MOODY'S INVESTORS SERVICE

RATING METHODOLOGY

Moody's Approach to Rating EMEA CMBS Transactions

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Analyst Contacts:

FRANKFURT +49.69.70730.700

Oliver Moldenhauer +49.69.70730.744
Vice President - Senior Credit Officer/Manager
oliver.moldenhauer@moodys.com

LONDON +44.20.7772.5454

Andrea Daniels +44.20.7772.1471
Associate Managing Director
andrea.daniels@moodys.com

Sarwesh Paradkar +44.20.7772.5265
Assistant Vice President - Analyst
sarwesh.paradkar@moodys.com

This rating methodology replaces *Moody's Approach to Rating EMEA CMBS Transactions* published in October 2020. We edited section 6.1, "Issuer-level Cash Flow Model and Note Expected Loss," to provide more information on our modeling approach, and we made limited editorial updates. These updates do not change our methodological approach.

1. Executive Summary

This report describes our approach to rating commercial mortgage backed securities (CMBS) in Europe, Middle East and Africa (EMEA). Our EMEA CMBS analysis follows a bottom-up approach. The analysis starts at the property and tenancy level to develop cash flow and value expectations for each loan's collateral (Section 3). At the loan level, we perform additional credit analysis on the loan and borrower structures to derive our term and refinancing default probability for each loan.[1] Based on our assessment of the term and refinancing default risk profile of the loan, and our property value assessment, we use a simulation tool to assess each loan's expected loss (Section 4). We use the results of the individual loan analysis to derive a portfolio loss risk assessment (Section 5). We allocate the cash flows from the loans to the different notes according to the transaction waterfall, taking into account the structural features (Section 6). We map the expected losses of the notes and their weighted average lives to a model-implied rating,[2] which is then subject to rating committee review. We also take into account transaction party risk and other structural features that may impact the risk profile of the transaction (Sections 7 and 8).

In addition, the report describes in Appendix 8 how the methodology for CMBS transactions is adjusted when we assign ratings to commercial real estate (CRE) loans that are not part of a securitisation structure. We address the differences between CRE loans and CMBS transactions in the rating determination by limiting the uplift from the default risk of the loan even though there may be significant recoveries post loan maturity.[3]

[1] An example of the term and refinancing risk assessment can be found in Appendix 6.

[2] 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 10.

[3] Some credit ratings we assign and monitor using this credit rating methodology do not carry an (sf) indicator.

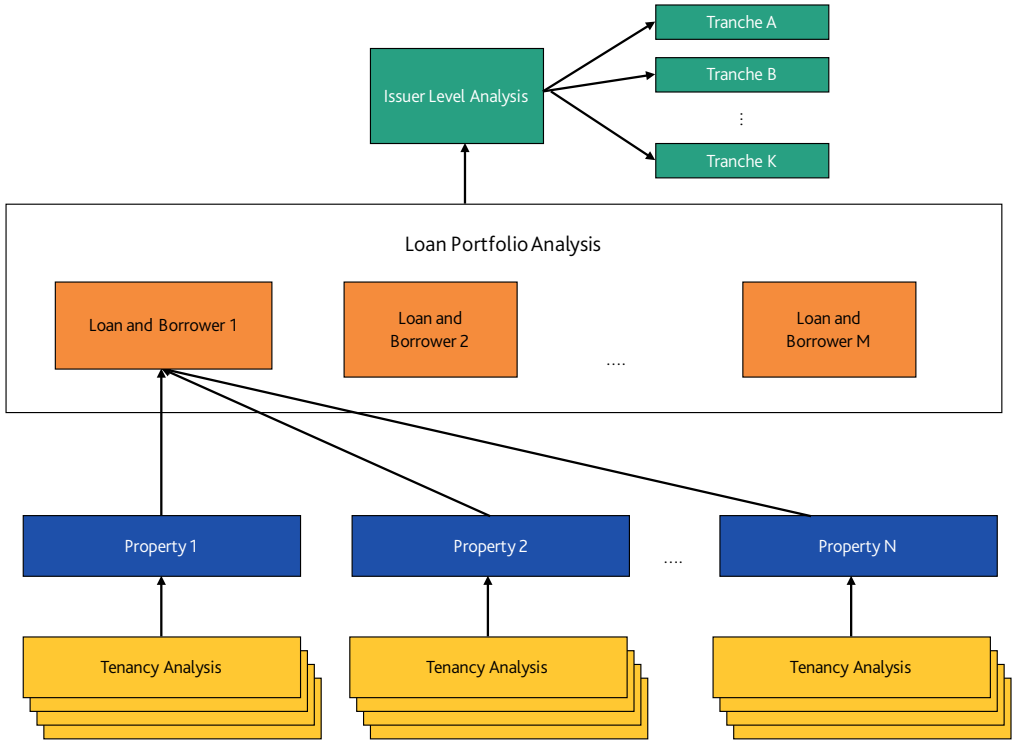
Key distinctions include the lack of external liquidity support and no tail period after loan maturity.

This methodology is intended to be applied with judgment; rating committees will, where appropriate, consider other factors that we deem relevant to our analysis.

Exhibit 1 provides an overview of the components described above.

EXHIBIT 1

Flow of Moody's Bottom-up Analysis for EMEA CMBS



Source: Moody's Investors Service

The EMEA CMBS analytical rating process involves a number of key assessments, which are summarised in Box 1 below and further expanded upon in the remainder of this report.[4]

Box 1: Key Assessments in EMEA CMBS Analytical Rating Process

Determining Moody's property grade. We grade the collateral properties on a scale of 1 to 5 (1 being best and 5 being worst) based on both the individual property characteristics as well as the market in which the property is located. The property grade affects the majority of the subsequent steps in our analysis.

Determining Moody's cash flow. We determine our cash flow based on the property quality, the in-place tenancy quality and lease terms, and property cost expectations. Moody's cash flow is essentially the average of the year-by-year cash flows over (at least) 10 years. It is the basis for determining a property's value as well as the property's ability to generate sufficient cash flow to cover debt service payments over the loan term.

Determining Moody's value. We typically determine Moody's value by applying Moody's market-based yields to Moody's cash flow. Moody's market-based yields take into account minimum yields as described further in this report.

Determining term default risk. To determine term default risk, we first compare our cash flow expectations to the debt service due each year over the loan term to ascertain the debt service coverage ratio (DSCR). We then typically use a correlated binomial extension technique based on our DSCR and the tenant diversity score to determine the annual term default risk. The higher the DSCR, the higher the tenant diversity, and/or the higher the tenant credit quality, the lower the term default risk. Other factors affecting term default risk are the tenant quality, borrower and loan structures, and borrower sponsorship. If applicable, alternative approaches for determining term default risk include the use of public ratings or credit estimates of the borrowing entity, mapping from an originator's rating system, or a top-down risk assessment.

Determining refinancing default risk. Typically, CRE loans do not repay in full during the term of the loan and are hence subject to refinancing risk. We map Moody's refinancing loan-to-value (LTV) ratio (loan balance at maturity as a proportion of Moody's value) and Moody's property grade to a baseline refinancing risk assessment. We consider, inter alia, the property type, the exit debt yield, the lease profile, the loan size and complexity, the prevailing outlook on the lending market as well as borrower sponsorship to adjust our base assessment.

Simulating loan defaults, loan severity and portfolio effects. We use our term and refinancing default assessments to simulate defaults of each loan in a pool. We use Moody's value as a starting point in our property value simulations of recovery and loss expectations for the loans. We take into account correlations between loan defaults, property values and default severities when deriving a loss distribution for the pool of CRE loans.

Issuer-level analysis and note expected losses.[5] We use our loss distribution as a key input in our issuer-level cash flow model that derives an expected loss for each class of notes. We map the note expected losses and their weighted average lives to our idealised loss targets for each rating category. Transaction features such as pay structures, triggers, counterparty and country risk are incorporated into the issuer cash flow analysis or in the asset-level assumptions as appropriate.

Assignment of ratings by rating committee. In the last step, a rating committee assigns a rating. Our ratings are ultimately determined by a committee process that considers both quantitative factors like model results and other qualitative factors like legal, operational and counterparty risks. Therefore, the rating outcome may differ from the model output.

[4] The EMEA CMBS approach differs from the US CMBS approaches as the length and breadth of the historical data used to calibrate the US CMBS methodologies is not as readily available in EMEA. As such, we rely more on a bottom-up loan DP/LGD approach that also suits less granular pools like those we see in EMEA.

[5] 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 10.

2. Information Scope

Our rating analysis is based on the information provided to us by the arranging parties. The information consists of documentation, quantitative inputs (as detailed in our data template) and in-person reviews of the real estate assets and/or the entities that play an integral part in the securitisation.

In a typical EMEA CMBS transaction, we usually expect our data template to be populated with detailed information on the relevant aspects of a CRE loan (i.e., tenancy, property, loan and borrower level data). The electronic version of the data template is available on demand. In limited circumstances, we may accept other forms of quantitative information to cover the relevant data inputs. An example of the most common quantitative data points is shown in Appendix 1.

Aside from the information contained in the data template, we expect to receive for the purpose of our analysis, documentation on the borrower, loan, property and tenancy level. This information includes recent third-party reports[6] such as appraisal reports, environmental reports, property condition assessments, or other due diligence done on either the property or the loan and borrower. This information may not be relevant for our surveillance activity, in particular, when no update is available nor needed.

We review all transaction level documents to properly reflect them in our analysis, including the prospectus, loan sale agreements and issuer security documentation, agreements related to all agents of the issuer, hedging documents and legal opinions.

It is essential that the key factual information provided in the rating process meets a certain level of reliability. To assess this level, amongst others, we consider the originator's alignment of interest with investors, its policies and procedures, representations and warranties and review checks by independent third parties on the data template based on agreed-upon procedures (AUP)[7] or other documentation that can verify the key factual data upon which our analysis is based. Given the broad range of transaction types covered by our EMEA CMBS methodology, the information requiring third-party verification varies. Most notably the degree of granularity at the borrower, loan, property and tenancy level will determine the level of detail required.

As part of our initial rating analysis, we will accompany the asset analysis by site visits and operational reviews with loan originators or loan sponsors. We expect to visit a substantial part of the underlying asset base of the loans. We will take into account the relative importance and the granularity of the assets when determining our site visit requirements. Site visits may not be needed for monitoring as periodic performance information including, amongst others, data on gross and net rents, updated property valuations, and other qualitative information could be used as a substitute.

3. Property-level Analysis

3.1 Determining Moody's Property Grade

Our property grades reflect a property's quality relative to its property type peers. The property grade takes into account both the individual property characteristics and the market where the property is located. It does not take into account the debt financing associated with the property.

The individual property characteristics reflect the relative attractiveness of the property to lenders and investors. The indicators we use to measure individual property attractiveness include:

» historical occupancy levels

» the age of the property

[6] Not older than 12 months.

[7] For general considerations on third-party reviews and data quality evaluations, see our cross-sector methodology. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

» the physical condition of the property

» historic maintenance and capital expenditure (capex) spending

» the credit quality of tenants

» the term of leases

The quality of the market reflects the strength of its investment and leasing activity. The indicators we use to measure the strength of the market include:

» the size of the market

» the stability of capital values

» take-up and vacancy rates

» rental levels

» the stability of rental levels

» prime headline yields

» typical length on new leases

The property grades range from 1 (best) to 5 (worst) and aim to distinguish between prime and secondary properties/markets. The market perception of the quality of a property tends to change over time depending on the risk appetite and perception of investors and lenders. Our grading system takes a "through the cycle" view of the property independent of cyclical factors. Nevertheless, property grades can fluctuate over time, especially as property management, maintenance and capital expenditure investment can impact a property's quality and positioning in its market over time. We assign a worse grade when there is limited or no information at the market or property level.

The property grade influences our value assessment by affecting 1) the minimum yield floor and 2) cash flow assumptions relating to renewal probability, void period and length of new lease term. We will discuss this in the next few sections.

3.2 Moody's Property Cash Flow Assessment

We determine annual property net cash flows for each year of the loan term

Based on the property grade assessment, we derive a projection of the expected annual net cash flows generated by the respective property. The net cash flow projection is used to determine the term default probability assumption and our value estimate that we use for the severity analysis. The time horizon we usually consider is the longer of the loan term and 10 years (we describe the term default probability and loss severity analysis later).

Exhibit 2 shows the components we usually analyse for core property types (e.g., office, retail, industrial) to determine our property net cash flow expectations. We focus on a property's net cash flow (NCF), as opposed to net operating income (NOI), because we believe NCF gives a truer picture of the sustainable cash flow-producing capability of a property. We define NCF as NOI less capital items, such as capital expenditure and re-letting costs. In our view, a property owner needs to spend some CAPEX or re-letting expenses to keep the property attractive for tenants.

EXHIBIT 2

Simplified Calculation of Property Net Cash Flows

Gross Rental Income (excluding service charges)
(-) Non-Recoverable Expenses » Maintenance Cost » Void Cost » Management Cost
Net Operating Income
(-) Capital Expenditure
Net Cash Flow

Source: Moody's Investors Service

In-place lease agreements are the starting point for the property cash flow projection

A key part of the net cash flow projections is the assessment of the gross rental income, the main drivers of which are highlighted in Exhibit 3. The assessment starts with the cash flows from the in-place lease agreements as provided by the arranger for new transactions, or by the servicer for monitored transactions. The terms of the leases, which include the break options, lease expiry dates, rent levels and regulation on the distribution of costs between landlord and tenant, will substantially drive the future cash flows.

EXHIBIT 3

Main Drivers of Gross Rental Income

In-place lease terms
» Lease expiries and lease breaks » Rent review regimes
Potential new leases
» Likelihood of lease renewal » Market rents » Typical market lease terms
Structural vacancy

Source: Moody's Investors Service

Lease structure depends on the jurisdiction in which the property is located

The lease structure depends on the jurisdiction in which the respective property is located. In the UK, leases tend to be long whereas in Continental Europe leases tend to be shorter. For example, in the French market, the usual lease term is nine years with break options after years three and six. Long leases increase cash flow certainty while short leases increase the risk of vacancy and lower rental levels if market rents are falling. Shorter term leases are also common in certain markets with rolling leases like some Nordic countries or German multifamily portfolios where tenants can cancel the lease with three months' notice, but the likelihood of renewal is higher there than in other markets.

