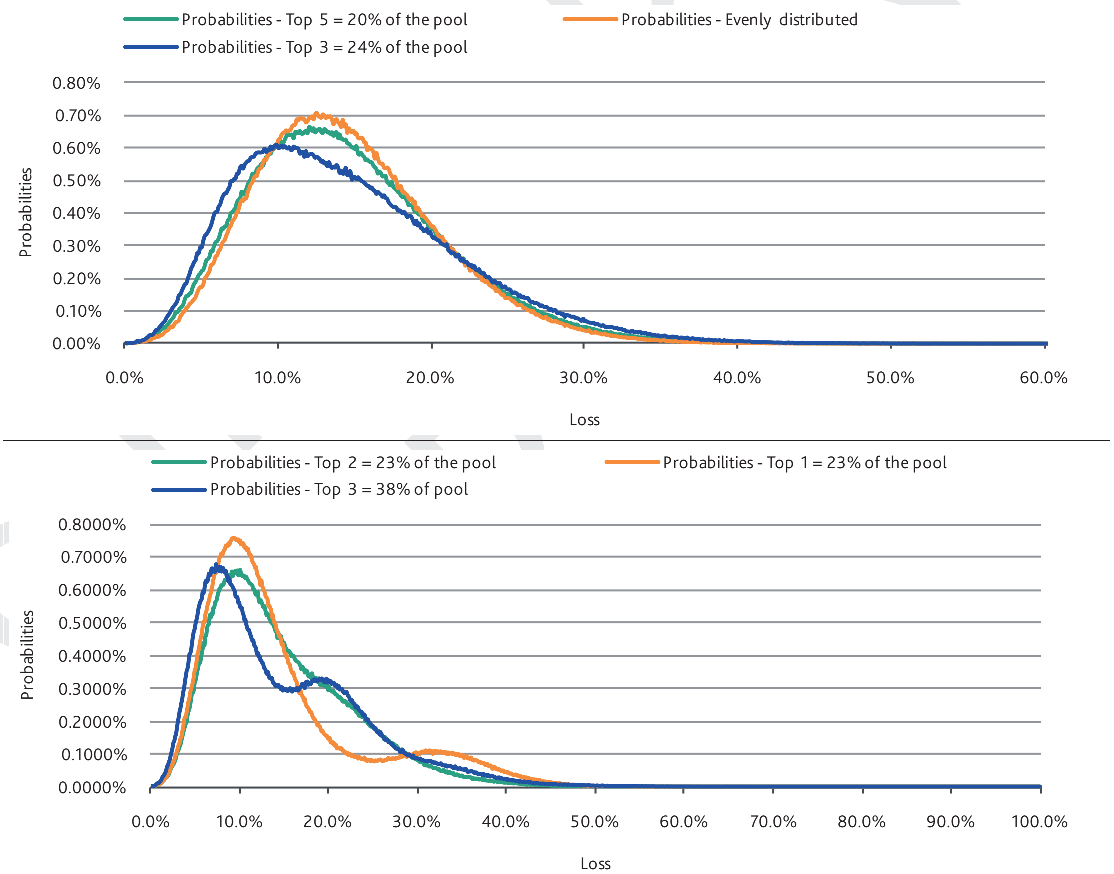
SME pools range from very granular pools to much more concentrated pools. Asset concentrations, including disproportionately large individual assets, and regional and industry concentrations, directly influence the shape of the asset pool default curve. As a result, the analytical approach we choose to rate a particular transaction depends heavily on how well it addresses the level of concentration in the pool.

As an example, Exhibit 1-1 shows the impact of various top obligor concentrations on the shape of the pool default distribution.

EXHIBIT 1-1

Impact of Obligor Concentration on Portfolio Default Distribution

Monte Carlo simulation results for a pool of 100 B-rated obligors in a single country (the pool is well diversified across industries; the obligors are evenly distributed in terms of size, with the exception of the top 1, 2, 3 or 5 obligors respectively):



Source: Moody's Investors Service

Obligor Concentration and the Effective Number Calculation

A securitized pool with significant borrower concentrations is subject to idiosyncratic loss-performance behavior that is generally difficult to predict based on the experience of historical pools. In this case, we often use a Monte Carlo simulation technique to simulate the default behavior of the individual assets, based on asset-specific characteristics and assumed correlations among the assets.

Increasing the number of obligors in a pool decreases the pool's obligor concentration, while an uneven distribution of obligor sizes tends to increase it. Our calculation of the pool's "effective number" of obligors provides us with a tool to evaluate the trade-off between the two in their effect on obligor concentration.[82]

We calculate the Effective Number[83] for a pool of n obligors using the following formula:

$$\textit{Effective Number (n obligors)} = 1/\Sigma_1^n (Wi)^2$$

Where:

» *Wi* is the share of the outstanding of obligor *i* on the total pool[84]

The Effective Number adjusts the actual number of obligors in the pool by reducing it for any uneven sized exposures to obligors. For pools with equally sized obligors, the Effective Number is equal to the actual number of borrowers. However, the more uneven the distribution of exposures, the smaller the Effective Number of obligors and the larger the difference between the Effective and the actual number of obligors.

Determining the Effective Number Cut Off for Concentrated vs. Non-Concentrated Pools

We typically consider a pool with an Effective Number below 250-300 as a concentrated pool that would benefit from an individual asset approach. Conversely, we view a pool with an Effective Number higher than 250-300 as granular, suitable for analysis with either a pool approach (assuming pool data are available) or an individual asset approach. If the effective number of a pool is close to this 250-300 range, the rating committee determines the best approach to estimate the future defaults.

Exhibit 1-2 shows the impact of lowering the Effective Number of obligors on the Aaa advance rate using (1) a Monte Carlo Simulation (the Individual Asset Approach) and (2) an approximation of the Monte Carlo simulation via a normal inverse distribution. In both approaches, the Aaa advance rate starts decreasing (i.e., the Aaa levels of enhancement starts increasing) exponentially when the Effective Number falls below the 250-300 range. At the same time, the Aaa levels of enhancement for each approach start to diverge more significantly when the Effective Number falls below the 250-300 range, even if the expected loss and variance in the two approaches are equal. The reason for the divergence is that the normal inverse then loses accuracy as it does not adequately account for the idiosyncratic risks associated with concentrated pools. Note, however, that the distribution from the Monte Carlo simulation (using our CDOROM) produces a lower senior note credit enhancement than the normal inverse (assuming the mean and the standard deviations of the two distributions are identical), so the approximation of the Monte Carlo distribution (via CDOROM) by a normal inverse is a conservative one.

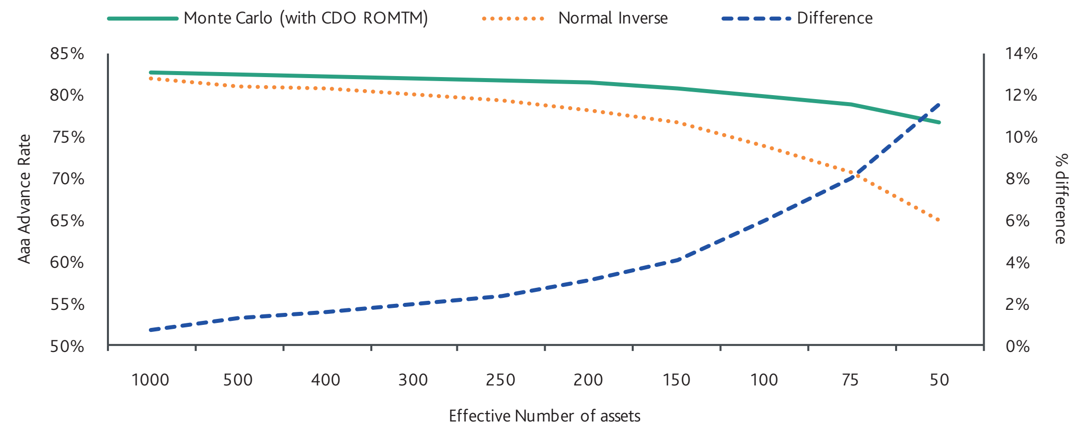
82 In evaluating obligor concentration, we also consider other measures, such as the weight of the top few borrowers in the pool.

83 The Effective Number of the pool is equal to the inverse of the Herfindahl Index of the pool. Moreover, in case each asset had the same default probability and there would be no correlation between asset defaults, the Effective Number would be equal to Moody's Diversity Score.

84 The pool's Effective Number is usually calculated based on information from the pool's loan-by-loan data. When loan-by-loan data are not available, we would use the information on obligor size stratifications in the pool to estimate the Effective Number.

EXHIBIT 1-2

Impact of Lowering the Effective Number on the Aaa (sf) Advance Rate: Monte Carlo Simulation vs. Statistical Approach (using a normal inverse (NI))*.



* The chart shows the impact of the Effective Number on the tranching based on a purely homogenous portfolio (2% mean DP, 10% asset correlation, 0% RR). The moments of the normal inverse distribution are matched to those of the Monte Carlo simulated distribution (i.e. the mean and the standard deviations of the two distributions are identical).

Source: Moody's Investors Service

Industry Concentration

Obligors involved in similar businesses are to some extent subject to the same positive and negative factors and could all suffer concurrently from a single negative factor, which would result in substantial losses in the asset pool. Industry concentration tends to vary widely in SME balance-sheet securitizations, although material concentrations in specific sectors (such as building and real estate) are common.

In our view, portfolios with a single-industry concentration of around 25%-30% or higher benefit from an individual asset approach, because it can more accurately reflect the risk posed by deterioration in particular industries. When we use a Monte Carlo simulation and vary the industry concentration in a specific portfolio, we find that the volatility of the asset default distribution (which we can measure by the asset correlation or the CoV of the default distribution) tends to increase exponentially when the concentration in a specific industry reaches levels close to 25%-30% (i.e., asset correlations higher than 10% or a coefficient of variation higher than 50%, levels that are rare in historical data).

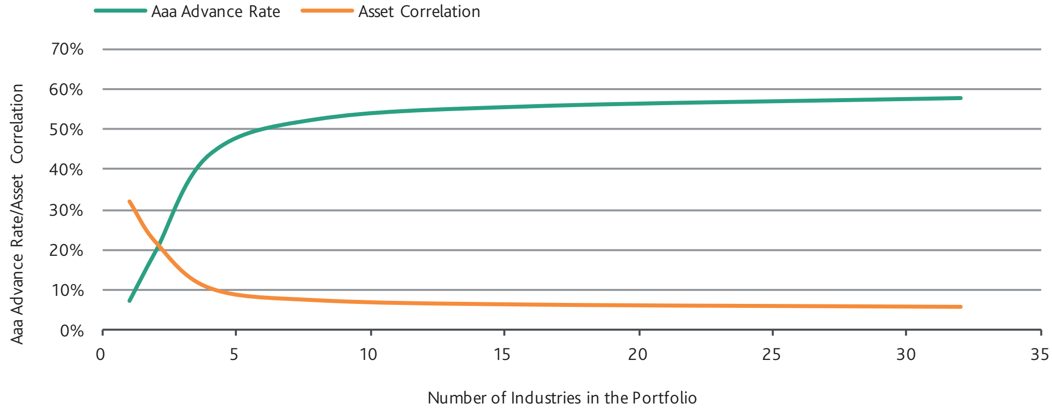
In Exhibit 1-3 below, we generated[85] a portfolio of 480 identical assets, all rated B1 with a WAL of five years. We then split the portfolio evenly among 32, 16, 8, 4, 2, and 1 industries (i.e., in the case of 32 industries, we had 15 assets in each industry, in the case of 16 industries, 30 assets in each industry, etc.). We then extracted the default distribution in each case and tested the Aaa issuance amount. Asset correlations and covariance levels tend to increase exponentially once you are left with four industries or fewer, and the Aaa advance rate then reduces significantly.

85 In CDOROM.

EXHIBIT 1-3

Aaa Advance Rate as a Function of Number of Industries in the Portfolio

(Monte Carlo Simulation)



Source: Moody's Investors Service

Exhibit 1-4 shows the implied asset correlation (based on the mean and standard deviation of a default distribution derived for a specific portfolio composition) as a function of pool granularity and the largest single-industry concentration. In each of the scenarios in the Monte Carlo simulation, we vary the effective number as well as the largest single-industry concentration. We keep the mean probability of default for the assumed portfolio at 15.1%, and the second-largest industry sector, constant at approximately 10%; we also assume a global inter-industry correlation is 5%. Hence, the variation in the implied asset correlations is driven mainly by the variation of the overall portfolio concentration or the single-industry concentration. The table shows the negative impact of sector concentrations on the implied asset correlation.

EXHIBIT 1-4

Implied Asset Correlation* as a Function of Granularity and Single Industry Concentration for a Sample Portfolio**

		Top single industry concentration in % of the total pool		
		21%	32%	45%
Overall portfolio concentration measured by Effective Number ("EN")	Pool with 900 EN, smallest obligor accounts for 0.02% of pool	6.50%	8.20%	11.70%
	Pool with 617 EN, smallest obligor accounts for 0.1% of pool	6.80%	8.50%	12.00%
	Pool with 353 EN, smallest obligor accounts for 0.25% of pool	7.10%	8.80%	12.50%
	Pool with 170 EN, smallest obligor accounts for 0.6% of pool	7.70%	9.50%	15.10%

* Implied asset correlation is the correlation implied by a normal-inverse default distribution as defined by its mean and the standard deviation. Equation (2) describes this relationship and can be solved for "ρ", which represents the implied asset correlation.

** In order to create the scenarios, only the number of borrowers was varied to reduce the EN (base case = 900 EN), while only the industry sectors were varied to increase single industry sector concentration (base case = 21% top industry sector). Consequently, overall mean PD rate is the same in all scenarios.

Source: Moody's Investors Service

In some situations, we may use historical pool performance data with the pool approach to analyze a transaction with significant industry concentrations. These situations are limited to when a) the historical performance data relate to pools whose industry concentrations are very comparable to those of the securitized pool, and b) such historical performance data cover at least one full economic cycle. Outside such scenarios, we use the individual asset approach (via a Monte Carlo simulation),[86] which allows us to assess the impact of the pool's actual industry concentrations on the pool default distribution.

86 In the Monte Carlo simulation, we typically add an intra-industry asset correlation on top of the inter-industry correlation if the borrowers are active in the same sector. We can also further stress the pairwise correlation depending on (1) the overall portion of borrowers active in a given industry sector, and (2) the expected cyclicality of the sector.

Appendix 2: Information for the Rating Process of SME Balance Sheet Securitizations

Loan Description

We generally receive a detailed description of the loan contracts underlying the securitized receivables. This description not only details specific features (such as tenor, nature of amortization or payment frequency), but ideally also explains the origination channels.

Information on Actual Portfolio

Because of the limited homogeneity of the underlying SME loan receivable portfolios, we typically obtain a loan-by-loan data template listing each single asset included in the (initial) portfolio in order to be able to assess the actual credit quality of that portfolio. As some information may not be provided on a loan-by-loan basis, we look for the following additional information to model credit quality of the assets:

- borrower-by-borrower information regarding deposits, bonds and derivative contracts for the set-off risk analysis
- amortization profile of the portfolio/master amortization schedule
- yield vector of (initial) portfolio (i.e., development of weighted-average portfolio spread over the course of the transaction) separately for fixed and floating rate paying loans.

In case a mapping approach is taken to determine the default rate of the securitized portfolio on top of the rating or score for each borrower, we look for the description of the rating system and the validation results (e.g. migration matrices).[87]

87 For more information, see Appendix 6.

Appendix 3: Moody's Industry Classifications

Our sectors can be determined using a statistical classification of the economic activities, such as Statistical Classification of Economic Activities (NACE) Revision 2 in Europe or North American Industry Classification System (NAICS)in US or Japan Standardized Industrial Classification.

Industry Classifications

» Aerospace & Defense
» Automotive
» Banking, Finance, Insurance & Real Estate
» Beverage, Food & Tobacco
» Capital Equipment
» Chemicals, Plastics & Rubber
» Construction & Building
» Consumer goods: Durable
» Consumer goods: Non-durable
» Containers, Packaging & Glass
» Energy: Electricity
» Energy: Oil & Gas
» Environmental Industries
» Forest Products & Paper
» Healthcare & Pharmaceuticals
» High Tech Industries
» Hotel, Gaming & Leisure
» Media: Advertising, Printing & Publishing
» Media: Broadcasting & Subscription
» Media: Diversified & Production
» Metals & Mining
» Retail
» Services: Business
» Services: Consumer
» Sovereign & Public Finance
» Telecommunications
» Transportation: Cargo
» Transportation: Consumer
» Utilities: Electric
» Utilities: Oil & Gas
» Utilities: Water
» Wholesale

Appendix 4: Historical Static Pool Data Analysis: Extrapolation Methods

For historical pools that reflect only a part of their life cycle but nevertheless contain some useful data, we extrapolate defaults or losses to date for the remainder of the pool's life. To extrapolate default or loss data for the missing periods, we typically rely on average changes in the cumulative rate, either as an absolute number or a percentage, in similar pools during those periods.

We use one of two methods to extrapolate data series, both of which yield similar results in most circumstances. We typically use a single extrapolation method in a given market to enhance consistency across transactions in the market.

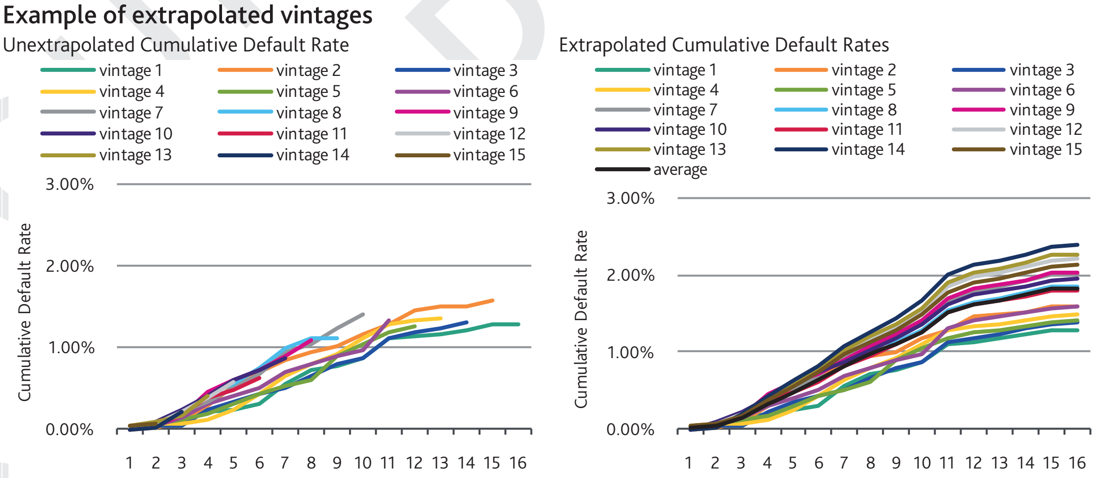
The Growth Rate Extrapolation Method

The Growth Rate Extrapolation Method is based on the calculation of the growth rate of the average cumulative defaults[88] (using a comparable number of data points) during previous periods. We extrapolate default data for a vintage by multiplying the last historical data point by one plus the growth rate of the average cumulative defaults of the specific period and then repeat the process for each successive period by using the last extrapolated figure as the starting point.

If the static pool performance history does not include pools that have paid down in full, we can extend the actual default curves to capture the impact of potential defaults after the period we are reviewing until the term of the loans and build a full default timing curve. To "simulate" these potential defaults, one approach is to extrapolate the default rate of the longest review period to the weighted average maturity of the pool for each vintage curve, at a rate equal to the last actual growth rate (see Exhibit 4-1).

EXHIBIT 4-1

Example of extrapolated vintages



Source : Moody's Investors Service

The Delta Net Loss Timing Curve Method

The starting point is to create a loss timing curve for the originator. The loss timing curve provides the percentage of the overall lifetime losses the receivables are likely to incur at various intervals of the pool's life. We can use the loss timing curve to extrapolate the cumulative losses on a static pool of receivables from its current level to the expected level at maturity.

[88] Or losses, if we extrapolate losses.

We frequently use the "delta" loss curve method to construct the loss curve (see Exhibit 4-2). In this method, we use an increment (delta) of each vintage's cumulative loss rates to calculate the average incremental loss rates across vintages for each period (the average delta loss rate). Next, we calculate the cumulative average "delta" loss rate for each period by adding the incremental delta loss rates up through that period (cumulative delta loss).