Rental arrangements determine cash flows from the in-place lease agreements

For the in-place leases, we consider the contractual base rent and fixed rental uplifts in our cash flow projection. Depending on the property type and the jurisdiction, the total rent can consist of a fixed base rent and a variable portion. In the UK, rental reviews are the market norm. The review intervals will vary and be negotiated between tenant and landlord. In other jurisdictions, rents are usually indexed to inflation. Depending on the negotiating power of the tenant, the rent may not be increased by the full inflation rate. We typically do not consider variable rent increase agreements in our projections.

For income generated by very granular properties like multifamily portfolios, a cash flow analysis based on individual tenant leases is not appropriate. In these cases, we typically assume generic rental level increases combined with generic cost increase assumptions.

Building quality and the property market fundamentals drive re-letting assumptions at lease expiry

We assign specific re-letting assumptions based on the assessed property quality as reflected by the property grade at each lease-break or expiry date. These re-letting assumptions determine the 1) renewal probability of the current tenant, 2) assumed void period and 3) assumed new lease term.

The building quality and the property market fundamentals determine our assumed probability that an expiring lease will be extended, or a new tenant will be found for the vacated space. The main considerations are the attractiveness of the property for the existing or potential new tenants and the supply-demand dynamics in the respective submarket. In a downturn, lower quality properties will suffer more as tenants take advantage of oversupply and look for a better property with better lease terms. Therefore, the assumed renewal probability is significantly lower for below-average properties in submarkets with an oversupply of space. Other considerations that will influence our re-letting assumptions include the strategic importance of the property for the tenant, and significant capital investment made by the tenant to their space.

The property grade also determines the void period that we assume for the vacant space after lease expiry. The void period covers the marketing period and potential rent-free periods that are granted to existing tenants for lease extensions or to new tenants. This represents the period during which the rental unit generates no income.

For future leases we use our estimate of the market rent based on the quality of the property, its competitive positioning in its submarket and the occupational market dynamics. If a property unit was initially let at above-market rents, we usually assume a lower rent for this space after lease expiry or tenant default in our cash flow projection. In addition, we determine the length of the new lease depending on the property's quality and the market/submarket conventions.

If applicable, we also factor re-letting costs associated with leasing and marketing of vacant space into our cash flow projections. We apply leasing commission fees based on the relevant market convention. The assessed building quality drives the capital expenditure requirements for the property, especially when leases are expiring, and the respective space needs to be re-let. We assume tenant incentives in our cash flow projection in case of re-let space depending on the building quality assessment, the property type and the submarket in which the property is located.

Structural vacancy assumptions are based on the vacancy history of the property

Part of the analysis of the property cash flows is the determination of structural vacancy assumptions. We assess historic vacancy levels if the information is available. We determine whether the vacancy in the respective property is structural or whether it is cyclical. For the vacancy analysis, we assess whether all parts of the property or only specific parts of the lettable area are affected by structural vacancy. There could be situations where, in a mixed-use property, only a part of the lettable area with a certain use shows higher vacancy levels (e.g., if in a mixed retail/office property located in a high street retail location the office space shows higher vacancy level). For regional shopping centres, we analyse vacancy levels excluding the anchor tenants to assess the centre's shop vacancy rate in comparison to the total centre's vacancy rate.

Our probabilistic approach on lease renewals will likely apply a haircut to in-place cash flows. Since we assume that not all expiring leases will be renewed and take into account void periods upon lease break or expiry, our 10-year average net cash flow expectations can be significantly lower than in-place net rental income.

Non-recoverable costs reduce our net property cash flow expectation

If applicable, we deduct certain non-recoverable costs to be borne by the landlord from the gross rental income. The share of the costs borne by the landlord depends on the property type and the market standards. For office properties in the UK, for example, full repairing and insuring (FRI) leases are usually agreed. Under these leases, the tenant is responsible for all internal and external maintenance, as well as for building insurance. In addition, when the tenant hands back the property, it will usually be responsible for putting back the property in its original state. Nevertheless, especially for multi-tenanted properties with lease expiries over the period of the cash flow projection, we usually assume that the landlord needs to bear some costs, such as asset management fees.

In other continental European markets, the landlord is usually responsible for the maintenance of the structure of the buildings, which increases our assumed non-recoverable costs. An important expense item in this respect is the sinking fund, which reflects the need for the landlord to invest in the property to keep it in a lettable state. For shopping centres, for example, non-recoverable costs will be higher because the landlord bears the majority of the centre's management costs. In certain instances, a landlord will grant strong tenants, such as anchor tenants in shopping centres, a cap on ancillary costs that are usually paid by the tenant. This will increase the share of non-recoverable costs borne by the landlord, thereby reducing the cash flow generated by the property.

The amount of expenses taken into account depends, *inter alia*, on the lease terms and our opinion about the level of maintenance required to keep the property in a lettable state. In our view, this effort requires a certain amount of capex.

For vacant units, we also assume void costs (i.e., the recoverable costs otherwise borne by a tenant that the landlord has to bear for vacant units) in our cost assumptions. In certain jurisdictions, such as the UK, these costs would also include local taxes due on vacant space. Void costs can significantly increase the overall costs borne by the landlord, if there are elevated vacancy levels in the respective property.

Considerations for operationally intensive property types

Property types such as hotels, healthcare facilities, residential (multifamily and student housing) properties, cold storage facilities, technical spaces and ground rent portfolios are operationally intensive in nature which results in a strong exposure to the underlying operator. They require more substantial and continuing management involvement to generate cash flow and maintain property value. As such, we consider the depth of the market in terms of availability of alternative operators, in the event of a failure of the underlying operator. Additionally, some of these property types display higher cash flow volatility due to a combination of shorter term 'leases' and/or high operating leverage due to a higher fixed expense component of their running costs.

We focus our analysis on the determination of a sustainable income and cost level to derive a projection of the expected annual property net cash flows. The drivers of the sustainable cash flows depend on the respective property type.[8]

Property net cash flow is the projected annual amount available for debt service

The ultimate result of the income and cost analysis is our expected property cash flow. After the deduction of potential borrower level costs, the net cash flow is the projected annual amount available to the borrower to serve its debt obligations.

3.3 Moody's Property Value

Moody's property value is a medium-term view on the market value of the property from a lender's perspective. This implies that we take a view on how future cash flows can look like with a view on potential

[8] For more information, see Appendix 3.

downside risks, and it typically results in the application of yields that are higher than potential yields seen in the property market. Moody's value is generally lower than the underwriter's market value.

We apply conservative market yields to average expected cash flows

Our value assessment is based on our property cash flow analysis. We look at a horizon of 10 to 15 years depending on the features of the property including, for example, in-place lease agreements at rental levels significantly above market levels and with long remaining lease terms. We typically apply a yield to these cash flows that depends on property type, property grade and sub-market. Moody's market yield represents our estimate of the current yield level in the respective sub-market.

Minimum yields provide a floor for applied yields

To mitigate the market value volatility associated with commercial real estate prices, we use minimum yields as a floor. For a given cash flow assessment this effectively caps our value assessment during peak market conditions. The applicable minimum yields, more background to and an example of their application can be found in Appendix 2. The relevant minimum yields applicable to operationally intensive properties such as hotels, healthcare facilities and technical space fall in the "Other" category.

We recognise the limited availability of historic yield information across CRE markets, property types and qualities in EMEA. Hence, we derived the minimum yields by combining the available yield history from real estate data providers, quantitative and qualitative broker information and our perception of the value volatility risk for the different types and qualities of CRE assets.

Discounted cash flow approach and value per square foot/square meter assessments are also considered

Alternatively, we may use a discounted cash flow approach to derive our value estimate. The starting point with this approach is also our annual property cash flow projection. However, we apply discount rates observed for the respected property type in the sub-market in which the property is located, adjusted for the certainty of the discounted net cash flows. As a check, the resulting value will be compared to the minimum yield approach.

For granular property portfolios or the granular part of a larger portfolio, we also consider the value per square foot/square meter as an additional benchmark to derive our values. We also apply this approach in cases of short remaining lease terms and heightened uncertainty around re-letting. Our estimates of the value per square foot/square meter are derived from current market observations.

Additional considerations for operationally intensive property types

We consider whether a valuation approach based on tenancy-related cash flows and market yields is the most appropriate way to assess the value of an asset. Alternative measures are used for more operationally intensive property types, for example multiples of annual ground rent for ground lease portfolios. We also consider different value benchmarks, e.g., value per key for hotels or value per square foot/square meter for multifamily properties.

Vacant possession value used for single-tenanted properties

In the case of single-tenanted properties,[9] we typically derive a vacant possession value (VPV) for calculating the loss severity during the term of the loan. The VPV is a market value based on the special assumption that the property is vacant and generates no cash flows. The rationale for this value concept is the assumption that the default of a loan secured by a single tenanted property is likely due to the fact that the tenant has defaulted and vacated the property.

The main drivers of the calculation of the VPV are the assumptions on the void period (the marketing period and potential rent-free period), the costs to refurbish the vacated space and the market rental level. In

[9] We also apply this analysis for dominating tenants.

certain cases, the VPV could be near zero if the vacated property has been purpose built for the defaulted tenant and third-party usability is therefore limited.

Property value drives refinancing risk and loss severity

Our assessment of a property's value drives both our assessment of refinancing risk and our loss severity analysis as further described in the following section.

4. Loan-level Analysis

Following the property-level analysis, we analyse the credit risk of the loan. Based on the results of the property-level analysis, we assess 1) term default risk, 2) refinancing default risk and 3) the expected loss severity of the respective loan. Exhibit 4 summarises the key loan default risk drivers.

EXHIBIT 4

Key Drivers of Loan Default Risk

Term Default Risk	Refinancing Default Risk
» Annual DSCR	» Moody's LTV Ratio
» Cash Flow/Tenant Quality	» Exit Debt Yield
» Cash Flow Diversity	» Sponsor Support
» Sponsor Support	» Property Quality
» Financing Structure	» Tenancy/Lease Expiration Profile
» Borrower Structure	» Lending and Property Market Conditions

Source: Moody's Investors Service

4.1 Term Default Risk Analysis

Based on our property-level analysis and the resulting annual net cash flow projections, we determine the default risk during the term of the loan on an annual basis. For this assessment, we calculate the expected annual coverage ratios and determine the quality of the expected cash flows, as well as the tenant diversity compared to the expected annual coverage ratios.

Determination of the number of tenant defaults leading to loan default

The term default risk for the analysed loan is driven by the probability of property net cash flows falling below the debt service payments due on the loan. To determine this probability, we first calculate the expected annual DSCR. We divide the expected annual net cash flows available to the borrower by the annual expected relevant debt service. Based on the annual expected coverage ratios and the tenant diversity, we usually estimate the contribution of each tenant to the expected coverage ratio and determine the number of coinciding tenant defaults that would push the coverage ratio below 1.0x, which would lead to an expected loan default.

Expected debt service payments contain interest and scheduled amortisation

To determine the expected debt service, we consider 1) interest payments and 2) scheduled amortisation payments. The amount of interest to be paid depends on the interest rate type (i.e., whether the borrower has to pay a fixed or a floating interest rate) and potential borrower-level hedging instruments used to mitigate interest rate risk. For an unhedged floating rate exposure, we typically assume a gradually increasing reference rate over time. We also take into account potential interest step-up or step-down agreements. In terms of the amortisation obligation, we typically only consider scheduled amortisation due on the loan.

Financing structure determines relevant debt service payments

The financing structure and the loan documentation determine the debt service amounts that must be paid to avoid a default. We therefore consider the debt service of subordinated loans if the non-payment of the debt service for these loans leads to a default of the analysed loan. In addition, we consider the whole debt service of loans ranking senior to the analysed loan.

Credit quality of the tenants determine cash flow quality

Cash flow quality depends on the credit quality of the tenants assumed to occupy the analysed properties over time. If available, we consider Moody's long-term, senior unsecured rating of the tenants as a proxy for their likelihood of default under the lease. We may consider the risk of default to be lower than implied by the tenant's senior unsecured rating (or equivalent) in certain circumstances, for example when the leased facility is considered important for the continued business of the tenant.

Unrated tenants are assumed to have a credit quality equal to the average credit quality of small- and medium-sized enterprises (SMEs) in their respective countries with adjustments that would potentially be made under our SME methodology. Depending on the macroeconomic environment, our assumed ratings for SME tenants are typically in the Ba2 to B3 range. In general, we assume new tenants entering the properties after lease break or lease expiry dates to be unrated. We may also adjust our tenant credit quality assumption based on the size of the tenant, industry classification, and/or the quality and type of the occupied property.[10]

Tenant diversity determines diversity of property income

Diversity of the annual expected cash flows is measured by tenant diversity. Tenant diversity depends on the 1) number of tenants, 2) tenant industries and 3) relative weight of each tenant in the overall expected property net cash flow. In general, we express tenant diversity as the number of independent and homogeneous tenants that contribute to the overall expected net cash flow of the loan. For details, see Appendix 4.

Sponsor's incentive to support the loan depends on leverage and property quality

If appropriate, we adjust the term default probability by the probability that the loan sponsor will inject cash to keep the loan current. Despite most securitised loans being structured without recourse to the loan sponsor, sponsors may decide to support their loans. We assign a probability of such a support based on the Moody's LTV ratio, the assessed property quality and sponsor quality. The incentive of a sponsor or equity investor of a real estate transaction to support the loan in case of temporary cash flow shortfalls increases, 1) the higher the sponsor's equity value in the property transaction and 2) the better the assumed property quality.

We assess the credit quality of the sponsor taking into account our long-term, senior unsecured rating of the sponsor (if available), other credit risk assessments, when appropriate, potential parental support and other available information.

Non-special-purpose-vehicle (SPV) borrower structures increase term default risk

If the borrowing entity is not an SPV, we generally incorporate the additional default risk from the borrower's other activities. An SPV, in this context, is a borrowing entity newly established for the purposes of acquiring the property securing the loan with the sole business purpose of holding and letting the property. The entity is restricted from incurring further debt and hiring employees. We recognise that in contrast to an SPV issuer, a borrowing entity cannot be insolvency remote as it will usually have further creditors that have not entered into a limited recourse agreement with the borrower.

The additional risks we consider stem, for example, from being an operational company with employees and pension liabilities or from additional indebtedness incurred by the borrowing entity, which is unrelated to

[10] As an example, we would expect prime office properties to attract tenants with a different risk profile than secondary industrial properties.

the property securing the respective loan. In general, additional liabilities at the borrowing-entity level increase loan default risk and can also have a detrimental impact on the loss severity of the respective loan.

Disposal and substitution rights can drive term default risk

If the loan agreement allows the borrower flexibility to change the underlying property collateral, the term default probability could be driven more by the future property portfolio composition than by the current portfolio. If we believe that the disposal plan or the substitution rights alter the risk profile of the loan, we adjust our default risk assessment and our property value expectations accordingly. This includes scenarios where a potential disposal plan was to fail, or when substitutions change the property pool characteristics in a negative way.

If a loan agreement contains disposal or substitution rights, the borrower is either allowed to dispose parts or the whole underlying property portfolio over the loan term or the borrower is allowed to substitute parts of the underlying property portfolio.

The loan agreement determines the scope of the allowed changes to the underlying property portfolio and the conditions under which the changes are allowed. The conditions are supposed to mitigate the risk of adverse selection (i.e., that the quality of the underlying property portfolio deteriorates as the best properties are sold). Mitigants include a release premium if a property is sold where the leverage of the remaining loan is reduced through a higher amortisation payment than the allocated loan amount. The allocated loan amount typically corresponds to the portion of the loan that is secured by the asset sold. We take into account the conditions under which disposals or substitutions are allowed when determining a stressed scenario for a loan.

Additional considerations for operationally intensive property types

For loans secured by operationally intensive property types, the loan default risk is in some cases directly linked to the credit strength of the operator.

For loans secured by multifamily portfolios, the term default probability depends on the likelihood that the vacancy rate exceeds the breakeven level that would result in net cash flows decreasing below the relevant debt service. As multifamily portfolios are characterised by non-corporate tenants, the term default probability depends to a lesser extent on the individual tenant credit risk.

For loans secured by ground lease portfolios the key driver of term default risk is the potential increases in the costs, especially the viable management fee, resulting in a decline in the coverage ratio.

Alternative term default risk assessment techniques

In certain circumstances, the approach described above may not be the most suited, in which case we will use alternative measures to assess the term default risk. For example, we may believe the borrower default risk is more linked to the general business risk of a (non-SPV) borrower than to the performance of the real estate asset and the resulting loan DSCR. If the pool is very granular, and we do not receive detailed tenancy information, term default risk is also assessed using other techniques. We nevertheless aim to assess in detail any loan even in granular pools that is larger than 2% to 3% of the loan pool balance. This includes the expectation that we get information about borrower, loan, property and tenant level. If pools contain both larger loans and very small loans, we will combine both the individual assessment as well as the alternative assessments.

In a number of granular transactions, where we expect the loan pool to exhibit SME type of risks, we use elements of the top-down approach used in rating SME balance-sheet transactions to assess term default risk. Hence, we adjust country-specific default risk assumptions for SMEs to CRE loan portfolios to reflect underwriting quality, borrower characteristics, loan characteristics or historic performance. The macroeconomic and sector specific outlooks for the relevant countries and sectors also impact our final

default probability assumptions for the pool.[11] We will also factor findings of potential loan-by-loan analysis on more concentrated parts of the portfolio into the top-down assumptions.

Especially for concentrated parts of a generally granular loan portfolio, we might use credit estimates[12] to assess the default risk of the borrower (group). Our credit estimates are subject to stress testing (e.g., notching and impact analysis of a jump to default of the largest credit estimates) to 1) assess the sensitivity of the transaction ratings to severe downward movements of the credit estimates and 2) account for the low frequency of monitoring of these credit estimates.

If borrowers have an internal rating from the originating bank based on a specified internal rating system, we assess whether a direct mapping of the originator's internal credit rating[13] into default risk assessments is possible, or if such rating mapping can be used as an additional parameter to determine default risk (i.e., within a top-down approach).

4.2 Refinancing Default Risk Analysis

The second element of the loan default risk is the refinancing risk at loan maturity if the loan does not fully amortise over its term. It addresses the inability of the borrower to repay the remaining loan amount at loan maturity or to sell the property at a price that covers the loan amount.

The refinancing risk is driven by factors at the loan, property and macroeconomic level. Starting with our projected LTV ratio at loan maturity, we determine the final refinancing default probability by considering, inter alia, the sponsor's incentive and ability to support the loan, the property quality and property type, the lease profile, the loan debt yield as well as lending and property market conditions.

Moody's LTV at loan maturity is the starting point for refinancing default probability assessment

The starting point for our determination of the refinancing default probability is the expected Moody's LTV. It is based on the expected relevant loan maturity balance and the expected Moody's value at that point in time according to the property-level analysis. The refinancing LTV is combined with the property grade assessment to lead into a base refinancing risk assessment. Exhibit 5 shows illustrative guidelines.

EXHIBIT 5

Refinancing Default Probability Guidelines

	DP Guidance for Property Grades				
Moody's LTV	1	2	3	4	5
≤40%	<1%	<1%	1.50%	2%	2%
40-60%	<1-3%	<1-4%	1.5-5%	2-6%	2-6%
60-80%	3-10%	4-14%	5-21%	6-40%	6-40%
80-100%	10-40%	14-53%	21-70%	40-90%	40-90%
>100%	40-100%	53-100%	70-100%	90-100%	90-100%

Source: Moody's Investors Service

Relevant loan maturity balance determined by financing structure

To determine our expected LTV at loan maturity, we first identify the part of the total financing structure that must be refinanced with the analysed loan. Typically, it is the total debt that is secured by the underlying property. In a standard A/B loan structure in which a whole loan is only split at the lender level, the obligation of the borrower encompasses the whole loan and, consequently, the borrower needs to

[11] For more information on the top-down approach, see our methodology for rating SME balance sheet securitizations. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

[12] For a discussion of credit estimates, see *Rating Symbols and Definitions* (a link can be found in the "Moody's Related Publications" section) and our cross-sector methodology for using credit estimates. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

[13] For more information on our approach to mapping ratings and scores provided by third-party entities, see Appendix 5.

refinance the whole loan. Financing structures sometimes include mezzanine financing that is secured by the shares in the borrower at the borrower-holding level, but not by the underlying property security. The impact of this debt on the refinancing risk depends on the rights and the security structure of the mezzanine debt and will be considered on a case-by-case basis.

For the expected relevant debt amount at loan maturity, we generally consider only the scheduled amortisation, not the soft amortisation that the borrower only needs to pay if funds are available.

Property quality and lease profile are strong drivers of refinancing risk

Our refinancing default risk assessment is lower for properties with a lower property grade (higher quality properties). For the determination of the refinancing risk, we consider the physical quality of the property and location as well as the expected tenancy and lease expiry profile at loan maturity.

The availability of refinancing is often tied to the certainty of property rental income. Hence financing is more difficult to obtain if the remaining lease term is rather short or the credit quality of the tenants is weak.

In some instances, we consider the VPV for the determination of the refinancing default risk. If the lease term of a single tenanted property is less than five years and we assume a high likelihood that the tenant will vacate the property, the VPV is a more appropriate basis of risk analysis. The rationale is that a new lender would also consider the short remaining lease term and the lease rollover risk. In such cases, it is very difficult to obtain refinancing or only at a low leverage, which increases the refinancing risk of the existing loan.

Certain property types have higher chances of refinancing

During a CRE crisis, lending markets become constrained and borrowers have difficulties refinancing their loans. Banks also restrict lending to prime properties only in crisis situations. While we capture the property characteristics and market attractiveness in our property grade, we view certain property types more favourably than others when it comes to refinancing. Asset types that exhibit higher cash flow stability like multifamily properties are able to attract refinancing even for average quality stock, while other asset classes require long leases or prime locations to secure refinancing in a crisis.

Sponsor's incentive to support the loan additional criterion for refinancing risk

As with the term default probability assessment, we may also adjust the refinancing default probability by the probability that the loan sponsor will support the loan. We typically assign this probability based on the Moody's LTV ratio and the assessed property quality as described in the term default risk assessment section. In addition, we assess whether the sponsor's credit quality is sufficient relative to the total financing amount.

Debt yield at loan maturity is an additional indication of leverage

An additional indication of leverage and the likelihood of refinancing is the debt yield at loan maturity. This ratio is the debt service on the existing loan that can be supported by the expected property cash flows at loan maturity. A high ratio indicates that the property can support the loan even in a high interest rate environment.

Lending and property markets are the main drivers of refinancing risk at macroeconomic level

At the macroeconomic level, the state of the lending market determines the supply of debt available for refinancing. If the lending market is weak and underwriting criteria of lenders are strict, financing is usually only available for prime properties with a low risk profile.

Property market conditions determine the price at which the property securing the loan can be sold and whether the sales proceeds are sufficient to repay the loan.

An example of our term and refinancing risk assessment can be found in Appendix 6.

4.3 Loan Default and Loss Severity Simulation

Based on our assessment of the term and refinancing default risk profile of the loan, and our property value assessment, we use a simulation tool to assess the loan's expected loss.

We first simulate loan defaults (during the term and at the refinancing date) in accordance with our default risk assessments. Based on the annual term and refinancing default probabilities derived in the loan analysis, we use a multifactor model that takes into account a global, a property type and a location factor, in which the loan may or may not default each year of a loan term (see Appendix 7 for details on the simulation model). We simulate many different such default paths for each loan in the portfolio, which generates a default distribution and default timing profile.

The second step is to calculate the loss severity upon default. The model compares the loan amount outstanding at the default date with the simulated property value at time of enforcement to calculate any potential loss, taking into account enforcement costs and accrued interest during the enforcement period. Given our simulation approach on property values, we derive a loss distribution on the loan or loan portfolio.

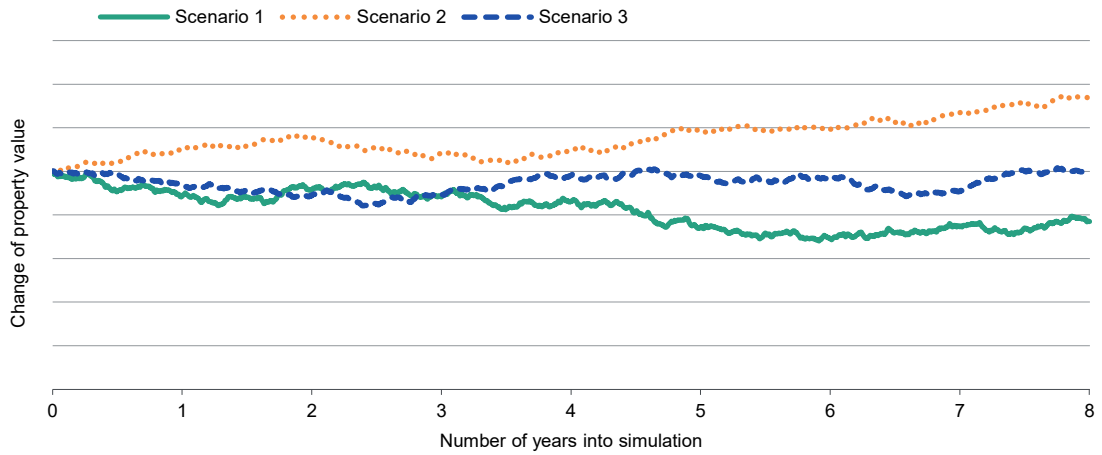
The future value of property security at the time of enforcement is simulated

We also simulate future property values, taking account of increasing uncertainty over the analysis horizon (i.e., the loan term plus a potential enforcement period). Empirical observation has shown that property values are cyclical, rising above and falling below a trend of long-term growth. Thus, we apply a mean reverting stochastic process to model the property value available to repay the loan after its enforcement.

On each simulation run, we derive the value of the properties at the time of enforcement. Exhibit 6 presents three runs for the same property. The longer the time period, the more uncertainty there is about the property value.

EXHIBIT 6

Simulation of Future Property Values



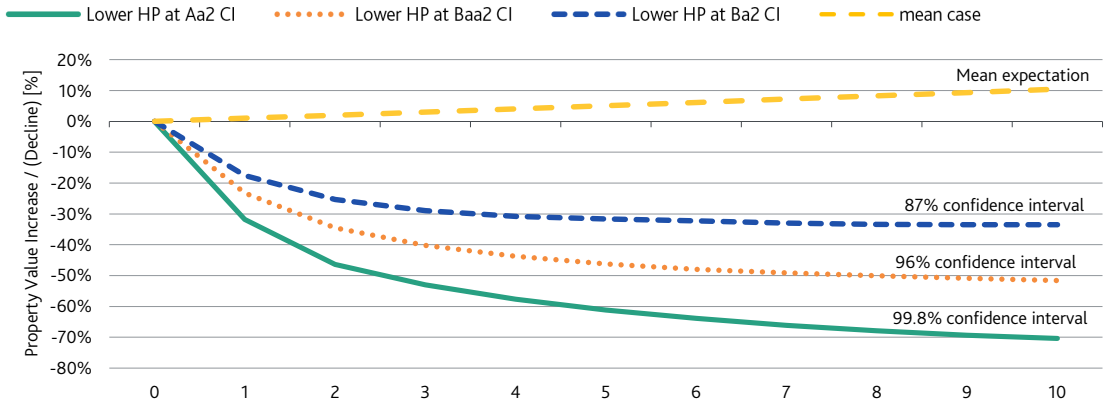
Source: Moody's Investors Service

The simulation model stresses property values and implies higher stresses for higher rating categories. A certain probability is given to scenarios with high-value declines. Those value declines can be seen as confidence levels and depend on the parameters used in the process. As uncertainty increases over time, the implied stress rates for certain confidence levels increase over the life of a given loan, as illustrated in the Exhibit 7. Exhibit 7 shows, as an example, the maximum property value decline (for 10 years) as a percentage of the initial value, which we do not expect the respective confidence level to exceed. Furthermore, it can be seen that the higher the confidence level, the higher the implied stress rates. Higher

confidence levels are associated with higher rating levels, therefore, the higher the rating level the higher the implied stress rates used in our portfolio simulation.