If the static pool performance history does not include pools that have paid down in full, the static pools will incur losses over their remaining lives. Therefore, to apply the cumulative average delta loss to pools that we need to extrapolate, we determine the "anchor" or terminal value of the cumulative delta loss curve. We can use a number of methods to forecast the anchor value; one is to analyze the trend line of six-month deltas to determine the projected six-month deltas over the remaining life. We add these projections to the life-to-date losses to determine the anchor or terminal loss.

We create the loss curve by calculating the percentage of the total cumulative delta loss incurred in each period after origination. We can then use the loss timing curve to project the cumulative loss for each of the vintages with an incomplete history by dividing the life-to-date loss for any vintage by the corresponding value of the loss timing curve.

EXHIBIT 4-2
"Delta" Loss curve method

Column	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Originations in $000'	25,216	26,878	27,815	27,327	26,943	28,433		
Pool Factor	0.01%	0.31%	1.92%	10.56%	25.38%	48.76%		
Year	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**		**Loss Curve**
1	0.68	0.86	0.94	0.76	0.74	0.72		**24.28%**
2	1.73	1.84	2.32	1.96	1.74	1.71		**58.38%**
3	2.26	2.57	2.64	2.39	2.18			**73.57%**
4	2.49	3.28	2.91	2.75				**85.74%**
5	2.59	3.5	3.46					**94.73%**
6	2.66	3.75						**99.69%**
7	2.67							**100.00%**
Projected Lifetime Loss	**2.67**	**3.76**	**3.65**	**3.21**	**2.96**	**2.93**		

(1) Delta Calculation: 2.26%-1.73% =0.53%

(5) Projected Lifetime Loss calculation: 2.18%/73.57% =2.96%

(3) Cumulative calculation: 0.78%+1.10%=1.88%

(2) Average Calculation: Average of year1 =0.78%

Incremental static pool losses, %:							Average Delta Loss	Cumulative Delta Loss	Loss Curve
1	0.68	0.86	0.94	0.76	0.74	0.72	0.78	0.78	24.28%
2	1.05	0.98	1.38	1.20	1.00	0.99	1.10	1.88	58.38%
3	0.53	0.73	0.32	0.43	0.44		0.49	2.37	73.57%
4	0.23	0.71	0.27	0.36			0.39	2.77	85.74%
5	0.10	0.22	0.55				0.29	3.06	94.73%
6	0.07	0.25					0.16	3.22	99.69%
7	0.01						0.01	3.23	100.00%

(4) Loss Curve Calculation: 3.06%/3.23%=94.73%

Source: Moody's Investors Service

Appendix 5: SME Top-Down Approach to Determine the Expected Default Rate: EMEA Settings

SME Top-Down Approach at a Glance in EMEA

EXHIBIT 5-1

Roadmap for PD assumption in rating SME balance sheet securitizations	EMEA Typical Settings
Step (1): Define Country-Specific Base Assumption for Standard SME	In the mid- to low-Ba range.[89]
Step (2): Portfolio Quality Adjustment	
Step (2.1): Underwriting/Origination Quality Adjustment	+1 notch/-1 notch[90]
Step (2.2): Portfolio Borrower Composition Adjustment	Size of company: + 1 notch for large corporate, - 1 notch for micro-SMEs. Sector of companies: see below.
Step (2.3): Loan-Specific Adjustments	Short-term facilities: see below. Bullet and Balloon loans: see below. Payment frequency: we penalize loans paying semi-annually or less frequently (typically 5% extra PD stress). Interest and/or principal grace period: we penalize such loans (typically with 10% extra PD stress).
Step (2.4): Past Performance/Seasoning Adjustments	Delinquent loans: we typically penalize loans in arrears by more than 30 days depending on the transaction's default definition and the numbers of days in arrears (up to 3 rating notches). Seasoning: we apply a benefit to those performing amortizing loans depending on when the origination took place (e.g. more than 5 years ago) and the sector of activities of the borrower (up to 2 rating notches benefit).
Step (3): Outlook Adjustment	
Step (3.1): Macro-Cycle Adjustment[91]	
Step (3.2): Sector-Specific Cycle Adjustment	

Source: Moody's Investors Service

Portfolio Borrower Composition Adjustment: Focus on Our Industry Sectors (Step (2.2))

Using our RiskCalc models[92] and historical information covering at least one business cycle (e.g., country specific bankruptcy, insolvency and non-performing loans statistics, and the past performance of SME transactions), we have identified certain industry sectors that are performing (in terms of default rates) independently of the prevailing economic situations (i.e., much better or worse than the economy on average). Based on this research, we have, for example, identified that industry sectors such as Construction and Development or Real Estate Developers are generally performing worse than the economy on average. Therefore, when assessing Step 2.2 under our top-down approach, we may adjust the PD assumption for borrowers in these sectors by up to -2 notches, in particular in certain countries such as Spain and Italy.

89 The country-specific base assumption may be lower for certain EMEA countries (e.g. Greece, Turkey).

90 Differences in the historical data between two originators subject to the same macroeconomic and regional situation may be a good indicator of the underwriting (e.g., risk appetite) and servicing standards of the two originators. A similar approach can be applied to compare the performance data (delinquency and cumulative default rates) of any previous securitized SME pool originated by the same bank with the rest of the market over the same period of time.

91 See Moody's Global Macro Outlook, among others.

92 In particular, the latest available average 5-year financial statement only (FSO) expected default frequency by country and sector.

Special Risks and the Treatment of Short-Term Credit Facilities[93] (Step (2.3))

Typically, receivables resulting from securitized short-term credit facilities share the following characteristics:[94]

1) They have a contractual maturity horizon of one year or (significantly) less.
2) They are typically fully drawn upon transfer to the issuer and typically do not involve an option for re-drawing.[95]
3) They are due for repayment at their contractual maturity date (i.e., bullet repayment)[96] and might also have an option for earlier (partial) repayment.
4) They result from "uncommitted" credit facilities i.e., allowing the bank to terminate the underlying credit facility relatively quickly, if needed (and as soon as repaid by the obligor).

Given the bullet nature of these facilities, the major element driving the credit risk is whether or not the borrower can repay at maturity. Typically, the actual repayment at maturity date is achieved via a rollover into a new loan granted by the originating bank. Hence, the repayment at maturity depends on a borrower's credit quality as well as a bank's funding situation.

We differentiate between two scenarios in our analysis of the credit risk embedded in short-term credit facilities, whereby the probabilities for each scenario occurring are linked to the bank's current rating:

1) If the originating bank has access to funding and is comfortable with the borrower's credit quality, the rollover will most likely take place. The fact that for short-term loans a bank reviews more frequently the credit exposure (and if needed, can reduce or cancel the relevant exposure) compared to loans with longer maturity horizon explains the better historical performance observed for a one-year loan facility renewed five times compared to a five-year term loan. Consequently, in our analysis, we typically grant a one notch benefit in Step (2) for short-term loan receivables.[97]
2) If the bank faces funding problems (e.g., due to a deterioration of its own creditworthiness), fewer facilities will be rolled-over. In this scenario, the borrower needs either to have sufficient own funds[98] or to obtain a new facility from another bank at short notice.[99] Hence, it is likely that some borrowers will not be able to refinance or repay in a timely way the expiring short-term loan. Typically, in SME balance sheet securitizations such cliff risk (usually a low probability, but high severity scenario) is structurally mitigated by:

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93 In line with corporates' general financing situation, a meaningful portion of banks' SME loan books are composed of short-term credit facilities that often embed a replenishment period. Hence, banks started to also include receivables resulting from short-term credit facilities into their securitization programs (true sale as well as synthetic).

94 Although there might be differences in legal terms in the loan contract for such short-term credit facilities across countries, we found that economically these facilities typically share characteristics.

95 This is different to synthetic securitizations, where typically the reference amount (i.e., the risk protection amount) is defined as the sum of the drawn and undrawn amount of the underlying (revolving) credit facility and where re-drawings are allowed (which is typically not possible in cash securitization to avoid a lending obligation on the side of the issuer.) Nonetheless, in exceptional cases, re-drawings (or drawings of undrawn amounts) under the underlying credit facility could take place after the receivables transfer to the issuer. In such cases, to avoid a liquidity burden on the securitizations structure, these drawings are addressed structurally (for instance via a replenishment period and/or a highly liquid source of funding provided at closing date, such as the maintenance of cash in a segregated account at an eligible institution).

96 The only exception observed so far are so-called Alliloheros loan receivables included in Greek SME transactions, which do not have a contractual maturity date.

97 Additionally, when translating the loan-specific rating factor equivalent into a cumulative default rate, the actual short WAL of the receivable is generally applied (because banks have the option to withdraw the short-term credit facilities at the contractual maturity date).

98 This is probably true only for a limited portion of borrowers as borrowers typically account on the roll-over option and, hence, are not necessarily prepared to repay the expiring short-term loan receivables by own means.

99 Potentially, only a certain portion of borrowers will be able to agree with other banks on a refinancing on a short-notice, namely those with, inter alia, (1) good credit quality and/or (2) other existing bank relationships.

a) not having a replenishment period during which expiring short-term loan receivables could be replaced with new short-term loans (i.e., this limits the risk horizon for the cliff risk to the relatively short maturity horizon of the respective portfolio as of closing)

b) an early amortization trigger/stop replenishment trigger linked to the originator's credit quality in the case of replenishable structures, to ensure that all securitized short-term loans have expired and repaid before a potential default of the originating bank.

If the cliff risk is not structurally mitigated, we size an additional expected loss assuming that a significant portion of loans will not be refinanced on time and, hence, default. The portion of loans defaulting as well as the expected recovery on such defaults (e.g., deriving from refinancing with other bank) is affected by various factors (e.g., a country's banking landscape and macroeconomic environment) and, hence, will have to be determined on a case-by-case basis.

Treatment of Bullet and Balloon Loans (Step (2.3))

Non-amortizing loans (i.e., "bullet loans") and loans with limited amortization (i.e., "balloon loans") entail a higher risk, because their risk exposure does not diminish over time. They are also highly exposed to refinancing risk, especially if the economic conditions are (expected to be) depressed or distressed upon the loans' maturity. For instance, SME loans to borrowers active in the building and real estate (B&RE) sector and/or collateralized by real estate are often bullet loans.

Hence, for European balance sheet SME, we typically assume higher default rates for all bullet loans. We typically add to each bullet loan the higher of (1) the one-year default probability (i.e., the idealized cumulative default rate over a tenor of one year) using the borrower's rating factor equivalent obtained after Step 2.2[100] or (2) a default probability using the originator's rating over the maturity horizon of the loan. Typically, (1) is higher than (2). However, (2) allows us to better consider whether the originator is able to refinance the loan. Additionally, we consider on a case-by-case basis an extra stress for bullet loans (granted to borrowers active in the B&RE sector) when the loan-to-value (LTV) ratio is above 90% (although this is rarely the case).