EXHIBIT 7

Simulation Property Value Stresses for Given Confidence Intervals



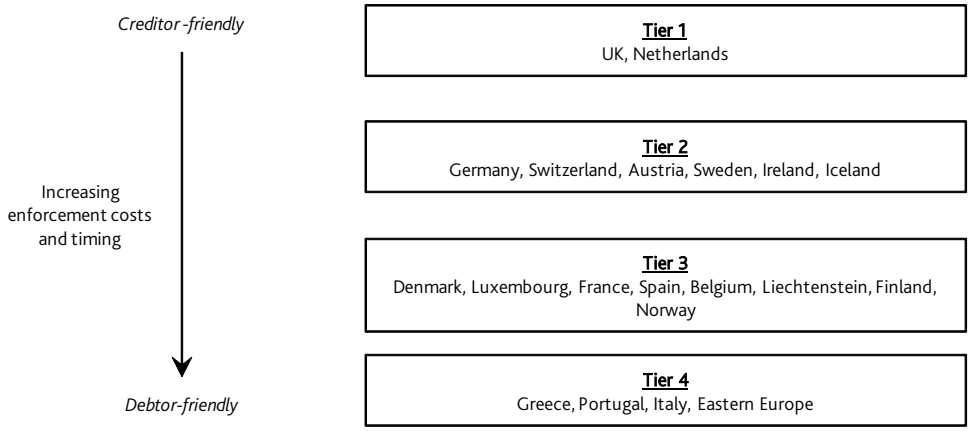
Source: Moody's Investors Service

Enforcement cost and accruing interest can increase loss severities

Enforcement cost and accruing interest frequently decrease principal recoveries on the loan after a default. These, in turn, depend on the creditor-friendliness of the jurisdiction where the real estate and/or the borrower are located. In general, we apply a tiering concept to assess the creditor-friendliness of a jurisdiction. Exhibit 8 shows our ranking of the main jurisdictions in Europe. We consider Tier 1 the most creditor-friendly. The more creditor-friendly the jurisdiction, the lower our enforcement cost and accrued interest assumptions for that tier.

EXHIBIT 8

Jurisdiction Creditor Friendliness



Source: Moody's Investors Service

Apart from these country tiers, our enforcement cost assumptions also depend on the 1) legal set-up of the loan/borrower group, especially any hedging and loan-level tranching; 2) granularity of assets in the pool; 3) property type(s) securing the loan, and 4) size of the loan.

The ultimate enforcement cost will depend on aspects that can only be assessed once the loan is in an enforcement process. For example, the work-out strategy will impact cost and timing of the process. Cost and length of the process will usually increase if borrower administrators or receivers are involved,

potentially blocking cash flows or consensual sales. Depending on the jurisdiction, formal enforcement of the mortgage security will have a stronger impact on cost and potential sales prices than consensual asset or share sales. Complex borrower structures can also delay the enforcement process, increase cost and increase the time period during which interest can accrue on a defaulted loan. The timing of the default can also be relevant, especially if hedging instruments are involved at the borrower or issuer level. A maturity default usually means that the potential claim from a hedging instrument is significantly reduced or can be even zero. We will update our cost assumptions during surveillance to incorporate any newly available information once the loan is in its enforcement process.

5. Portfolio-level Analysis

In our loan analysis, we simulate loan defaults and losses given default (through the simulation of property values). On a loan portfolio level, we combine these results. The main goal of the portfolio analysis is to create a portfolio–wide loss distribution, an expected timing of losses on the loan pool and the expected cash flow profile of the loan pool.

Granularity and correlations impact the ultimate risk profile of the loan pool

The portfolio-level assessment is not just a simple aggregation of the loan-level losses. Both granularity and correlations impact the ultimate risk profile of the loan pool. The more granular the pool, the lower the chances of very high losses in the pool, but also the higher the chances of having at least some losses. The more diversified the properties that secure the loans are (i.e., different property types and countries), the greater the impact of diversification.

Correlation assumptions reflect that credit and CRE value drivers affect all loans

We believe that some important credit and CRE value drivers affect all loans that are securitised in a transaction through the underlying collateral. Therefore, we apply correlations in our portfolio assessment. Loans that are secured by assets in different regions and different property types are deemed to have a lower asset correlation. The simulated loss distributions for such pools have lower standard deviations than those of less diversified portfolios.

By contrast, if two loans are secured by identical property types and/or are in the same market, we assume the loans to have a high asset correlation of 10% to 20%, in line with our assumed default correlation for sub-investment grade corporate entities within the same industry or region. Assumed additional intra-property and intra-location correlation can increase the total correlation assumption to 33%.

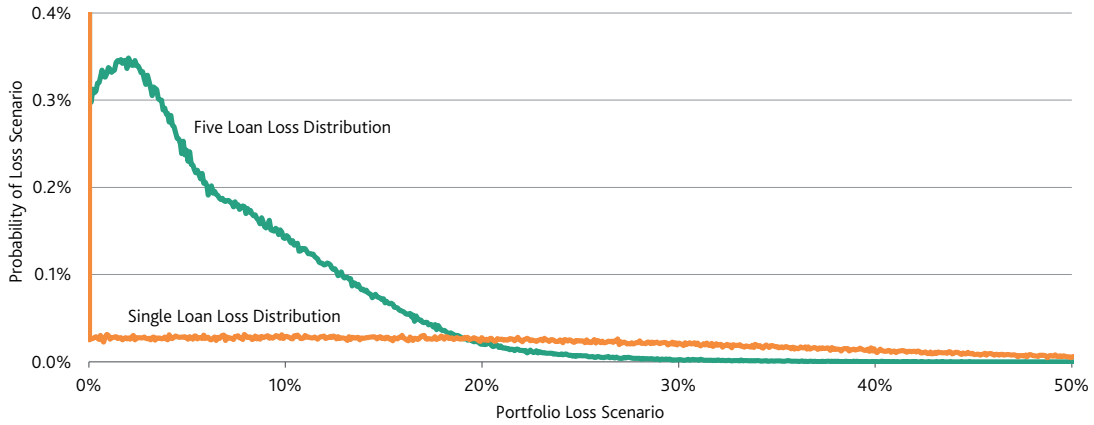
When a loan is secured by several property types and/or properties in different markets, diversity benefit arises from the simulation of different property value paths for different property types and/or markets. Here again, we apply correlations to take into account that CRE values do not behave independently, even across markets or property types.

We also account for negative correlation between portfolio default rates and property values (i.e., the higher the level of simulated defaults, the lower the simulated property values). This reflects our assumption that numerous defaults on commercial loans are a sign of adverse property value developments and therefore should result in more severe outcomes (fatter tails) of the simulated portfolio loss distribution.

Exhibit 9 illustrates the impact of diversity on our portfolio loss distributions. The exhibit compares the loss distributions of five identically-sized loan pools secured by different property types and different credit characteristics and a single loan transaction. The single loan transaction exhibits a larger tail in the distribution and would, therefore, require more credit enhancement to achieve a high rating level.

EXHIBIT 9

Comparing Five Loans with a Single Loan Loss Distribution



Source: Moody's Investors Service

6. Transaction and Issuer-level Analysis

6.1 Issuer-level Cash Flow Model and Note Expected Loss[14]

When the analysis of the asset portfolio is complete, we typically use a comprehensive cash flow model, ABSROM™, to assess the expected loss on each class of securities. ABSROM enables us to model transaction cash flows derived from portfolios of commercial mortgage loans 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.

The loan portfolio's loss distribution, amortisation schedule, weighted average interest rate and expected loss timing are used as the main input parameters in the cash flow model.

The following features will be tested through scenario analysis on the asset side rather than through the cash flow model itself:

» different cash flow allocations, such as sequential versus *pro-rata*

» triggers that change the allocation of cash flows, such as *pro-rata* to sequential triggers

» principal to pay interest mechanisms

» the benefit of expected spread on the issued notes (unless stripped out by I/O classes)

» reserve fund mechanisms

Ratings are assigned by a rating committee which considers both quantitative factors like models and qualitative factors. Therefore, the rating outcome may differ from the model output.

6.2 Payment Structures and Triggers

Our rating approach generally assumes that principal proceeds available from the loans are allocated to the notes on a sequential basis. A fully sequential pay structure creates the highest build-up of subordination for senior classes as prepayments/repayments of loans occur. The additional subordination as a share of the

[14] 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 10.

remaining pool balance helps offset risks resulting from potentially adverse changes in the loan pool. These risks include 1) an increase in loan concentration that in turn increases susceptibility to event risk and volatility of losses; 2) the potentially declining average quality of the remaining pool as stronger loans prepay; and 3) potential negative changes in individual loan credit quality over time. These risks vary significantly from one transaction to another given the heterogeneous nature of EMEA CMBS loan pools.

Sequential pay structures put pressure on excess spread upon loan prepayments

While sequential pay structures mitigate the increased concentration and adverse performance risks, the prepayments of loans that are allocated fully sequentially to the notes will increase the weighted average spread on the notes. This can result in a declining or even negative excess spread. The pressure on excess spread is accelerated if loans with a loan margin higher than the remaining loans in the pool prepay.

Non-sequential pay structures can lead to higher credit support requirements and increase rating volatility

Senior or mezzanine notes may need more credit support with a non-sequential pay structure for the same rating levels as a sequential pay structure, other things being equal. In addition, adverse rating volatility in transactions with a non-sequential pay structure could potentially be higher than in transactions with a sequential pay structure. We capture the additional risk through scenario assessments, but we do not base our expected loss ratings on the capital structure of the worst-case prepayment scenario, because this would mean that we assign 100% probability to that event.

We typically assess the impact of non-sequential pay structures on ratings by analysing a selected number of prepayment scenarios

If transaction structures allow for non-sequential allocation of principal proceeds, we will assess the extent to which this has a negative impact on ratings. Given the loan concentration in a typical EMEA CMBS pool, we do not use a probabilistic approach of modelling the feature through a cash flow model but use scenarios to assess the impact.

As a starting point, we analyse how the principal proceeds for the individual loans are allocated to the notes. Usually, modified *pro-rata* structures can include 1) pool-level rules that apply to all loans, 2) rules that relate to loan buckets or 3) loan-by-loan rules. We especially determine how principal proceeds from lower risk loans (measured by expected loss) are allocated. It usually has a negative impact if principal proceeds from these loans are not allocated mostly or entirely to the most senior class of notes. The non-sequential allocation would not mitigate the lower average quality of the remaining pool.

Based on the analysis of the allocation rules, we select a number of adverse prepayment scenarios and compare the level of credit enhancement required to maintain stable ratings to enhancement for the initial portfolio.

Our three-step approach for testing the sufficiency of credit enhancement available for each tranche is illustrated in Exhibit 10. For each prepayment scenario, we then assume that the selected loans are prepaid immediately. Principal proceeds are allocated according to the intended allocation rules. In the example, the proceeds are allocated on a 50%/50% modified *pro-rata* basis (step 2). We then measure the potential adverse effects on the ratings. We re-run the portfolio model with the remaining loan pool and run the resulting loss distribution through the cash flow model. If the rating volatility, considering the rating level, were too high in respect of a likely scenario, more credit enhancement would be required (step 3). For a Aaa (sf) rated note we would expect no impact of the prepayment scenarios and for highly rated notes the impact should be very limited.

EXHIBIT 10

Testing Credit Enhancement Sufficiency in Non-Sequential Pay Structures

	① Initial capital structure and ratings assuming sequential structure			② Potential impact on ratings if a 50/50 modified *pro-rata* structure is applied	③ Adjusted capital structure, mitigating potential rating volatility	
	Class Sizes	CE	Ratings		Class Sizes	CE
Class A	78.50%	21.50%	Aaa (sf)	Aaa (sf)	78.50%	21.50%
Class B	8.50%	13.00%	Aa2 (sf)	Aa3 (sf)	6.00%	15.50%
Class C	4.50%	8.50%	A2 (sf)	Strong Baa1 (sf)	5.50%	10.00%
Class D	3.00%	5.50%	Baa2 (sf)	Baa3 (sf)	3.50%	6.50%
Class E	5.50%	0.00%	Ba2 (sf)	Ba2 (sf)	6.50%	0.00%

Source: Moody's Investors Service

Sequential pay triggers are meant to protect the structure

In a further step, we analyse whether the sequential pay triggers included in the transaction documentation will most likely switch the pay structure to fully sequential when the pool composition or the pool performance deteriorates. In these situations, the senior notes require more credit enhancement to support the initial rating levels.

It depends on the exact features of the triggers whether the non-sequential pay structure has a negative impact on the rating levels. Usually, the relevant sequential pay triggers for our analysis relate to loan default and pool redemption levels.

Trigger level and default definition are relevant for loan default triggers

For the loan default-level triggers, it is important that these triggers are set at levels that ensure that the pay structure switches at a point when the deterioration in the loan pool quality becomes evident. In addition, the loan default definition has a significant impact on the relevance of the triggers. If the loan default definition does not refer to the initial loan documentation excluding restructurings or waivers of the servicer, or if long cure periods are included, then triggers will not be breached even if the loan pool quality has already deteriorated. In these cases, the sequential pay triggers do not protect the structure sufficiently against the risk of the non-sequential pay structure. It becomes more likely that stronger loans are repaid on a non-sequential basis while weaker loans are already deteriorating.

Pool redemption triggers address concentration risks

Triggers relating to the level of loan pool redemptions ensure that the pay structure switches to sequential when a significant portion of the pool has already repaid or prepaid and the loan pool has become more concentrated. In this situation, higher credit enhancement levels are necessary to mitigate an increase in event risk and volatility of losses.

Principal loss triggers could be breached too late

Triggers relating to principal losses are relevant but could be breached too late to ensure a timely switch to a fully sequential pay structure. In case of lengthy work-out situations, or if loan defaults happen in short intervals, the allocation of losses to the notes happen most likely too late to protect the structure. The triggers become even more irrelevant if the threshold of principal losses is set too high.

6.3 The Impact of Interest-only Classes on Loss Severities[15]

Aggregate interest on the loans normally exceeds the aggregate interest on the CMBS notes plus transaction expenses. This generates excess spread that can absorb losses. CMBS structures usually contain mechanisms for extracting excess spread such as interest-only (IO) securities, Class X notes or similar instruments. Our analysis considers the potential impact of these instruments on other rated notes.

IO instruments, which generally rank *pari passu* with highest rated note, could cause or exacerbate payment shortfalls for other CMBS notes and increase their vulnerability to losses. Cases where IO securities have increased losses to noteholders include 1) performance issues with the underlying loans that reduce cash flows available to other CMBS notes but not to the IO class due to more favourable terms; 2) a mismatch between the aggregate interest on the loans and the aggregate interest on the CMBS notes, usually triggered by a repayment of one or more of the underlying loans; or 3) unexpectedly large expenses that are not at least partly borne by the IO instrument.

We take the potential additional risk for CMBS notes into account by reviewing the terms of the IO classes in particular in view of potential loan level performance deterioration. We usually also run scenarios to assess the risk IO or similar instruments pose to other CMBS notes. This can lead to an adjustment of the rating of the bonds, especially for the more exposed junior notes, to take into account any additional risk.

6.4 Note-to-Value Ratios as Benchmarks for Single Loan Transactions

For single-loan transactions, we also perform a check on the proceeds at each rating level that were derived from the primary rating model. We typically use Moody's note-to-value (NTV) ratios as benchmarks that reflect the level of stress to the collateral value that is appropriate for the given rating level. For example, for an NTV of 40% at the Aaa (sf) rating level, a property would generally have to lose more than 60% of its market value for there to be a loss on the Aaa (sf) portion of the loan proceeds. The implied cushion for the Aaa (sf) net recovery proceeds can be compared to the peak to trough value decline experienced for properties in the UK of 42% in the latest downturn from 2007 to 2009.[16] In addition, we typically apply a haircut to the underwritten market value and hence increase the cushion implied by the NTV for value declines.

Exhibit 11 shows typical ranges of Moody's NTV ratios for single loans secured by better quality, core properties (e.g., office, retail, industrial), located in transparent markets with high investment liquidity that are backed by experienced, institutional quality sponsors. The loans are typically characterised with moderate market LTV's (60% - 65%), no exposure to floating rate risk, and benign borrower and loan structural features. To the extent the loan and the collateral deviates from these expectations, the typical NTV levels would be higher or lower.

EXHIBIT 11

Common Moody's NTV Ratios for Strong Single Loan Transactions

Rating Level	Moody's NTV (%)
Aaa (sf)	40.0 - 50.0
Aa2 (sf)	48.0 - 58.0
A2 (sf)	56.0 - 66.0
Baa2 (sf)	64.0 - 74.0

Source: Moody's Investors Service

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

[16] See "UK IPD All Property Capital Value Index" June 2007 to June 2009.

7. Other Analytical Considerations

7.1 Country Risk Analysis

A rapid and significant deterioration in a country's government finances, its macroeconomic position and its banking system will weaken the quality of CMBS transactions with exposure to this country risk. If such a country event where to occur, CRE loans backed by collateral in these jurisdictions will suffer from volatile performance, reduced financing availability and heightened market value risk, while the transactions themselves will also come under increasing pressure as the number of viable transaction parties falls. With respect to CRE values, the likelihood of severe property value declines outside of our standard value volatility expectation is increased in case of a severe country event.

Moody's Local Currency Country Risk Ceilings and sensitivity analyses accounts for country risk

To account for the impact of severe stress scenarios in a given country, we consider as additional factors in our analysis 1) the Local Currency Country Ceiling (LCC) of the countries in which the underlying properties are located[17] and 2) sensitivity analyses assuming reduced recoveries for loans in multi-country pools.

LCC indicates the highest achievable rating for single-country pools

For transactions with assets within one country, the LCC indicates the highest achievable rating that we can assign to locally domiciled obligors or structured notes that derive their cash flows from domestic assets or residents. The LCC captures non-diversifiable country risks (excluding foreign currency transfer risk), which 1) affect all issuers and assets in a country and 2) neither local portfolio diversification nor credit enhancement can mitigate. In addition, transactions with non-prime characteristics in terms of loans and asset concentrations, property quality and Moody's LTV may be further constrained at a reduced number of notches above the government bond rating reflecting a higher dependency on the local economy and banking sector.

For multi-country pools, we assess the impact on tranches rated higher than the LCC of included countries

In the case of multi-country exposures within a CMBS pool, we consider stressed scenario analyses for the tranches that we rate higher than the LCC of the countries in which the underlying properties are located. In our stressed scenarios, where we consider the occurrence of a severe country event, we generally assume materially reduced recovery proceeds for the loans that are secured by properties in countries with an LCC below the highest targeted ratings in the respective transactions. We weigh these stressed scenarios with the probability indicated by the LCC of these countries. In a final step, we test whether the resulting blended rating of our base case (no country event occurs) and stressed case scenarios is lower than the targeted rating.

7.2 The Impact of Tail Periods

A transaction enters its tail period because some of the underlying loans have not repaid by their maturity dates. If tail periods are too short, the risk exists that the workout of the loans will not be completed in time to make principal payments to the notes by their final maturity date.

Since our ratings address payments by the legal final maturity of an instrument, short tail periods can cause ratings on CMBS bonds to be capped. We expect new transactions with investment grade ratings in more creditor-friendly jurisdictions like the Netherlands, the UK or Germany to have minimum tail periods of 5-7 years beyond the loan maturity date of the loan with the longest dated maturity. In less creditor-friendly jurisdictions, like France, longer tails of above 10 years are expected. For existing transactions, an insufficient tail period can lead to negative rating migration during the tail period.

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

Our analysis of the impact of tail periods on ratings reflects the increasing timing risk and resulting downward migration of credit quality for a CMBS in the tail period. The servicer or another issuer representative will work out the loan to maximise recoveries to noteholders. As the transaction moves closer to the maturity date, the risk increases that the workout of the loan will not finish in time to make principal recovery payments to the notes prior to their final maturity date. We address this risk by applying rating caps for transactions in the tail period as the maturity date approaches, and by applying rating caps to new transactions with short tail periods.

Primary drivers

The level of rating caps for transactions in the tail period will depend on a number of factors that affect the likelihood that a servicer will complete the process in time. Key drivers are:

» **Remaining time to note maturity**. The less time remaining, the more likely that the servicer will not complete a loan workout prior to the final maturity of the CMBS.

» **The visibility of the progress on the workout of the loan security.** The closer the servicer is to realising cash from a workout, the more likely that the notes will receive payment by the final maturity date.

» **The complexity of the workout process.** The more complex the workout, the more likely the servicer will not be able to complete it in time. The workout process will be more lengthy, costly and less successful if it involves:

  – misaligned control mechanism features (e.g., when effective control over the workout process rests with the junior noteholders)

  – complex legal aspects for the underlying loan

  – complicated structural transaction features

  – diverging noteholder interests, depending on ranking in the capital structure or the purchase price of the bonds

  – multiple interested parties, where coordination efforts increase the complexity of the loan workout

Secondary drivers

Other factors that will affect credit quality in the tail period include:

» **The jurisdiction.** The speed of the enforcement process depends on the legal systems of the borrower and the location of the real estate. We take this into account when assessing the likelihood of completing the workout process in time.

» **The granularity of the loan pool securing the notes.** If a number of loans secure a very senior note, it is possible that the servicer would only need to work out a small portion of the loans to fully repay the note.

» **The granularity of the property portfolio securing the loans.** If a number of properties secure a loan underlying a CMBS, it is possible that the servicer would only need to dispose of a small portion of the properties to fully repay the note.

» **Principal waterfall.** A sequential payment of workout proceeds to noteholders in the tail period benefits the most senior noteholders.

» **The quality of sponsorship.** Strong sponsors might still support defaulted loans, especially if the availability of financing rather than the asset operating performance is the main reason for the default.

Cap guidelines

We have established guidelines for determining the highest rating a CMBS can maintain during the tail period as the final legal maturity date approaches.

Exhibit 12 shows the rating cap guidelines applicable to transactions in the tail with a single loan remaining.[18] The rating cap guidelines apply to Germany, UK, France and the Netherlands.

EXHIBIT 12
Rating Cap Guidelines Applicable to Single Loan Transactions

Remaining Term of a Transaction in the Tail Period	Expected Rating Cap EMEA
24-36 months	Aa1 (sf) - A2 (sf)
12-24 months	Aa3 (sf) - Baa1 (sf)
6-12 months	A3 (sf) - Ba1 (sf)
0-6 months	Baa3 (sf) - B1 (sf)

Source: Moody's Investors Service

8. Transaction Party Risks

A number of transaction parties[19] play an integral role in a CMBS transaction. Hence, the risk of the notes is affected by:

» the performance of parties such as servicers, calculation agents, or cash managers, which is referred to as "operational risk"

» the creditworthiness of the hedging counterparties

» the creditworthiness of the account banks and investments in which the transaction's cash is held or invested

Operational risks cannot always be mitigated. If we believe that disruptions in the operations of the relevant parties can lead to a non-payment on rated bonds and no mitigants are in place, the bonds may not achieve the highest rating. In EMEA CMBS, we particularly focus on the question of whether liquidity facility drawings depend on the calculations of parties like the servicer.

Transactions can be exposed to interest rate, exchange rate or inflation rate risks, which may be addressed through hedging. We assess the rating impact of linkage to hedge counterparties at the issuer level following our approach to assessing swap counterparties in structured finance transactions.[20]

Borrower-level hedging, such as interest rate swaps, may also introduce linkage to swap counterparties, although the linkage is typically much less direct than transaction-level hedges. Borrower-level swaps may be assessed on a case-by-case basis by way of increasing the default risk of the loan during the loan term and/or increasing the loan severity due to unhedged accruing interest, or swap breakage costs. The additional risk stemming from default risk of hedging counterparty at the borrower level is typically limited, but we may adjust our default and severity modelling assumptions if deemed appropriate.

Securitisation transactions involve the collection of cash in accounts that ultimately pay interest and principal on the notes. In CMBS transactions this involves both issuer- and borrower-level accounts. To avoid additional risk to noteholders from cash in accounts or from investments made with the available cash, the funds are typically deposited with banks of high credit quality and/or invested in securities

[18] We will try to obtain information on the rating drivers, especially information about the workout plan from the special servicer and will therefore take into account the date at which such information will be available when considering the remaining term.

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

[20] 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.

minimising additional loss potential. We assess the proposed entities and investments for such purposes in each transaction.[21]

8.1 The Role of the Servicer and Special Servicer

The primary servicer and the special servicer (jointly referred to as the servicer) act on behalf of the issuer administering and potentially working out the loans in the underlying pool. Due to the number of tasks performed by the servicer, the notes can be subject to operational risk related to the servicer (depending on the respective transaction structure).

Besides operational considerations, the performance of the servicer also directly affects investors' ultimate recoveries. Therefore, a servicer's ability to diligently execute its duties is core to the overall performance of the transaction. Generally, the servicer has to abide by the servicing standards and should act in the best interest of the noteholders. The review of the servicing agreements is integral part of our rating process.

The primary servicing activities cover collection management, supervision of loan agreement compliance (reporting requirements, covenants) administration of the underlying security and ongoing borrower servicing.

The objective of the special servicer is to work out of defaulted loans and to maximise recoveries from the underlying assets. This involves development of a workout strategy, negotiations with the borrower, asset management and potential liquidation of the underlying properties, or an implementation of alternative work-out solutions including restructurings, refinancing or discounted payoffs.

In EMEA CMBS, most of the loans in the existing transactions are serviced by non-rated third-party servicers or special servicers. The remaining loans are serviced by captive servicers, either subsidiaries or departments of loan originating banks.

We conduct operational reviews for servicers

When a new servicer starts servicing a transaction we rate, we conduct an on-site operational review to assess the servicing ability, quality of the services provided and the stability of the servicing business. In preparation for the servicer review meeting, we analyse information provided by the servicer, including company's financials, policies and procedures, samples of servicing reports and loan files, and internal and external audit reports.

During the operational review, we discuss and analyse the following areas:

- Staffing and Organisation. We review the historical development of the servicing team, team members' tenure and backgrounds, servicing stability based on turnover rate, staffing rules within the servicing team, reporting lines, performance evaluation system of the company, the scope of training programmes and the recruitment strategy. We also analyse the outsourcing practices of the firm.
- Loan Administration. This covers the boarding process for new loans, methods and procedures of collection management and payment processing as well as general customer service standards.
- Risk Management. This includes arrears and default management, loan risk assessment and monitoring, loan review frequency and procedures and approval process for loan modifications.
- Asset Management and Loss Mitigation. While reviewing the special servicer's operations, we focus on collections and loss mitigation methods, models used to determine the strategy to maximise recovery value, historical data on foreclosure timing, collection rates and possession management.
- Reporting Quality. This review focuses on the accuracy and timeliness of information provided, the data collection process, quality control and approval procedures. We consider the overall quality of

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

market communication, including the depth of information provided, responsiveness to queries and the frequency and level of detail of investor notices.

» **Technology.** This covers the IT platform and data base, data quality management, investment in technology and business continuity plan.

» **Corporate and Business Profile.** This includes senior managements' profile, the company's strategy and business plan, as well as portfolio characteristics and historical growth.

» **Financial Conditions.** The main focus of this review is on the company's size, profitability and liquidity position compared to the peer group, the diversity of income and the ownership structure.