This approach captures the near-term refinancing risk related to shorter tenor (i.e., one to three years) bullet loans.[101] We will review the need for an adjustment of the stress applied depending on the credit cycle at the time of the transaction closing and on the average life of the transaction.[102]

[100] For highly rated borrowers domiciled in EMEA, however, the borrower's rating factor equivalent (for that purpose) will be on a case-by-case basis substituted with a determined rating, currently typically equivalent to B1. This allows us to introduce a minimum stress for refinancing risk, for instance, for large corporates active in less risky sectors (i.e., with low rating factors).

[101] With the described stress for bullet loans, the cumulative default probability of a bullet loan maturing in one year of a borrower rated B1 would be doubled, whereas the cumulative default probability of bullet loans maturing in five years for the same borrower would be increased by only 30%.

[102] If we expect a decreased refinancing risk at the time the bullet loans are maturing, the bullet stress might be adjusted accordingly. More precisely, instead of doubling the PD, we may decide to add a stress of 25% or 50% to the one-year PD.

Appendix 6: Approach to Mapping Ratings and Scores Provided by Third-party Entities

Overview

In this appendix, we describe our approach for mapping ratings and scores from third-party entities, such as banks and specialized rating or score providers, to Moody's rating factors. We map third-party ratings for unrated assets included in e.g. certain collateralized loan obligations (CLOs) such as balance sheet CLOs or transactions backed by loans to small- and medium-sized enterprises (SME). Our mapping approach incorporates both qualitative and quantitative elements and is determined and periodically reviewed by rating committees.

A mapping is a correspondence between a third-party rating category (or class) and our rating factor as per our Idealized Cumulative Default Rates. The rating factor that results from the mapping allows us to associate a default probability with an asset that does not have a Moody's rating or a credit estimate. Rating factors are not equivalent to and do not represent traditional Moody's credit ratings. If we conducted an analysis commensurate with a full credit rating, the result may be significantly different.

Furthermore, we may seek a credit estimate for any unrated individual asset that accounts for more than approximately 3% of the portfolio, rather than using a mapping for the asset.

Qualitative Analysis

Our qualitative mapping analysis determines whether we can achieve a mapping that is sufficiently reliable for use in a transaction. We cover the key qualitative elements of the rating system during an operational review. More specifically, our operational review of the third party[103] includes an assessment of the entity's rating system methodology and associated processes, including the credit approval process, credit and loan personnel and systems. We also review the independence of its ratings assignments from its processes for both loan origination and the selection of assets for inclusion in the structured finance transaction.

Operational Review

During the operational review, we seek to understand the expertise and experience of the individuals who are responsible for assigning the ratings, the adequacy of staffing levels at the rating provider, and detailed information on the third-party rating process. If the rating provider is a bank, we also obtain an overview of its loan underwriting standards. The operational review also includes a discussion of the roles of the rating provider's relevant staff, any models, methodologies and systems involved and the set of procedures applicable to the assignment of an internal rating.

We will also seek information related to the rating provider's monitoring process, including the standard frequency of review of ratings, the circumstances which may prompt an unscheduled review and the placement of credits 'on watch' for further attention. Another factor we consider is the stability of the rating process itself.

Finally, we will review whether the rating provider is regulated and the applicable regulations governing the provider. If regulated, we will assess the frequency and extent to which the provider's ratings process is audited by an internal audit function and evaluated by an external regulator(s). Both the frequency of such reviews and the findings are relevant. For a bank's rating system, an important aspect is whether it has been approved for the advanced approach under the Basel II framework (or any subsequent revision thereof). We

[103] When the rating is provided by a specialized provider, the operational review will cover the specialized provider with respect e.g. to the rating system methodology and rating assignment process and the originator with respect e.g. to the use of the ratings.

consider mappings of these types of rating systems to be generally more reliable because of: (1) the close scrutiny bank regulators apply to assess a bank's internal credit processes, and (2) their acknowledged experience and expertise in assessing the credit risk of their customers and counterparties. Strong bank supervision and implementation of robust risk management processes greatly increase the likelihood that a bank will maintain consistent credit policies across time, as well as across borrowers in different regions and sectors.

If we believe the entity's rating system is not sufficiently complete or robust, we may apply more conservative assumptions or adjustments when determining a mapping or we may conclude that a mapping process is not feasible.

Quantitative Analysis

In general, to determine the correspondence between a third party's rating and Moody's rating factor, two approaches are possible:

1) If the rating provider's overall portfolio contains a sufficiently large sample of borrowers with monitored Moody's ratings and the sample is representative of the securitized portfolio, we perform a statistical analysis, comparing the third-party ratings to Moody's monitored ratings.[104] We call this the *rating matching approach*.

2) If the rating provider's overall portfolio contains an insufficient sample of borrowers with monitored Moody's ratings, we establish a mapping by comparing:

   a) The long-run average probabilities of default ("target PDs") assigned to each rating grade within the provider's rating system to our Idealized Default Rates of the same time horizon; or

   b) If the third party's rating system does not include target PDs, the performance (e.g. historical default rates) of the provider's rating system with the performance of Moody's monitored ratings over a similar time horizon.

Mapping approach 2.a. may be complemented by an analysis of performance data commensurate with the approach described under 2.b. We call this the *default rate matching approach*.

Regardless of the type of mapping approach, for each third-party rating category the best possible rating factor equivalent will be the one corresponding to the third-party 's expected default rates (i.e. based on its master scale if they have a master scale). This ensures that the resulting rating factors are no better than the third party's expected ones.

We may adjust the results of this quantitative analysis based on the qualitative analysis we describe above. These adjustments may affect the entire portfolio or only a fraction of it (e.g. an 'x'-notch adjustment is applied to the mapping only for assets originated in a particular country).

Rating Matching Approach

To establish a mapping between the third party's ratings (TPR) and our rating factors, we use a sample of borrowers with both a TPR and a Moody's rating and we establish a mapping function between the two by performing a regression of the TPR on Moody's rating, i.e. the dependent variable, adjusted to take into account the number of observations available for each TPR (for more details, see Box 7).

[104] We may also rely on RiskCalc to generate one-year expected default frequencies (EDFs) that may be compared to the provider's internal ratings and can be directly translated by using our Idealized Default Probability table. For more information, see *Rating Symbols and Definitions*. A link can be found in the "Moody's Related Publications" section.

Box 7. The Rating Matching Approach

We start with a frequency distributions table of Moody's ratings for the obligors in the sample that have been assigned the TPR (see Exhibit 6-1).

EXHIBIT 6-1

Sample Frequency Distributions of Third-Party Ratings (TPRs) and Moody's Ratings

	Moody's Ratings																				
TPR	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	CA	Grand Total
1	16.7%	22.2%	16.7%	16.7%	5.6%	11.1%	5.6%	5.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2	0.0%	6.5%	9.7%	9.7%	16.1%	16.1%	29.0%	12.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
3	0.0%	0.0%	4.0%	8.0%	18.0%	28.0%	20.0%	18.0%	4.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
4	3.0%	1.0%	3.0%	4.0%	12.1%	24.2%	16.2%	24.2%	7.1%	5.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
5	0.0%	1.5%	0.0%	1.5%	4.6%	13.8%	20.0%	20.0%	23.1%	13.8%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
6	0.0%	2.2%	0.0%	0.0%	2.2%	6.5%	8.7%	26.1%	39.1%	13.0%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
7	0.0%	0.0%	0.0%	0.0%	0.0%	7.1%	7.1%	32.1%	39.3%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
8	2.9%	0.0%	0.0%	0.0%	2.9%	5.7%	17.1%	22.9%	17.1%	14.3%	8.6%	8.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
9	0.0%	0.0%	0.0%	0.0%	4.2%	12.5%	0.0%	4.2%	37.5%	25.0%	4.2%	4.2%	8.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
10	0.0%	0.0%	0.0%	0.0%	0.0%	3.4%	3.4%	13.8%	13.8%	37.9%	10.3%	6.9%	6.9%	3.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
11	0.0%	0.0%	0.0%	0.0%	0.0%	7.1%	0.0%	7.1%	14.3%	14.3%	28.6%	7.1%	14.3%	7.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
12	0.0%	0.0%	0.0%	0.0%	0.0%	5.4%	2.7%	5.4%	13.5%	18.9%	10.8%	10.8%	13.5%	10.8%	2.7%	2.7%	2.7%	0.0%	0.0%	0.0%	100.0%
13	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	9.1%	18.2%	0.0%	9.1%	0.0%	9.1%	27.3%	9.1%	18.2%	0.0%	0.0%	0.0%	0.0%	100.0%
14	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.9%	0.0%	11.8%	23.5%	5.9%	23.5%	11.8%	11.8%	0.0%	5.9%	0.0%	0.0%	0.0%	100.0%
15	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.7%	0.0%	16.7%	16.7%	0.0%	16.7%	16.7%	16.7%	0.0%	0.0%	0.0%	100.0%
16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	5.0%	10.0%	5.0%	15.0%	0.0%	30.0%	20.0%	5.0%	0.0%	0.0%	100.0%
17	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	25.0%	12.5%	0.0%	12.5%	0.0%	12.5%	0.0%	12.5%	0.0%	100.0%
18	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%	0.0%	33.3%	0.0%	0.0%	33.3%	0.0%	0.0%	100.0%
19	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
20	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	20.0%	20.0%	0.0%	20.0%	20.0%	20.0%	0.0%	0.0%	0.0%	100.0%

Source: Moody's Investors Service

Our objective is to derive a mapping function taking into account that for some TPRs, many observations (in terms of monitored Moody's ratings) are available while for others there are only few.

We consider three different statistical models: linear, exponential and second order polynomial, to explain the relationship between the monitored Moody's rating (dependent variable) and the TPR (independent variable) by fitting a curve between the percentile levels (the z%-tiles) of each TPR-specific frequency distribution of monitored Moody's ratings and the TPR. To find the optimal parameters for each model, we minimize the sum of weighted least-squares. For each TPR category, we take into account the number of observations available.

We then implement a constraint that the rating factor that the statistical model generates for the TPR representing the lowest credit risk must be equal to or worse than the respective z%-tile Moody's rating.