» **Procedures and Control.** This includes policies and procedures implemented by the company, document retention, quality control measurements, internal and external audit and complaints management.

We will analyse the information gathered and perform a final pass/fail assessment. Following the initial review, we meet with servicers on a regular basis to discuss updates in the relevant areas and any key changes since last review. The frequency and intensity of the communication with the servicers is much higher compared to other asset classes in structured finance due to the very concentrated nature of the underlying loan portfolios.

Transaction governance with respect to the servicing role

Our recovery assessment for defaulted loans is based on the assumption that the servicing agreement contains the framework for a workout process that aims to maximise recoveries by the legal final maturity date of the notes. This assumption implies that a professional party (typically the special servicer) can act to maximise recoveries without being pressured by transaction parties with no economic interest in the rated notes.

In a standard transaction, we assume that the transaction structure includes a party that has the ability to act in the workout process. Typically, a servicer is in-place and actively functioning from the securitisation closing date. A special servicer takes over the servicing and workout process subject to predefined events and criteria. If there is no servicer in place, we will review the mechanisms designed to ensure timely implementation of a party to act on behalf of the noteholders. Our concern in transactions without an initial servicer/special servicer is that it will take time to bring a third-party servicer/special servicer on board, and that conflicts of interest may arise among noteholders in a distressed situation with regards to the directions being provided to the servicer. If we think these concerns are relevant, we will adjust our recovery assumptions.

We assume that a servicer/special servicer can act without significant influence of parties having interests in terms of value recovery or timing of enforcement that contradict the goal of maximising recoveries. Such a contradicting interest can arise if a party with significant influence on the special servicer effectively does not have an economic value left in its note or loan portion. A party without an economic interest can influence the special servicer if the transaction structure does not include mechanisms to move control rights if the collateral value no longer covers a note or a loan portion.

If we have reasons to believe that a special servicer is pressured or incentivised not to act in accordance with the servicing standard and the goal to maximise recoveries, we will qualitatively adjust our recovery expectations on the loan.

Governance in synthetic CMBS transactions

We also assess the potential governance aspect of synthetic CMBS. Concerns can arise if the protection buyer is also the entity controlling the workout process (i.e., the servicer/special servicer). Misalignments of interest could arise if, for example, interest or enforcement cost were not part of the loss definition in the synthetic transaction, incentivising the servicer/protection buyer to sell assets in a fire sale to reduce the chance of potentially accruing interest and enforcement costs. The question of to what extent noteholders can influence the strategy and the nomination of the (special) servicer is also part of this assessment.

We will also review provisions related to the transparency requirements with respect to the loan or a potential enforcement process. Our expectation is that the information provided will be the same as in a typical true sale CMBS.

8.2 The Function of Liquidity Facilities

Liquidity in EMEA CMBS transactions has historically been provided by liquidity facilities. In some cases, servicing advances or reserve funds also provide liquidity to transactions. We generally refer to liquidity facilities in this section, but the assessment applies to all available liquidity support mechanisms.

Proper liquidity sizing by issuers is essential in assuming the timelines of interest payment on the rated tranches. A liquidity facility in a CMBS transaction serves two purposes: 1) to mitigate operational risks stemming from potential disruptions and 2) to temporarily bridge cash flow shortfalls on the transaction level as a result of loan defaults and loans in arrears. It is possible that until a loan is fully worked out through an enforcement of the loan security, the transaction will not receive interest and principal on the loans (e.g., due to insolvency proceedings on the borrower level). Typically, the mitigation of operational risks is the driver of liquidity requirements for granular transactions, while the need to bridge the enforcement period dominates the sizing considerations for concentrated or even single-loan transactions. The operational risk-driven liquidity requirements are lower than the liquidity needs aimed to cover loan-level shortfalls.

The liquidity components to facilitate timely payments of interest on the notes depend on the jurisdiction of the borrower and the real estate, property type, property income diversity, loan pool diversity, ease of servicing transfer, our rating of the servicer (if rated) and any needs arising from swap structures.

Highly granular CMBS transactions within a creditor-friendly jurisdiction require the least liquidity. It is unlikely that a large portion of borrowers will default at the same time that each involve borrower insolvency proceedings that in turn prevent cash transfers from the borrower to the issuer. Hence, the liquidity provided typically ranges between 6 to 12 months of note interest and senior ranking expenses.

By contrast, a single loan transaction in a creditor-unfriendly jurisdiction secured by a single property with limited tenant diversity would require the greatest liquidity. In this case, a borrower default would create a potentially prolonged need for liquidity support at the issuer level as the borrower-level work-out continues without interest payments to the issuer. In creditor-unfriendly jurisdictions, we expect that this process can last more than three years.

9. Monitoring

We monitor the credit quality of all our rated transactions on an ongoing basis as we seek to ensure that the transaction's outstanding ratings are aligned with the transaction's then-current credit characteristics.

We generally employ the same methodology that we use to rate new transactions, except for those elements of the methodology that could be less relevant over time or remain unchanged.[22] The process involves a comparison of the transaction's performance to our initial expectations and a reassessment of our forward-looking assumptions.

However, when monitoring transactions, there is more information available to the analyst than at the initial closing of the transaction. We take into account the performance trend of the transaction, the information provided from actual development and characteristics of the deal (e.g. pay down amounts, or level and type of eligible investments) and integrate this both quantitatively and qualitatively into the rating

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

committee decision. All of this may lead to a tranche's benchmark expected loss associated with the rating action consideration to diverge from the specific target level associated with its current rating.

We typically focus on the following areas:

» an update of the property level analysis

» a reassessment of Moody's value during the loan term and at loan maturity

» a reassessment of the term default risk for each securitised loan

» a reassessment of the maturity default risk for each securitised loan

» an analysis of the potential impact of the changes in the loan-by-loan assessments on the portfolio's credit risk, including the portfolio's expected loss and the standard deviation of portfolio losses

» an analysis of the impact of other changes in the loan portfolio on the portfolio's credit risk (e.g., through prepayments)

» an analysis of the impact of the reassessed portfolio's credit risk characteristics on the ratings assigned to the notes, incorporating the then-current capital structure of the CMBS transaction

We update our property net cash flow projections based on the current tenancy profile

We update our property net cash flow projections following the same approach as in the initial rating assessment. We analyse the current tenancy profile according to the current rent rolls provided by the servicer and apply re-letting assumptions for vacant space and at lease break or expiry of the in-place leases. The re-letting assumptions are based on the updated property quality assessment.

We update our property value assessment

We re-assess the Moody's property value, based on the updated property level analysis. We do not necessarily change our value assumptions as soon as updated valuations reveal a positive or negative difference. Instead, we usually keep the value assumptions unchanged unless there is a significant deviation from the previous value assessment that we deem to be permanent (i.e., not likely to revert in the short term). Examples include a significant change in the tenancy profile or a sharp widening of the respective market yields. As we simulate volatility around our value assumptions over time, adverse value developments are to some extent captured in our analysis.

For the term default probability assessment, we compare actual net cash flows with our previous expectations

To determine whether we need to change our term default probability assumptions, we generally compare the actual net cash flows (and, in turn, coverage ratios) with our initial or previously updated expectations. Thus, actual net cash flows available for debt service that are higher (or lower) than expected can result in a decrease (or increase) of the assumed term default risk. Similarly, an unexpected change in the tenant mix can result in a reassessment of the term default probability.

As our expectations are probability weighted, the non-renewal of a lease, a tenant default or the slower (or faster) than expected letting of partially vacant properties can result in a revision of the assumed term default probability. Other factors that influence the ongoing term default probability assessment include disposal efforts (if expected at closing), interest rates (if the borrower is unhedged), rated tenants, non-recoverable costs, cash-trap mechanisms and the sponsor's creditworthiness.

For the refinancing default probability assessment, we reassess the expected LTV at maturity

For the updated refinancing default probability assumption, we determine whether we need to change our previously expected LTV ratio at loan maturity. For this analysis, we reassess the Moody's value and the expected loan amount at maturity. Unexpected amortisation or disposal plans deviating from expectations could affect the expected loan amount at maturity.

Based on the property level analysis, we determine whether the changes to the tenancy profile have an impact on our refinancing default risk assessment. Changes in the tenancy profile could lead to different exit debt yields or assumed lease lengths at loan maturity.

Another important factor that we monitor is the expected state of both the CRE lending and investment markets. The lending market determines the availability of financing and the investment market determines the price at which the borrower could sell the underlying properties to repay the loan.

For defaulted loans, we focus on the property value and the property net cash flow

The focus of the analysis for defaulted loans is the reassessment of the achievable sales price for the underlying property. In addition, we determine for loans defaulted at loan maturity whether the property generates sufficient net cash flow to meet the interest payments on the loan. For loans that default at maturity but continue to pay the interest due on the loan, no interest accrues that would reduce the recovery proceeds from the sale of the underlying property.

If a monitored loan defaults, we usually set the default probability of the loan in our portfolio model to 100%. Generally, we deem a loan to be in default if a payment default occurs during the term or at loan maturity.

For loans that defaulted due to a breach of a covenant, we do not automatically assume a 100% default probability in our portfolio model. LTV covenant breaches usually do not trigger a revision of the assumed term and refinancing default probability. LTV covenants can mitigate the negative impact of value declines because a breach most often results in cash being trapped or in a partial prepayment. Concerning the latter, the impact on the risk profile of the rated notes depends on how such proceeds are allocated.

Similarly, loan coverage covenant breaches usually only result in an upward revision of the assumed term default probability if we did not expect the coverage to decrease below the covenant level in our previous analysis. However, for loans subject to covenant breaches, we typically include scenarios into our analysis where the servicer enforces the loan security immediately.

Based on the changed loan-by-loan assessment we typically rerun our portfolio and cash flow models

We use our simulation tool to assess the expected loss on the loans based on the revised loan-by-loan term and refinancing default probability as well as Moody's value assumptions. Combined with other portfolio information like prepayments we derive an updated portfolio loss distribution.

Based on the updated portfolio loss distribution and capital structure, we rerun our cash flow model to assess changes to the model-generated ratings of the CMBS notes.[23] We may not run our portfolio and cash flow models for a pool with only one or very few defaulted loans. The updated capital structure reflects the changes due to loan repayments and prepayments and the subsequent allocation of the principal proceeds to the notes.

Depending on the pay structure of the transaction, we do a further sensitivity analysis to assess a potential negative impact of loan prepayments.

10. Loss Benchmarks

In evaluating the model output for EMEA CMBS transactions, we select loss benchmarks referencing the Idealized Expected Loss table[24] 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

[23] 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 10.

[24] 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.

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:

[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 $Rating\ Upper\ Bound_R$.

» $R\text{-}1$ 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: Detailed Information Scope

Borrower Level	Example for Information Type
Borrower Type	
Borrower Country	
Recourse to Borrower / Sponsor	
Sponsor Information	
Borrower Historic Financials	» i.e., unless newly established SPV
Loan Level	
Loan Balance	
Loan Currency	
Additional Borrowings	» i.e., revolving facility, further commitments, prior and equal ranking claims
A/B Note Split	
Waterfall on borrower level	
Amortisation Profile and Maturity Balance	
Origination Date	
Maturity Date	
Syndication Information	
Hedging Details	» i.e., hedging type, maturity and reset dates, hedging rates
Loan Interest Rate and Margin	
Escrow Accounts and Reserves	
Main loan covenants and triggers	
Underwriter DSCR / ICR	
Underwriter LTV	
Property Level	
Property Type	
Property Location	
Ownership Type	
Property Size	
Property Age and historic renovations	
Property Valuation Details	» i.e., market value and vacant possession value, date of valuation
Cross-Collateralisation Details	
Historic Occupancy Levels	
Property Gross Income	
Property Expense Details	» i.e., recoverable vs. irrecoverable expenses, types of cost
Property Net Income	
Property Insurance Details	
Historical Capex Spent	
For Multifamily Transactions	
Number of Units	
In-Place Gross Rents	
Subsidies Details	
Operating Expense Details	

Borrower Level	Example for Information Type
In-Place Net Rent	
Historic and Expected Capex Spending	

Tenant Level	Example for Information Type
Tenant Characteristics	» i.e., name, industry
Area Occupied	
Tenant Rating	
Rent guarantee details	
Lease Start Date	
Lease Maturity Date	
Lease Break Dates	
Lease Type Details	
Rent Review Details	
Gross Rent	
Expense Details	
Net Rent	

Source: Moody's Investor Service

Appendix 2: Minimum Yields

Minimum yields allow for greater stability of Moody's property values throughout market cycles to mitigate the market value volatility associated with commercial real estate (CRE) prices.

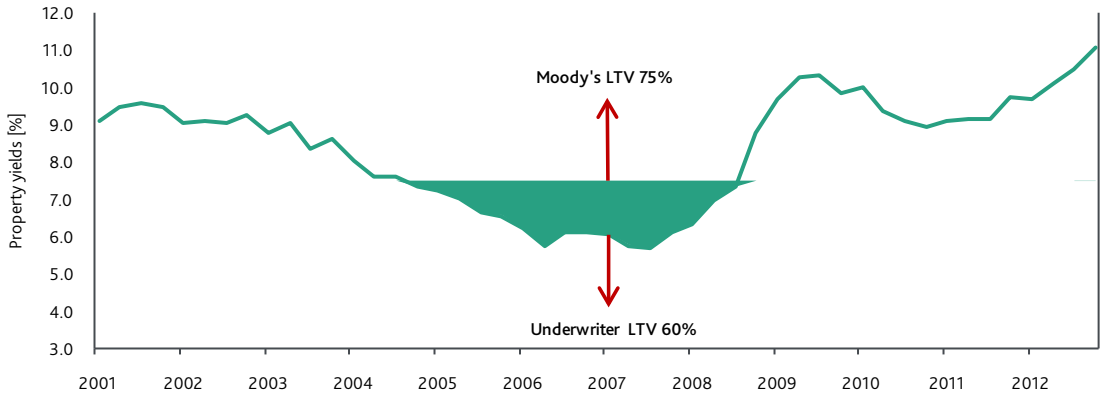
CRE loans, especially those subject to balloon risk as typically found in CMBS transactions, are invariably exposed to market cycles. The value of the underlying collateral property is a key factor in our credit assessment of CRE loans and impacts, amongst others, our refinancing risk and our loss severity simulation. Property values can vary over the cycle, most notably through fluctuations in property yields that at times can be more volatile than the property's cash flows.