When choosing a certain percentile (the z%-tile), we typically conduct a sensitivity analysis by deriving alternative mapping functions using a slightly higher and/or lower percentile. We may complement our analysis by carrying out a scenario analysis for a larger number of different percentile levels where in a first step, we determine the level of credit enhancement necessary for a theoretical senior-most liability tranche with a Aaa target rating and using a portfolio mapped using the given z%-tile. Next, we calculate the rating impact (through Moody's Metric, MM[105]) of adjusting the percentile to a higher level, using the same credit enhancement level. By repeating this exercise up to the 100th percentile and using the same incremental step size when adjusting the percentile, we can calculate the expected MM by weighting the respective percentiles by their probabilities of occurrence. The expected MM must lie within a predetermined tolerance level, which we generally take to be 2 rating subcategories. If the tolerance is exceeded, then either the starting point of the mapping must be more conservative (i.e. a higher percentile), or a larger sample must be gathered to reduce statistical uncertainty.

[105] For more information, see Moody's CDOROM™ User Guide on www.moodys.com.

Default Rate Matching Approach

To establish a mapping between the third party's ratings (TPRs) and our rating factors using the default rate matching approach, we compare our Idealized Default Rates at the same time horizon and the third party's long-run average probabilities of default for each third-party rating category. If the third party's system does not include this information, we compare the performance of the provider's rating system, expressed for example by historical default rates, with the historical performance of Moody's monitored ratings over a similar time horizon.

The rating factors we derive from this approach need to be supported by the validation results, both in terms of discriminatory power and if applicable, calibration level over a full economic cycle.

Data Quality

While reviewing the third-party rating system in our operational review as we describe above, we also assess the sample and quality of the data provided to establish the mapping. We typically review a number of key factors:

» **Rating system**: We review the rating system concept, such as the default definition (and how it differs from our default definition[106] and the securitization's default definition), the time horizon (i.e. point-in-time vs. through-the-cycle), the main components (e.g. financial, behavioral and qualitative) and the sources of the inputs.

» **Back testing and historical data**: We look for data supporting the third party's rating scale, including default rates and rating transitions, ideally covering at least the previous five years or a full economic cycle, including a recession.[107]

Typically, to create a mapping relationship between a sample of the third party's ratings and our rating factors, the sample comprises the entire universe of assets of the type that will be securitized (i.e. the sample should be representative of the securitized portfolio). The data sample may also be tailored to match the characteristics of the portfolio that will be securitized, with assets' attributes such as industry, country, obligor size and credit quality in similar proportions.

Monitoring

When monitoring a transaction where the credit quality of the portfolio is determined using a mapping, we monitor the mapping by looking for the following information:

» Reported overall delinquency and default rates in the portfolio are in line with what we would expect from the average mapped quality of the portfolio, and whether defaulted assets exhibit unusual behaviour.

» Third-party rating provider to confirm that there has been no significant change in their rating process or approach since the mapping was established. In case we obtain limited or insufficient confirmation, we may apply an additional default probability stress to the mapped rating factors.

We periodically refresh our mapping analysis given that the relationships between the third party's rating and our rating factors may drift over time. Our refreshing of existing mappings is generally similar to the

[106] Moody's definition of default is (1) a failure to pay interest of principal when due, (2) the filing for bankruptcy or a similar insolvency/receivership event, or (3) a restructuring or distressed exchange that has the effect of diminishing the present value of the creditor's obligation or postponing default. For more information on Moody's definition of default, see *Rating Symbols and Definitions*. A link can be found in the "Moody's Related Publications" section.

[107] We may also request to evaluate a smaller 'control' sample of unrated names which have been analyzed through Moody's Analytics CreditEdge® and/or RiskCalc models or which have been assigned credit estimates as a further test.

approach we use to assign initial mappings, incorporating both an updated operational review and quantitative analysis.

Other events such as significant, unexplained credit deterioration in the portfolio as well as material changes in the third-party rating process or approach may prompt a refreshing of our mapping. All mappings which are older than two years are subject to an additional default probability stress when used in our monitoring analysis. When the remaining number of mapped assets has reduced over the transaction life, we may subject the mapped assets to a default probability stress given that the mapping becomes less statistically robust the smaller the number of assets in the transaction portfolio.

Appendix 7: European Recovery Rate Approach in Detail

Roadmap for Stressed Recovery Value

Exhibit 7-1 is setting forward the roadmap for stressed recovery value assumptions in European SME ABS transactions.

EXHIBIT 7-1

Roadmap for Stressed Recovery Value Assumption in Rating SME Balance Sheet Securitizations in Europe

Country- Specific Recovery Rate for Secured Loans	Jurisdiction specific
Portfolio-specific Quality Adjustment	**Valuation of commercial real estate (CRE) property**: Due to often incomplete information on CRE prices, the regional specific house price stress rate (HPSR) as defined for residential real estate properties is typically increased by 1.2 times for CRE prices. **Unsecured loans**: RR of 25%. ***Expected foreclose costs**: at 5%-10% for residential properties (depending on jurisdiction) and applying a stress factor of 1.05 to 1.1 times for the commercial properties due to lack of specific data.*
Servicer Quality Adjustments	-5% - +5% depending on the ranking of the servicer.
Final result:	**Stressed recovery rate transformed into a stochastic recovery rate**: + 5%-10% on the stressed recovery rate.

Source: Moody's Investors Service

Country-Specific Recovery Rate for Secured Loans

There are significant differences between bankruptcy regimes in European jurisdictions, which clearly impact the final realization proceeds and the timing of recoveries (i.e., the recovery lag). We classified European countries in four tiers depending on the creditor-friendliness of the bankruptcy regimes and the security package.

These tiers reflect the predictability of the length and outcome of the legal processes and the degree to which competing interests of creditors and other parties are addressed in a balanced manner under the laws of that jurisdiction.

To determine the expected recovery rate for a senior fully secured loan in a given country, we assess the prevailing stage in the credit and real estate cycle and analyze national residential and commercial real estate prices.

Portfolio Quality Adjustment

To reflect the portfolio quality of an SME loan portfolio that is collateralized (at least partially) by real estate properties, we apply a loan-by-loan stressed recovery rate approach similar to the one used for rating RMBS transactions[108] (assuming sufficient collateral data is provided). This approach allows us to consider in our analysis on a loan-by-loan basis the following aspects in detail:

» economic lien (typically first economic lien)

» degree of collateralization of the portfolio (e.g., the portion of unsecured loans and loans backed by land, percentage of loans backed by mortgages)

» property value versus loan balance at closing (i.e., the LTV)

[108] For more information, see our methodology for rating residential mortgage-backed securities. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

» type and location of property provided as collateral (e.g., residential versus commercial property).[109]

Specifically, the differences in the legal framework highlighted are reflected in our country specific assumptions on the foreclosure costs, the time to foreclosure, the level of interest accrued and the property price stress rates applied to each loan, depending on the location of the property.

This approach also enables us to take into account the pro-cyclicality of the collateral requirements by the lenders. An update of the house price stress rate (HPSR) for a specific country will prompt an update of the values used to determine our recovery rate in such country.

To determine our stressed recovery value for a specific portfolio, we apply on a loan-by-loan level a fixed recovery rate assumption of 25% for unsecured loans and the above approach used for RMBS with the following portfolio specific adjustments for collateralized loans:

1) The HPSR for commercial real estate properties is typically derived by stressing 1.2 times the HPSR defined for residential real estate properties.[110]
2) Loans secured by undeveloped urban land are considered to be unsecured loans to account for the high volatility experienced by prices for urbanized land. For loans backed by rural land, a decision is taken on a case-by-case basis.
3) Second (or higher) economic lien mortgage loans are typically treated as unsecured loans, as first economic lien information is typically unavailable to us and, hence, the value of the higher lien mortgage cannot be determined.
4) The foreclosure costs applied to commercial properties are derived by increasing upwards by 5% to 10% the foreclosure costs assumed for residential properties to account for the complexity of the legal proceedings when liquidating a commercial property.
5) The market value of the properties might be adjusted up or downward on a case-by-case basis depending on the type of the property valuation conducted by the originator (desktop versus external valuation, liquidation versus market value) and on the country-specific development of the real estate prices since their valuation (indexation).

With this approach, we obtain a stressed recovery value on a loan-by-loan level (i.e., a recovery value expected by applying the HPSR to the property's market value, if any).[111] This is also benchmark with the exposure weighted-average downturn LGD estimated by the originating banks that adopt the advanced internal rating based approach under Basel II. However, LGD estimates need to be treated cautiously because the integration of downturn effects in LGD estimates is challenging due to the limited data available. Therefore, we will review in detail the validation results of the internal estimates.

Servicer Quality Adjustment

Our final recovery rate assumption also takes into account the quality of the underwriting/servicing carried out by the originator/servicer of the portfolio, because the servicing standards for the management of late delinquent and defaulted loans have a large impact on the ultimate recovery rates.

109 Note that the adjusted MILAN approach does not consider the occupancy type, because this information is usually not provided by the originator. The investment purpose mainly drives the type of purchaser if the borrower defaults and the owner needs to sell the property. Purchasers of income-producing real estate are primarily professionals in the real estate sector (real estate investors), while buyers of warehouses, industrial buildings and offices can be other SMEs that need space for their activities. Some of these properties might be tailor-made, so their price depends on the outlook for that specific economic sector.

110 This is based on the price corrections of commercial properties shown during previous real estate crises, such as those seen at the beginning of the 1990s or between 2007 and 2009 in the UK.

111 The recovery cash flows are not discounted for the cash flow model when the timing of recoveries is considered directly in the cash flow model.

Appendix 8: European SME Securitization with High Real Estate Exposure

Overview

SME portfolios can be exposed to fluctuations in the real estate market in two main ways:

Borrower Activity: The borrower can directly operate in, or be strongly linked to, the B&RE sector. This sector is heterogeneous and comprises (1) companies developing, trading or holding land or real estate properties (e.g., real estate developers, REDs); (2) building material companies; and (3) construction companies that generate the majority of their total revenues as general contractors or subcontractors of the construction or refurbishment of buildings used for residential, commercial or public purposes, civil infrastructure and industrial infrastructures (including dams or oil and gas facilities).

In EMEA, the importance of the construction sector (without the RED activities) varies considerably among European countries, depending on the development of the real estate market over the past two decades. This is also reflected in the composition of the securitized SME loan portfolios.