In the case of peak market conditions with low property yields, the minimum yields will effectively cap our value assessment for a given property cash flow. We typically derive our value assessment by applying Moody's market yields to our property cash flow expectations. To avoid strong fluctuations of our property value assessment due to market yield volatility, we use minimum yields. See Exhibits 14 and 15 for applicable minimum yields.

Exhibit 13 illustrates the concept behind the minimum yields. In this example, historic yields for secondary shopping centres in the UK ranged from less than 6% to 11%. Based on historic yield and broker information on the property type, as well as our perception of the value volatility risk for this type and quality property, we have determined an applicable minimum yield of 7.5%. The shaded area of the chart shows where we would automatically apply a value haircut by using a higher yield than the market due to the minimum yield concept. Assuming a market value-based underwriter LTV of 60%, a given property cash flow and a market yield of 6%, Moody's LTV would be at least 75% through the application of the minimum yield of 7.5%.

EXHIBIT 13

Moody's Minimum Yield Concept



Source: Moody's Investor Service

Exhibits 14 and 15 show the minimum yields applicable for the EMEA region.

EXHIBIT 14

Minimum Yield Ranges for Major Property Types in Main European Countries*

	Prime Property Grades		Good Quality Secondary			Secondary			
Property Types	1	1.5	2	2.5	3	3.5	4	4.5	5
Office	5.00%	5.50%	6.00%	6.50%	6.75%	7.25%	7.75%	8.50%	10.00%
Retail - Regional Shopping Centre	5.00%	5.25%	5.75%	6.00%	6.50%	7.50%	8.50%	9.50%	10.00%
Retail - High Street	4.50%	5.00%	5.75%	6.25%	6.75%	7.75%	8.00%	9.50%	11.00%
Retail - Warehouses & Parks	5.25%	5.50%	6.00%	6.50%	7.00%	7.50%	8.00%	9.00%	10.00%
Retail - Boxes	5.50%	6.00%	6.50%	6.75%	7.25%	7.75%	8.25%	9.00%	10.00%
Industrial - Logistics / Warehouses	5.50%	6.00%	6.50%	7.00%	7.25%	7.75%	8.00%	9.00%	10.00%
Industrial - Other / Light Industrial	5.75%	6.25%	7.00%	7.50%	8.00%	8.50%	9.00%	9.50%	10.00%
Multifamily	4.25%	4.38%	4.50%	4.75%	5.00%	5.75%	7.00%	8.50%	10.00%
Student Housing	5.75%	6.00%	6.25%	6.75%	7.25%	7.75%	8.50%	9.00%	10.00%
Other	7.00%	7.50%	8.00%	8.50%	9.00%	9.00%	10.00%	11.00%	12.00%

* This excludes countries in Central and Eastern Europe, Greece and Portugal
Source: Moody's Investor Service

EXHIBIT 15

Minimum Yield Ranges for Other EMEA Countries

	Prime Property Grades		Good Quality Secondary			Secondary			
Property Types	1	1.5	2	2.5	3	3.5	4	4.5	5
Office	6.00%	6.50%	7.50%	8.00%	8.25%	9.00%	9.50%	10.50%	12.00%
Retail - Regional Shopping Centre	6.00%	6.25%	7.25%	7.50%	8.00%	9.25%	10.25%	11.50%	12.00%
Retail - High Street	5.50%	6.00%	7.25%	7.75%	8.25%	9.50%	9.75%	11.50%	13.00%
Retail - Warehouses & Parks	6.25%	6.50%	7.50%	8.00%	8.50%	9.25%	9.75%	11.00%	12.00%
Retail - Boxes	6.50%	7.00%	8.00%	8.25%	8.75%	9.50%	10.00%	11.00%	12.00%
Industrial - Logistics / Warehouses	6.50%	7.00%	8.00%	8.50%	8.75%	9.50%	9.75%	11.00%	12.00%
Industrial - Other / Light Industrial	6.75%	7.25%	8.50%	9.00%	9.50%	10.25%	10.75%	11.50%	12.00%
Other	8.00%	8.50%	9.50%	10.00%	10.50%	10.75%	11.75%	13.00%	14.00%

Source: Moody's Investor Service

Appendix 3: Operationally Intensive Property Types

In this appendix, we describe in more detail our analysis of net cash flow projections for operationally intensive property types.[25]

Hotels

Hotel cash flows are subject to significant volatility given that rooms are priced on a daily basis. Additionally, these properties have high expense ratios, typically 70% or more of total revenue, with a high fixed expense component. As such, a small decline in revenue can result in a significant decline in net cash flow.

In analysing the cash flow, we typically review a hotel's historical cash flow in addition to current trailing 12-month performance compared to the same period in the prior year. We generally assess the historical revenues and expenses in several ways, as a gross amount, as a share of departmental revenue, and on a per available room (PAR) and per occupied room (POR) basis.

For our income projection, we forecast a sustainable revenue level from rooms, food and beverage (F&B) and other minor operating departments. Room revenue is the largest component of total hotel revenue. To determine room revenue, we generally estimate a stabilised revenue per available room (RevPAR) over time, which reflects the function of assumed occupancy levels and average daily room rates (ADR). To derive stabilised RevPAR, we typically analyse a hotel's historical performance and its annual RevPAR growth rates in comparison to those of its competition as well as its RevPAR penetration rate. We also assess the overall supply and demand trends in the respective sub-market. We consider the impact of new room supply on the subject property's competitive positioning whether from new construction or extensive repositioning of existing hotels in the sub-market.

F&B revenues are typically generated in full-service hotels from a variety of sources including room service, restaurants, cafes, and banquet facilities and typically range from 15% to 25% of total hotel revenue. We typically estimate F&B revenues based on historical operating results and may adjust for any non-traditional revenues from nightclubs, rooftop bars, and lobby bars where revenues may be more volatile.

Revenues from other minor operating departments include parking, guest laundry and valet, and business centre. They typically make up 2% to 4% of total revenue. For resort and convention hotels, they can include spa, golf, parking and casino operations, and can often exceed 4% of total revenue.

For our expense projection, we typically differentiate between departmental and undistributed expenses. Departmental expenses are typically for rooms, food and beverage and minor operating departments and vary to a certain extent in line with occupancy; we therefore evaluate them on a POR basis. However, we also consider that more than 50% of departmental expenses usually do not vary entirely in line with occupancy but are fixed expenses and stop decreasing after a decline in occupancy. For example, even after a fall in occupancy, a hotel needs to maintain a minimum level of housekeeping staff for daily housekeeping tasks and to maintain public spaces. We typically evaluate expenses based on historical operating results, comparable facilities and industry norms.

Undistributed expenses are expenses not allocated to a specific department and include administrative and general, sales and marketing, utilities, and property operations and maintenance expenses. A significant portion (usually over 80%) of undistributed expenses are fixed and do not correlate directly with fluctuations in revenue. We typically evaluate undistributed expenses as a share of total revenue and on a PAR basis. For furniture, fixtures and equipment (FF&E) reserve, we typically reserve a fixed portion, usually in the 3% to 5% range of total revenue each year in anticipation of an increase in capital requirements during a hotel's life.

[25] For additional information, refer to Section 3.2.

The revenue and expense considerations discussed above are relevant even if there is a long-term lease in place with the operator. The rent under these long leases is typically index-linked or subject to fixed uplifts over the lease term. As such, we assess whether the in-place rent has been set at a sustainable level compared to our expected earnings before interest, tax, depreciation, amortisation and rent (EBITDAR).

Healthcare facilities (Care homes)

The cash flow profile of healthcare facilities is relatively riskier because revenues are exposed to changes in government policy and regulations, and the sector has structurally high operating expense ratios. Healthcare facilities are typically let on a master lease to a specialised operator who is typically responsible for all operating expenses. To determine a sustainable medium-term net income, we forecast the operator's ability to pay a sustainable rent compared to our expected EBITDAR.

Our revenue expectations are driven by the average weekly fee per bed and the potential growth in the fee over time. A considerable portion of the revenue is driven by payments received from the state authority, and hence policy and regulatory changes can have a significant impact. Therefore, policy trends will be considered in our analyses. Healthcare facilities also have other sources of revenue from self-funders, depending on the level of additional care provided. We also consider the revenue breakdown between self-funders and government reimbursement. Another contributor to our revenue expectations is the occupancy assumption, which is driven by the average length of stay. Length of stay is based on the level of personal care provided and local demographics, such as the proportion of ageing population. As such, we review the subject's current and historical occupancy levels as well as consider the market and peer group occupancy levels.

Our expense expectations are driven by payroll costs and non-payroll costs such as insurance expenses, real estate taxes and utility costs, and the potential expense inflation over time. Location and level of personal care provided have a significant impact on expenses, especially on payroll costs due to the skilled nature of the workforce involved. Maintenance and capex requirements are driven by the quality of the properties and the future requirements to adhere to regulatory standards. Due to the relatively higher proportion of fixed costs, a relatively small revenue decline can result in significant volatility in the net operating income.

Residential (Multifamily and Student housing)

For private rental multifamily, our sustainable revenue projection is based on our expectations for market rental levels and the potential for rent increases over time. The potential to increase rents is driven by the level of tenant demand and the lease structure in the respective jurisdiction. In some jurisdictions, shorter fixed leases and limited regulation allow the landlord to increase rents more easily compared to jurisdictions with more stringent regulations and infinite lease terms, e.g., Germany. Our revenue projection is also driven by our vacancy rate assumption, which takes into account the current and historical vacancy rates of the property, level of tenant demand and the overall supply in the sub-market as well as the quality of its location. Favourable locational attributes include access to a large and stable employment base, easy access to transportation and reasonable commuting times to employment sources as well as availability of amenities such as supermarkets, restaurants, and shops within the vicinity. Revenue is reduced by losses due to non-payment of rent by the tenants as well as rent concessions, which can be a sign of a weak market or a less competitive subject property. We also evaluate the sustainability of other income sources (e.g., parking, fees) when reviewing historical information.

For purpose-built student housing, tenant demand is driven by a number of factors including proximity to universities that are attractive due to higher global rankings, the level of student growth, and the supply of competing facilities. The presence of master lease agreements with adjacent universities is viewed positively as it provides a reliable supply of student demand. We also examine the mix of unit types in the property. A high proportion of studios could lead to higher volatility in revenue as these types of units will have more volatile demand.

We typically evaluate operating expenses or costs based on historical performance and industry norms. Our cost assumptions are based on the level of non-recoverable costs not borne by the tenants. Residential tenancy regulation in the respective jurisdiction determines which costs the landlord can charge to the

tenants. Main cost items include property management and maintenance costs, capex necessary to maintain the quality of the property, re-letting costs and void costs for vacant units. Maintenance and capex requirements are driven by the quality of the property, level of amenities and any potential maintenance backlog.

For purpose-built student housing, the main cost items include property management costs, maintenance costs and capex. These can run higher relative to standard multifamily properties due to greater wear and tear from high annual turnover rates and the realities of student lifestyle and behaviour.

Other Industrial

Cold-storage facilities

The cash flow profile for cold-storage facilities is more volatile compared to the core industrial property types because of shorter leases between the end-user and the operator as well as higher operating expense ratios.

Cold-storage facilities are similar to large industrial logistics or warehouse properties except that a portion of the total revenue is derived from the handling fee component of operating the cold-storage facility. The handling fee income depends on the location, with facilities located closer to the end-user typically having a higher proportion of handling fee income in the total revenue. Due to the operating nature of the properties, our sustainable medium-term revenue expectation is driven by the EBITDAR.

To derive a sustainable revenue level for cold-storage facilities, we typically consider the warehouse component and the handling fee component of total income. For the warehouse component, we determine our market rental level expectations. For the handling fee component, we may include a portion or all of the handling fee that is sustainable and supported by historical data. Another driver of expected income is our occupancy assumption, which is influenced by demand and supply factors. Tenant demand is typically higher if the property is closer to a manufacturing facility or to the end-user. Supply is generally limited considering the high barriers to entry.

Expense assumptions are driven by our forecasts of the labour costs for the handling fee component and real estate costs such as insurance expenses, real estate taxes and utility costs. Capex is higher relative to other industrial logistics and warehouse properties due to the maintenance requirements associated with cold-storage technology.

Technical Space

The revenue-generating capacity of properties with technical space, like telephone exchanges, depends on the quality of the operator and the importance of the properties to their operations. Typically, these properties are let on long-term leases with strong tenants, but there is a risk that these properties become obsolete and lose most of their value if the current user no longer needs the respective property. Therefore, the strategic importance to the current tenant typically drives our renewal probabilities for expiring leases and thus our medium-term cash flow projections.

The operating costs borne by the landlord can vary depending on the type of property and the lease structure. Costs are typically low if the tenant is responsible for all operating and maintenance costs, but high if the landlord is an operator providing equipment and services to the end-users. If the landlord acts as an operator, we usually analyse the historic performance and adjust our cash flow projection to reflect stabilised revenue and cost levels.

Data Centres

Our cash flow projection reflects the different risks for the respective types of data centres.

For "turnkey data centres", we especially consider the higher capex requirements for landlords (i.e., loan sponsors) to address technological changes because the landlord is responsible for providing and maintaining the building's infrastructure.

For "powered shells" and some "carrier hotels", tenants generally maintain their leased space infrastructure, which shifts the risk of technological change from landlord to tenant and reduces the capex requirements of the landlord. Furthermore, the tenants make significant investment in the property and the infrastructure of their leased space. We take this into account for our renewal probabilities for expiring leases and thus our medium-term cash flow projections.

Ground leases

Ground leases involve the payment of ground rents to the freeholder for the right to use and occupy land for relatively long periods. The ground lease agreements typically involve fixed-term rent reviews, when the ground rent is adjusted based on a standard inflation index. Depending on the jurisdiction, we may also include ancillary income that we consider sustainable as supported by historical data.