Type of Collateral: Unlike loans to large corporates, loans to SMEs are often collateralized by real estate properties including:

1) **Owner-occupied commercial real estate properties**: The majority of loans to SMEs are collateralized by the premises of the debtor, such as commercial real estate properties occupied directly by the SMEs (e.g., industrial buildings, offices, warehouses, retail stores and hotels).
2) **Residential or mixed properties**: Loans to microenterprises are sometimes collateralized by residential (or mixed) properties (i.e., the house of the owner or a building with both residential and business premises). This is because there is typically no real distinction between the wealth of the owner and the assets of the company (often an individual enterprise).
3) **Income-producing real estate properties** (both residential and commercial): SME loans can be taken out for investment purposes by all SMEs, not only by SMEs active in the B&RE sector. The loan purpose is usually "buy-to-let" and the collateral can be residential (e.g., for a homebuilder) or commercial real estate. The default probability of the loan is also related to the sustainable cash flow generated by the purchased properties. However, the main source of reimbursement still remains the total borrower's cash flow from the operating company. This is different from loans in CMBS transactions, where the borrower is typically a bankruptcy-remote vehicle with the real estate properties as its only assets.
4) **Land**: Loans to REDs are sometimes only collateralized by land because the purchase of land is the first step in the development of a building project.

In EMEA, all real estate properties collateralizing the SME loans are completed[112] and, as such, the loan receivables included in SME transactions are typically not exposed to construction risk, whereas in Japan a portion of the portfolio might be exposed to construction risk.

Special Risks and the Treatment of Loans Exposed to Construction Risk

SME loans to borrowers active in B&RE, especially when involved in RED activities and/or collateralized by real estate properties, are often bullet loans with a maturity of one to two years. This reflects the nature of the real estate business. These loans are typically paid down in a lump sum using proceeds from the sale of

[112] All properties used as collateral have an "occupancy license" if the property is residential or a "start of activity" license if the property is commercial. This is also valid for loans to REDs, whose purpose is to develop a real estate project. REDs frequently use existing properties as collateral to obtain new loans.

the mortgaged properties or proceeds from a refinancing loan. If the property has not been sold by the expected maturity date, the obligor will have to renew the loan or refinance it with a new loan provided by other financial institutions. If neither course is possible, the obligor will have to use its own funds to pay down the loan.

Construction risk may include the risk of (1) postponing of the termination date of the construction due to, for instance, technical or administrative issues (e.g., the discovery of geographic obstacles or denial of the occupancy license due to non-compliance with the regulations), or adverse weather conditions; and (2) jeopardizing the project's economic viability due to adverse market development for the construction costs.

Appendix 9: Incorporating Sovereign Risk to SME Balance Sheet Transactions

Loss Distribution Curve Accounts for Changes in the Probability of High Loss Scenarios

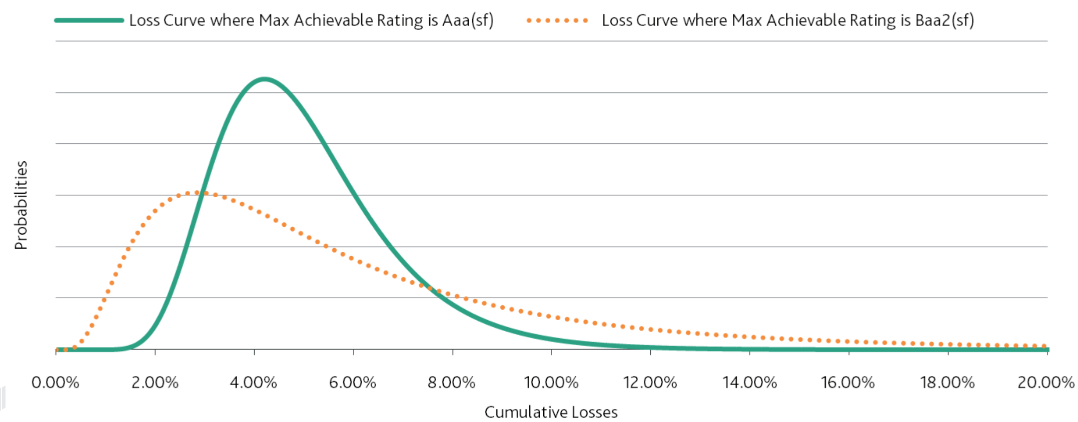
The modelling approach for SME ABS transactions usually takes into account a country's local currency country ceiling (LCC) when calibrating the portfolio loss curve, which we use to generate portfolio losses. In particular, we typically define the portfolio credit enhancement as the credit enhancement consistent with the highest rating achievable in the country (i.e., the LCC).[113]

As Exhibit 9-1 shows, two loss distributions reflecting the same amount of credit enhancement (CE) but different maximum achievable ratings will have markedly different shapes, meaning the losses and their associated probabilities differ markedly. The loss distribution for a maximum achievable rating of Aaa (sf) has a lower probability of very high loss scenarios than the loss distribution for a maximum achievable rating of Baa2 (sf).

EXHIBIT 9-1

Calibration of Credit Enhancement to Aaa (sf) vs. Baa2 (sf)

Same Portfolio Credit Enhancement for Different Country Ceiling Levels (Granular Portfolio)



Source: Moody's Investors Service

Under this approach, if we lower the maximum achievable rating for structured finance transactions in a country, we will not necessarily lower the amount of CE necessary. For example, if a maximum achievable rating of Aaa (sf) previously corresponded to 10% CE, a new maximum achievable rating of Baa2 (sf) may also correspond to 10% CE, to account for the risk of a higher probability of high loss.

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

This approach provides for a consistent stress across the capital structure, from the senior to the junior classes. The revised loss distribution captures a change in the level of country risk and resulting changes in the maximum achievable rating or the relevant CE (for junior notes).

When we use the top-down approach to assess the expected default probability of individual obligors in a pool, we usually already incorporate a macro-cycle adjustment and a sector-specific adjustment.[114] Such

113 Under certain circumstances, in particular for low ceilings, we might consider alternative loss distribution assumptions or might not adjust our loss distribution assumptions in light of the LCC.

114 For more information, see section 2.1.4, and specifically steps 3.1 and 3.2.

adjustments are typically calibrated based on sovereign-related considerations in the respective country. In that case, we may consider modifying appropriate assumptions to derive the portfolio CE in order to avoid over-estimating sovereign risk in a transaction.

Minimum Portfolio Credit Enhancement

Furthermore, for transactions issued in countries where the availability of information limits the predictability of severe stress, our analysis will also consider additional features. Specifically, we may subject the CE consistent with the highest rating achievable in a given market to a floor, the minimum portfolio CE. This minimum portfolio CE mitigates general market factors such as system-wide event risk and asset correlation, which could lead to high losses in the pool in the event of extreme stress despite overall good asset quality. We will set the minimum portfolio credit enhancement level at different levels for each affected country and asset class, to reflect the underlying economic uncertainty of the asset class in the specific market.

We generally determine the minimum portfolio CE levels for each country as a function of the potential deterioration arising from macroeconomic, social or political events that would affect all portfolios originated in a particular jurisdiction, regardless of (a) the strength of the origination and underwriting processes of an originator, (b) the type of borrowers in a portfolio, or (c) the characteristics of the underlying security the borrowers provide.

We apply such minimum portfolio credit enhancement levels as long as we assume that those conditions will prevail.

Appendix 10: Monitoring US SME Securitizations Backed by Commercial Real Estate Loans

In this Appendix 10, we describe our approach for monitoring US SME securitizations backed by small balance commercial real estate (SBCRE) loans, which were closed in or before 2011. We do not run a model as part of this approach, instead we perform a loss coverage analysis.

Analysis of Small Balance Commercial Real Estate Loans

Roll Rate Method for US Small Balance Commercial Real Estate Loans: This approach evaluates historical roll rate behavior of loans and extrapolates these roll rates forward to determine an expected gross loss on the pool. We evaluate historical roll rate behavior by looking at the rate at which loans pay in full or move through delinquency to default over a specified period of time. Historical roll rates are applied to the pool as a starting point going forward, with adjustments to those assumed roll rates to account for future expected improvement or deterioration in economic conditions and, therefore, pool performance, to arrive at an expected gross loss. Additionally, adjustments to the roll rates for certain loan characteristics, such as balloon payments or previous modifications, are used. To determine the expected net loss, recovery rates are applied. We then compare the net loss number with the credit enhancement available under the rated notes (loss coverage analysis).

Increasing Concentration Risk as Pools Age:[115] Some of the highly seasoned US SBCRE transactions have relatively concentrated pools due to the lower number of remaining loans. For these deals, we usually do not receive borrower financial statements or regularly updated property valuations, and therefore we may use LTV estimates and delinquency status and history to analyze potential default and recovery scenarios.

In order to estimate the LTVs of loans, we approximate the current market value of the property by applying the change in the commercial property price index ("CPPI") from the date of the most recent valuation to today, adjusting for any downward movements. Furthermore, we typically adjust the estimated property value downward to account for differences in properties that comprise the CPPI compared to the property in the securitization. We use the LTV to determine the amount of liquidation proceeds to the trust if a loan defaults.

We evaluate a variety of scenarios, such as a scenario in which delinquent loans and loans that have been delinquent in the past default, loans with highly stressed LTVs default, or the top five largest loans default. For these scenarios, we use a recovery rate based on the loan's LTV or a stressed recovery rate. In general, we also consider the condition of the commercial property market and the potential volatility associated with the small number of remaining loans.

115 For more information, see also section 7.1, "Pool Size."

Appendix 11: Japanese Apartment Loan Securitizations

In Japan, an apartment loan is a financing instrument for high net-worth individuals or small business obligors who want to build or purchase apartments for rental. Monthly rents are used to pay down the apartment loan. Upon a loan default, the underlying apartment building is usually liquidated. We take the following transaction characteristics into consideration in our analysis.

1. Characteristics of Apartment Loan-backed Securities

» There are two types of obligors in apartment loans: the landowner and the investment owner. Landowners take out apartment loans to obtain tax deduction or to make better use of their land. Investment owners take on debt to purchase land and an apartment building to realize income gains.

» Most obligors hire a property management firm – typically the company that will put up the apartment building – or an affiliate or master lessee as property manager.

» The maximum loan amount is usually around JPY200~300 million but varies according to the originator and the value of the apartment (or building). The typical maturity of an apartment loan is around 30 years. The apartments are generally scattered around Japan.

» Most initial LTV levels are around 70%~80% based on external valuations. External values are typically calculated based on the land value and the building construction cost.

» Apartment loans are classified as either recourse loans or non-recourse loans. A non-recourse loan is secured by collateral for which the borrower is not personally liable. The main source of the loan payments will be rents, the stability of which will depend on the property characteristics – which will significantly affect the performance of a loan.

» The number of obligors for securities backed by apartment loans is typically several hundred at closing.

» Payment to noteholders is typically made either on a sequential basis (sequential payment structure) or based on target redemption amounts (target redemption payment structure), although other structures can be considered.

» Servicers are mostly the originating banks or third-party servicers.

2. Estimating the Cumulative Default Rate

To determine a cumulative default rate estimate, we review the historical performance of the portfolio and of comparable outstanding transactions. We examine obligor attributes, loan and property attributes, and any non-recourse provisions to estimate the cumulative default rate in a pool. Generally, the main source of periodic loan repayments will be the rent, to which our default estimate is sensitive.

As such, we consider DSCR when determining default rates at closing. DSCR represents the profitability of the property and is calculated based mainly on rents, vacancy rates, operating expenses, taxes, repair costs, and loan payment amounts. Each property attribute – location, submarket, real estate market trends, type of construction, and age – is taken into account. We do not give credit to rental guarantees in our analysis for high target ratings, because the credit qualities of the master lessee or rental guarantors are either unknown or insufficient for a high rating. Therefore, in our analysis, rents are dependent solely on the quality of the property.

Additionally, we assume that, when the DSCR is under pressure, the default probability of an apartment loan is further impacted by the type of recourse, the building purpose and the obligor's financial strength. We expect obligors who build apartments for tax benefit purpose have a high incentive to maintain payments to avoid default regardless of recourse provisions, because they are usually high-net worth individuals being land owners or business owners that are well-known in their respective area. In that scenario, our estimated default probability of obligors will not differ significantly between recourse and non-recourse loans. On the other hand, for obligors who build apartments for investment purpose, recourse provisions may positively incentivize them to maintain payment when the property cash flows are under stress.

When the securitized portfolio is granular, we assume defaults are typically log-normally distributed. Alternatively, when the securitized portfolio has significant concentrations at closing (or concentrations increase significantly during the life of a transaction as loans default or repay), we usually determine a transaction-specific default distribution by using a Monte Carlo simulation approach. We may also verify that the amount of credit enhancement under a given class of notes is sufficient to protect this class from the risk of a default by the largest borrowers.

The assumed timing of default varies also, with a concentration of defaults expected after the first ten years of the loan, as it becomes more difficult to find new tenants while properties deteriorate over time and newly built apartments come to the market.

3. Estimating the Recovery Rate

Whether a loan is recourse or non-recourse, recoveries upon obligor default will depend mainly on the liquidation proceeds of the property. This means that the collateral value, i.e. land and apartment building, is a key factor in estimating the recovery rate for apartment-loan securitizations. The recovery rate is calculated as the stressed property value (Moody's stressed value) over the outstanding loan balance.

We use two alternative approaches to determine the recovery rate upon loan default. The main approach assumes a variable recovery rate that depends on the timing of a potential default. In that scenario, we assume that the property value remains at the original Moody's stressed value for an initial period before decreasing over time down to a floor value that relates to the land value (see following section for more details). We may also use a constant recovery rate (calculated as a fixed percentage of outstanding loan balance), irrespective of the timing of a potential default. The assumed future value of the property, in this case, is directly proportional to the outstanding loan balance. We expect that the first approach provides a better recovery rate estimate. However, estimating future property value curves requires individual property analysis based on detailed information on collateral properties, which is not always available.

4. Time-series Evaluation of Collateral Value

The amounts recovered from the sale of property vary according to the valuation approach, for example, whether income or cost or combination of both. We use multiple valuation methods for individual properties, in light of the property characteristics and age.

The length of time – as a portion of the loan term, for example – to be used to determine a property's value will depend on the age of the property. For example, on a 30-year apartment loan for a new apartment building, we will evaluate each ten-year period using a different approach, as described below, because an income approach may not be appropriate over the full term of the loan for typical apartment buildings whose value could depreciate in a much shorter time.

EXHIBIT 11-1

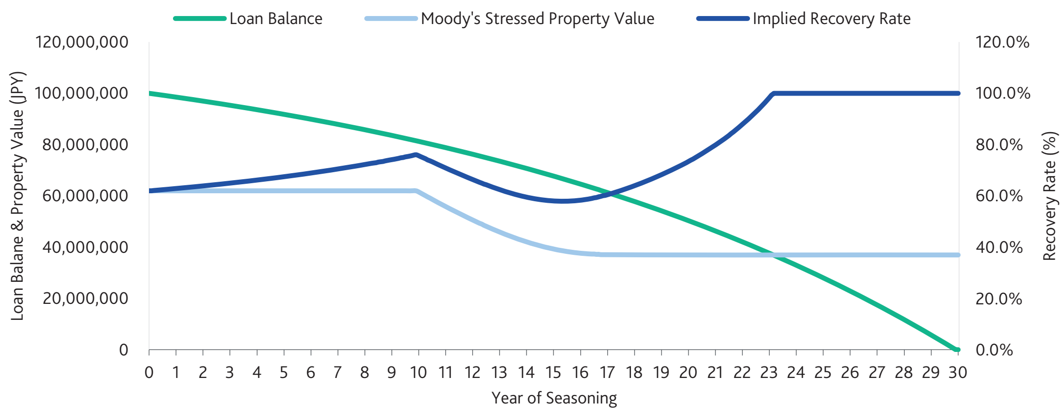
Collateral Value over Time

First ten years:	We evaluate the initial collateral value (Moody's value) based on an income approach (i.e. a net cash flow value, assuming sustainable rents, vacancy rates, expenses and cap rates). We then haircut that value to arrive at a Moody's stressed value.
Next ten years:	We link the values for years 10 to 20 with a bow-shaped line.
Last ten years:	We estimate that the life span of an apartment building is 20 years and that its value will equal its current rosenka land value estimate (as appraised by the National Tax Administration Agency) for the remaining 10 years of the loan.

Source: Moody's Investors Service

EXHIBIT 11-2

Example of Moody's Expected Collateral Value and Related Recovery Rate over Time



Source: Moody's Investors Service

5. Expected Loss Approach

Once the asset-side modelling assumptions and transaction-specific inputs are implemented, a cash flow model produces a series of default scenarios. In each default scenario, the corresponding loss for each class of notes is calculated given the incoming cash flows from the assets and the outgoing payments to third parties and noteholders. The expected loss for each tranche is the sum product of the probability of occurrence of each default scenario and the loss expected in each default scenario for each tranche.[116]

We usually run sensitivities to a variety of key asset inputs (e.g., expected PD, prepayments) and structural features (e.g., triggers if any) in order to test the sensitivities of note ratings.

[116] For more information, see the discussion of Idealized Probabilities of Default and Expected Losses in *Rating Symbols and Definitions* (a link can be found in the "Moody's Related Publications" section) and in section 8, "Loss Benchmarks."

Appendix 12: Venture Debt Securitizations

This appendix provides an overview of where the analysis of venture debt differs from our approach of rating SME backed ABS. Venture debt securitizations are typically backed primarily by pools of senior-secured term loans to developmental stage growth companies in which venture capital firms invest. These pools typically consist of less than 100 obligors, and are concentrated in a few industries, compared with most other SME securitizations, which have more granular portfolios.

As such, in rating venture debt securitizations, we first perform an obligor-by-obligor assessment of the securitized collateral pool. The results of this analysis are the obligors' default probabilities and recovery rates. In the structural analysis of the securitization, we apply the default probabilities and recovery rates in Monte Carlo simulations and in a cash flow model to assess the transactions' structural features.

Collateral Analysis

Analysis of Loan Obligors

We start our collateral analysis by evaluating the creditworthiness of the loan obligors based on the underlying credits in the pool. We perform analysis on an obligor-by-obligor basis because pools are typically not granular. We analyze several credit aspects of the loan obligors and collateral including cash on the balance sheet, cash flows and cash burn rate, future loan commitments, their lines of business, their plan of development and future equity raises, venture capital ownership and percentage, combined loan-to-value (LTV) and lien position. We next generally examine the development status of the companies, with a focus on the underlying intellectual properties; the amount of equity raised; any relationships with co-lenders; product revenues; and debt service. We use these criteria to help determine how far along the obligors are in the development process. In our view, those we deem to be furthest along have the greatest viability.

We apply a default probability to each obligor based on all of these factors. For example, we might assume that a life sciences company with the highest degree of viability will have a default probability commensurate with a single-B rated company, while a technology company that is early in its development might warrant a default probability in the Caa-range.

Analysis of Historical Performance

Next, we review the originator/servicer's capabilities and historical performance data. A qualified servicer will have several years of data covering originations, loan modifications, delinquency and charge-offs for its entire portfolio. The data will reveal both the reasons for modifications, as well as frequency of defaults and recoveries upon default, segregated by vintage, sector and lien type. The sponsor data that we have received and analyzed were for loans originated after the 1999-00 tech bubble. Therefore, those loans and their obligors did not have to weather the dramatic reduction of liquidity that occurred during the bubble. Also, the historical data are from non-granular pools and do not allow for methods of analysis that are applied to granular pools.

Servicer Quality

A critical element of our rating approach is an evaluation of the servicer's capabilities. The servicer, which is normally the originator of the loans, monitors the performance of the underlying companies and whether they adhere to the terms of the loans, negotiates changes in the terms of the loan agreements and works out any troubled loans.

The servicer usually has in place surveillance processes that are designed to identify risks early. Toward this end, the servicer's loan and compliance administration group monitors the portfolio companies to determine whether they are meeting their financing criteria and the goals in their business plans. The servicer monitors the financial trends of each portfolio company by examining its periodic financial statements, to assess the appropriate course of action for each company and to evaluate overall portfolio quality. In addition, the servicer's management team closely monitors the status and performance of each individual company through contact with the company's management team and its financial sponsors. A lender can use its lien position and its control of the borrower's cash accounts as leverage over both the borrower and the venture capital firms to facilitate debt restructuring or payoff of an at-risk credit even before default. Therefore, borrowers rarely default because their loans are often modified or restructured before a default can occur.

Upon a delinquency or default, the servicer establishes an action plan and monitoring program, to pursue the highest recovery. The servicer typically has the ability to assist or advise companies with internal control, recruiting, financing, mergers and acquisitions, strategic planning and manufacturing and procurement, and is also capable of refinancing the transaction in appropriate cases. Under limited circumstances, the servicer can sell or substitute loans in the collateral pool. Loan substitution is a structural feature that transactions often use to minimize reduction in weighted average life of the transactions by substituting new loans for loans that plan to prepay. A criterion for substitution is that the substitution cannot materially affect portfolio characteristics. A too-high substitution percentage could affect or impair the legal true sale of the collateral and could therefore materially weaken the credit profile of the venture debt transaction. (See the True Sale/True Contribution section of this report for more on legal risks.) The substitution feature is typically credit negative because it cannot only eliminate the benefits of prepayments (through refinancing, merger, acquisition or initial public offering takeout) but also introduces the risk of new loans potentially being of lower credit quality than the substituted loans.

Back-Up Servicer

We also assess the back-up servicing arrangements for managing and monitoring of the loan portfolio in the event of a sponsor's bankruptcy. As part of this analysis, we take into account the rating or credit profile of the sponsor (as an indicator of the likelihood that it will have to be replaced), the back-up arrangements, and the experience and resources of the back-up servicer to be able to effectively take over the responsibilities, if necessary. In conjunction with assessing the back-up servicing arrangement, we assess whether a low-rated sponsor can issue a venture debt ABS that is consistent with a high-investment grade rating.

Structural Analysis

Cash Flow Simulation

Based on the default probability we apply to each obligor, we simulate defaults in the collateral pool and run the results through a cash-flow model that reflects the transaction's structure. The model simulates obligor defaults, taking account of each obligor's assigned credit quality. We assume a stressed liquidity environment that reflects venture capital cycles, but not necessarily general market conditions, during which obligors will find obtaining new rounds of equity financing very difficult and operating performance will likely be weak, resulting in a rise in default correlations among the obligors. Our modelling incorporates the correlation framework stated in this methodology by using CDOROM to simulate default correlations. The modelling tool pools losses based on a standard single-period Gaussian copula model using Monte Carlo simulations of defaults through stressed correlated asset values. Stressing correlation does not increase the average default probabilities but fattens both tails of a default distribution. We generally use stressed asset correlation values of 10% for inter-industry correlation for B-rated and below credits to reflect a stressed liquidity scenario as well as intra-industry correlation of generally 12% for the high industry concentrations typical in venture debt portfolios. Pools with a high degree of industry concentration similar to transactions completed in the sector would typically have a correlation of approximately 22%. However, the correlation used for new transactions depends on a number of factors, particularly industry concentrations.

In CDOROM, we take into account the underlying amortizing venture debt by modelling each of the scheduled principal payments as bullet loans to the same obligor. We do not model prepayments resulting from venture debt market dynamics such as refinancing, mergers, acquisitions or initial public offering because the loan substitution feature typical in venture debt transactions potentially allows the sponsor to substitute for loans that will prepay. CDOROM does not model interest income on the pool of loans. Therefore, we use a cash flow model in conjunction with CDOROM to model excess spread. We also use the cash flow model to account for structural features such as cash flow waterfall, borrowing base and excess concentrations.

The originator/servicer data we have analyzed show that recovery rates on defaulted loans over the last 10 years vary considerably. Although venture debt has a very low combined LTV ratio initially, around mid-teens on average, the recovery data that we have analyzed show that upon default, low LTVs do not provide sufficient protection against losses. One reason for that is that when a company is in distress, its value drops and no longer provides the high protection one would initially expect. We observed this in the decline of NASDAQ following the tech bubble. Although the NASDAQ is relevant for the public companies, an even higher decline in value likely occurred among private start-up companies. Given the often illiquid nature of the assets backing the loans, we assume very low recovery rates, typically between 0% and 20%. We also assume that any recoveries will be realized a year after default, to reflect the illiquid nature of the collateral, which generally include intellectual property.

Once we simulate defaults and recoveries from the asset pool, we pass these through a cash flow model of the transaction structure to determine the losses to bondholders. Each Monte Carlo simulation consists of many thousands of iterations. The primary model output is expected loss (EL). We calculate the average EL in all of the iterations and use them to help determine the appropriate ratings. We have established benchmark levels of average EL for different rating levels as shown in our published idealized targets. To determine the model output, we compare the EL calculated in the modelling analysis to the benchmarks.[117] The model results are generally very sensitive to obligor default, asset recovery and correlation assumptions.

Credit Protections

Typically, venture debt transactions incorporate a number of the following credit protections:

Over-collateralization: The advance rate for venture debt transactions against the aggregate principal balance of a loan pool depends on the deal structure and underlying collateral. Typically, transactions are structured so that over-collateralization grows as the loans prepay or mature, shrinking asset pools and increasing obligor concentration, which triggers concentration limits, causing the notes to begin paying down. Substantial over-collateralization helps protect typically highly concentrated pools from both a pullback in venture debt industry, and the less-developed nature of start-up companies, which typically have no operating cash flows.

Reserve fund: Venture debt transactions generally incorporate a reserve fund as a source of both credit enhancement and liquidity.

Excess spread: The interest rates on the underlying loans have typically ranged from the high single digits to the high teens. In addition, some of the loans could have end-of-term payments (e.g., ranging from 0% to 5% of the loan amount), which increase yield and cash flows to the transactions. The combined yield

[117] For more information, see the discussion of Idealized Probabilities of Default and Expected Losses in *Rating Symbols and Definitions* (a link can be found in the "Moody's Related Publications" section) and in section 8, "Loss Benchmarks."

relative to the issued notes' coupon produces substantial excess spread. However, some structures do not use all the excess spread to pay down the transaction.

Concentration limits: Venture debt transaction pools typically consist of fewer than a hundred obligors and could thus be subject to the risk of default of a single or small group of obligors. As the notes pay down and the venture debt pool amortizes, concentration risk typically increases. To address this risk, the transaction incorporates obligor concentration limits. In the event of a breach of these limits, the transaction will divert cash flows to the noteholders until the concentrations fall below the prescribed limits and thus increase over-collateralization that is necessary to reduce tail risk in a highly concentrated pool.

Rapid amortization: Some transactions are structured to allocate all available cash flows to pay down the rated notes upon the closing of the transaction. Other transactions rely on performance-based triggers to cause an acceleration of cash flows to noteholders. These performance-based triggers, known as rapid amortization triggers, are usually based on prescribed thresholds such as delinquency and default rates, as well as over-collateralization levels and concentration limits. Typically, an event of default is also an early amortization trigger.

Legal Risks

The legal risk analysis for venture debt transactions is similar to Section 4 of this SME Methodology. We focus primarily on the risk of bankruptcy of the transaction sponsor and of the securitization vehicle. In both cases, the risk to investors is either that creditors outside the securitization will make a claim on the securitization assets, or that the cash flows intended for ABS investors will be subject to an automatic stay and be delayed by the bankruptcy process.

Monitoring

In monitoring the ratings of outstanding venture debt transactions, we generally consider the same types of key variables that we used to assign the initial ratings.

The starting point is the evaluation of the obligors' financial performance. In addition, we track the amount and form of credit enhancement, and incorporate analyses of the key risks we considered in the primary rating process, such as loan modifications and delinquencies as well as amortization of the assets relative to the scheduled balances established at the inception of the transaction.

When performance trends are not in line with our expectations, we model the remaining cash flows and credit enhancement to further assess the credit risk posed to each rated security.[118]

[118] For example, in methodologies where models are used, modelling 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.

Box 8. Venture Debt Fundamentals

Pools of senior-secured term loans and other types of debt such as real estate loans, working capital loans, equipment loans and equipment leases back venture debt transactions. Most of the obligors of loans in these transactions are developmental stage growth companies in which venture capital firms invest. Such companies have short operating histories and low or no revenue, but generally are supported by the venture capital firms and have high growth prospects. Typically, the obligors' products or services are in their developmental stages and thus unproven, with limited or unknown market value. Other obligors might be public companies that need customized financing for proven products.

The underlying loans could be secured by either a first or second lien on the assets of the obligors. Nearly all of the loans are secured by 100% of the obligor's assets, which include not only physical equipment, but also either a positive or negative pledge of intellectual property that often has significant value for other industry participants long before the product or service has been fully developed. A negative pledge prohibits a borrower from pledging the intellectual property to others, but still allows the borrower to license the intellectual property, leaving open the potential for the borrower to realize revenue prior to final product development.

Other loan terms help limit risk as well. The combined, weighted average loan-to-value (LTV) for a pool is typically in the low to mid-teens, and original loan maturities typically range from two to five years. They are also generally fully amortizing (a small percentage amortize partially or are balloon loans) after a six- to 12-month interest-only period, which reduces principal risk over time and implies a relatively short weighted average life for rated notes. Additional or other indebtedness is strictly limited, but additional tranches can be added if the obligor reaches agreed-upon milestones.

The lender's lien on the borrower's key assets, including intellectual property and patents, plus the low combined LTV and loan amortization, serve to align the interests of the venture capital equity investors with those of the lenders, who need the company to pay off the loan if they are to realize returns or recoup their equity investments.

For the most part, the loan obligors are in the high-growth industries in which venture capital firms typically invest, such as life sciences or technology. Examples of life sciences firms are companies that develop biotechnological, pharmaceutical products, diagnostics, therapeutics or medical devices. Each product or device may be in the early to late phase of testing or may have already been approved by the US Food and Drug Administration. Examples of technology firms are companies that develop Internet consumer and business services, clean technology, communications and networking, software, media and information services.

In most cases, the source of cash flow is subsequent rounds of venture capital equity raised, based on the companies' reaching their product development milestones, rather than on their generating product revenues. Therefore, their ability to meet debt service obligations generally depends on their ability to reach the milestones and not be affected by other companies' performance. For example, the test phase/development failure of one drug of a company in the life sciences sector will have little bearing on other companies in another sector or even in the same sector, unless they happen to be pursuing a drug targeting a similar condition with similar test or development plans. In the technology sector, loans are in diverse sectors such as internet consumer and business services, clean tech, communications and networking, software and media. The diverse pursuits of the life sciences and technology obligors in these portfolios therefore imply a low risk of correlated defaults for pure business (as opposed to refinancing) reasons.

However, a general pullback in the venture capital industry due to a shortage of funding liquidity, rather than a recession, could hamper companies' ability to obtain subsequent rounds of equity financing, which they might need to continue meeting their debt service obligations. This risk will increase default correlation in the performance of the loans in a venture debt transaction.

Moody's Related Publications

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

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

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

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