To assess a sustainable medium-term income, we consider the current ground rent payment and our expectations around rental growth. Based on jurisdiction and leasehold property type, we might also consider the inability to increase the ground rent beyond a sustainable percentage of the market rent for the use of the leasehold property.

Depending on jurisdiction, we typically reduce the income in any period to account for losses from the payment lag due to a moratorium in the payment of the ground rent before the freeholder can enforce on the leasehold property.

Our cost assumptions are primarily driven by our expectations around a viable management fee for the portfolio. Since ground lease transactions are typically long dated, we also consider potential increases to the management fee in the future. Our management fee assumption is driven by the leasehold property type and the granularity of the portfolio. For example, a concentrated multifamily portfolio with few leaseholders will typically have a lower management fee compared to a very granular portfolio of residential units owned by private individuals, given the higher administrative burden to deal with a larger number of requests from individual leaseholders.

We also consider any additional costs which might be incurred to cover administrative expenses, and which cannot be recovered from the leaseholder.

Appendix 4: Term Default Probability

As mentioned in the "Loan Level Analysis" section, term default risk is primarily driven by the probability of property net cash flows falling below the required debt service payments.

Tenant Diversity Score

The default probability of a loan during its term depends partially on the diversity of the property income. The diversity of the annual expected cash flows reflects tenant diversity, which we measure through our tenant diversity score (Tenant DS) or alternatively through the Herfindahl Index. We typically calculate the Tenant DS for every year over the loan term. The Tenant DS depends in each year on the number of tenants, the tenant industries and the relative weight of each tenant in the overall expected cash flow per loan. The Tenant DS describes for each year of the loan term the number of independent and homogeneous tenants that contribute to the overall expected cash flow per loan. Each of these independent and homogeneous tenants is assumed to have the same default risk as indicated by the weighted average rating factor (WARF).

Our rating committee will ultimately adjust the Tenant DS to appropriately reflect our view of the tenant diversity in the property. We review the tenant industries given by the underwriter and decide whether tenants operating in similar industries are assumed to increase the tenant diversity or not. The view we take in terms of tenant industries is based on the nature of the respective commercial property. For example, even if the tenants of a shopping centre operate in different industries (retail, banking, food and beverage), the performance of the property and, in turn, the term default probability of the loan is mainly driven by the quality and management of the property. Consequently, a Tenant DS solely determined by tenant industries is likely to overstate the diversity benefit of the tenant mix. Typical Diversity Scores range between 1 for single tenanted properties to 10 for diversified, multi-tenanted property portfolios.

In general, we do not assume an increase in the Tenant DS over the loan term. In cases of break options and/or lease expiries, we usually assume any new tenant entering the property to be in the same industry as the initial tenant of the respective unit.

Correlated Binomial Expansion Technique (Correlated BET) is used to Calculate Probability of Default

To calculate the probability that the property net cash flows are insufficient to pay the debt service due, we typically utilise the correlated binomial extension technique. The Correlated BET is similar to our binomial expansion technique (BET) but differs from it by explicitly incorporating default correlations. The default correlation is introduced by the assumption that the conditional correlation is constant as defaults increase. In the BET, the actual portfolio of assets underlying a loan is represented by a reduced number of identical, independent assets. In contrast, the Correlated BET drops the assumption of independence and allows the representative assets to be correlated. The advantage of using the Correlated BET is that it can deal more effectively with low diversity scores and highly correlated assets by producing a much wider range of fatter-tailed default distributions and a more stable modelling result than the BET, an important enhancement, especially for CRE loans with high industry concentrations, as seen in the CMBS market.

Contribution of Each Tenant to the Total Expected Coverage Ratio

For example, with an expected coverage ratio of 1.43x in a given year and 5 independent tenants, the coverage would drop below 1.0x when two tenants were not paying (i.e., defaulting). In other words, the loan can withstand one tenant default without being affected. For an expected coverage ratio of 1.2x and five independent tenants, the coverage would drop below 1.0x when one tenant defaults (i.e., the loan cannot withstand any tenant default). Exhibits 16 to 18 show these calculations for a varying number of independent tenants, weighted average ratings and DSCR levels respectively.

EXHIBIT 16

Impact of Coverage Ratios on Term Default Risk

DSCR	# Independent tenants	Tenant's contribution to DSCR (DSCR/DS)	# Tenant defaults leading to DSCR < 1.0x	Weighted average tenant rating	Term default risk rating equivalent
1.90	5	0.38	3	Ba3	Baa2
1.65	5	0.33	2	Ba3	Baa3
1.43	5	0.29	2	Ba3	Ba2
1.24	5	0.25	1	Ba3	Ba3
1.07	5	0.21	1	Ba3	Ba3

Source: Moody's Investor Service

EXHIBIT 17

Impact of Diversity Scores on Term Default Risk

DSCR	# Independent tenants	Tenant's contribution to DSCR (DSCR/DS)	# Tenant defaults leading to DSCR < 1.0x	Weighted average tenant rating	Term default risk rating equivalent
1.43	10	0.14	4	Ba3	A2
1.43	8	0.17	3	Ba3	Baa3
1.43	5	0.29	2	Ba3	Ba2
1.43	2	0.21	1	Ba3	Ba3

Source: Moody's Investor Service

EXHIBIT 18

Impact of the Weighted Average Tenant Rating on Term Default Risk

DSCR	# Independent tenants	Tenant's contribution to DSCR (DSCR/DS)	# Tenant defaults leading to DSCR < 1.0x	Weighted average tenant rating	Term default risk rating equivalent
1.43	5	0.29	2	A3	A2
1.43	5	0.29	2	Baa3	Baa2
1.43	5	0.29	2	Ba1	Ba3
1.43	5	0.29	2	Ba3	Ba2

Source: Moody's Investor Service

Appendix 5: 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 collateralised 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[26] 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 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.

[26] 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.

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 securitised portfolio, we perform a statistical analysis, comparing the third-party ratings to Moody's monitored ratings.[27] 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 2).

[27] We may also rely on Moody's Analytics 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. See www.moodys.com for more information.

Box 2: 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 18-1).

EXHIBIT 18-1

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

	Moody's																				
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[28]) 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.

[28] 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 monitoring 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[29] and the securitisation's default definition), the time horizon (i.e. point-in-time vs. through-the-cycle), the main components (e.g. financial, behavioural 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.[30]

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 securitised (i.e. the sample should be representative of the securitised portfolio). The data sample may also be tailored to match the characteristics of the portfolio that will be securitised, 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 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.

[29] For information on Moody's definition of default, see *Rating Symbols and Definitions.* A link can be found in the "Moody's Related Publications" section.

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

Appendix 6: A Numerical Example of Term and Refinancing Risk Assessment

The example below illustrates how we derive our default risk assessment once the property quality and property cash flow assessment is complete. Setting the scene:

A large property investor purchased a Canary Wharf office with a market value of GBP 271.6 million. The property is multi-tenanted to financial industry and law firms with a staggered lease profile, but a few large tenants.

The purchase is financed with a GBP 186 million 5-year loan for an interest rate of 4% and 2% annual amortisation.

Moody's net cash flows vary between GBP 16 million and GBP 17.3 million annually over the loan term, with a 10-year-average of GBP 16.5 million. This assessment takes into account Moody's property grade of 1.5, the analysis of the tenancy of the property, and our estimates of ongoing property investments.

Exhibit 19 shows our term risk assessment. Even though the property is multi-let to investment grade tenants, the building effectively attracts tenants from similar industries and leads to a low measure of effective diversity.[31] The strong weighted average tenant rating and the high DSCR ultimately lead to a Baa2 equivalent term risk.

EXHIBIT 19

Term Default Risk Assessment

Moody's Average Cash Flow	16,500,000
Debt Service Due	10,000,000
DSCR	1.65
Diversity Score	3
Weighted Average Tenant Rating	Baa3
Term Risk Assessment	Baa2

Source: Moody's Investor Service

The refinancing risk shown in Exhibit 20 expresses the high-quality property and sponsorship as well as the strong credit characteristics of the loan. With a Refinancing LTV of 71% and Exit Debt Yield of just under 10%, a moderate Ba2 (6%) refinancing risk is assigned.

EXHIBIT 20

Refinancing Default Risk Assessment

Maturity Loan Amount	167,400,000
Moody's Yield	7.0%
Moody's Value	235,700,000
Haircut to Market Value	13.2%
Refinancing LTV	71.0%
Property Grade	1.5
Exit Debt Yield	9.9%
Sponsor Assessment	Experienced
Expected Remaining Lease Term at Maturity	5 years
Refinancing Default Risk Assessment	Ba2 (6%)

Source: Moody's Investor Service

[31] See Appendix 3 for more information on the impact of diversity on property cash flows and default risk.

Appendix 7: Technical Details on Our Simulation Approach

This appendix describes the technical details of our simulation tool. The simulation aims to address the inherent uncertainty surrounding key rating drivers, such as the default of a loan and the potential value of a property.

This section will address the following steps:

» the modelling of loan level defaults

» the modelling of severity upon default

» the use of correlations

Modelling of loan defaults

As a first step, our model simulates loan defaults on a loan-by-loan basis, based on the annual default probabilities determined in our loan analysis. Our model simulates defaults using a factor model framework as outlined in the following Box 3.

Box 3: Multifactor Model

The modelling of the defaults for each loan k, for $k = 1, \ldots, m$ in the portfolio, is based on a three-factor model:

$$Z_k = w_C C + w_{PT} PT + wZ + \varepsilon_k \sqrt{(1 - w_C{}^2 - w_{PT}{}^2 - w^2)} \qquad \text{(Equation I)}$$

C is the location factor

PT is the property type factor

Z is the global factor

ε_k is the idiosyncratic risk factor

w_C, w_{PT} and w measure the correlations between Z_k and C, PT and Z

where C, PT, Z, ε_k, are all independent random variables with a given distribution. These can be viewed as the "primary variables" or building blocks of the Monte Carlo Simulation. Given a realisation of these variables, Z_k, the default rate for loan k, can be determined from the prior equation.

The behaviour of each loan in the portfolio is influenced by three "external" factors (i.e., assumed to be determined exogenously from the loan – C, PT and Z, which altogether measure the systematic risk surrounding each loan). C refers to the location of the assets, while PT refers to the property type of the properties that collateralise each loan. Z is a measure of the global risk. C, PT and Z, are linked to Z_k through w_C, w_{PT} and w, which measure the correlation that each of the loans has with the location, property type and global factors. These correlation factors have been incorporated to reflect the increased interdependence of the loans if they share similar characteristics. For example, with a positive

global correlation factor, the likelihood of any loan defaulting increases if another loan defaults, while without the global correlation factor, two loans in different locations and of different property type would be independent.

The correlation framework for CMBS portfolios assumes a global correlation (W^2) between loans ranging from 10% to 20%, an additional correlation for loans within the same property type (W_{PT}^2) ranging from 3% to 10% and a further additional correlation for loans within the same country (W_C^2) ranging from 5% to 15%.

Finally, ε_k is an independent random variable for each loan in the pool. It can be thought of as a measure of the "internal" risk factor characterising the loan.

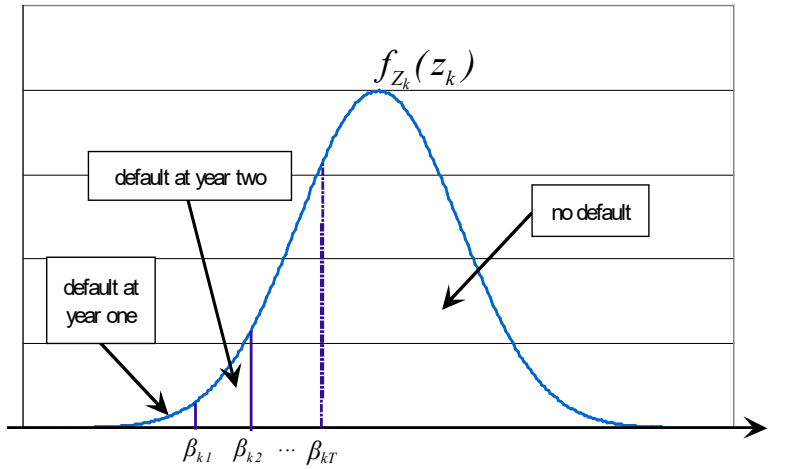
The simulation model determines for each year which loans, if any, have defaulted. Considering each loan, the model will randomly generate one single value for each primary variable contained in Equation I. Given the correlation factors, it is then possible to calculate a value z_k for each loan. At the same time, the default probabilities from our loan analysis serve as boundary values or trigger levels. The model will compare the values z_k obtained for each loan and the boundary values on a standard normal distribution chart to establish which loans default at any period, as illustrated in more detail in Box 4.

Box 4: Modelling Defaults

To determine if and when there is a default, the model compares the output value of Equation I with a certain critical trigger level, or *boundary value*. Based on the loan-by-loan annual default probabilities derived from our loan level analysis, boundary values are defined for each loan. For example, loan k has a known probability p_{ki} to default *before* year i, while $p_{k(i-1)}$ is the probability to default before year $(i-1)$. The probability to default *during* year i is equal to $(p_{ki} - p_{k(i-1)})$. These default probabilities are the outcomes from the loan analysis. Given that each loan's likelihood of default follows a known distribution described by a multifactor model, the boundary values β_{ki} and $\beta_{k(i-1)}$ are calculated such that, under the distribution's curve, the area "to the left" of β_{ki} and $\beta_{k(i-1)}$ equals, respectively, p_{ki} and $p_{k(i-1)}$. The model then compares the outcome from Equation I with the boundary values to determine whether or not the loans default, and the timing of default.

EXHIBIT 21

Determining Default



Source: Moody's Investor Service

We then run the simulation a second time. The model repeats this process by randomly extracting another value for the primary variables, calculating the values for Z_k and establishing if and when each of the loans defaults.

Repeating this process determines the timing of defaults of the portfolio and enables the generation of a default distribution.

Box 5: Modelling Severity upon Default

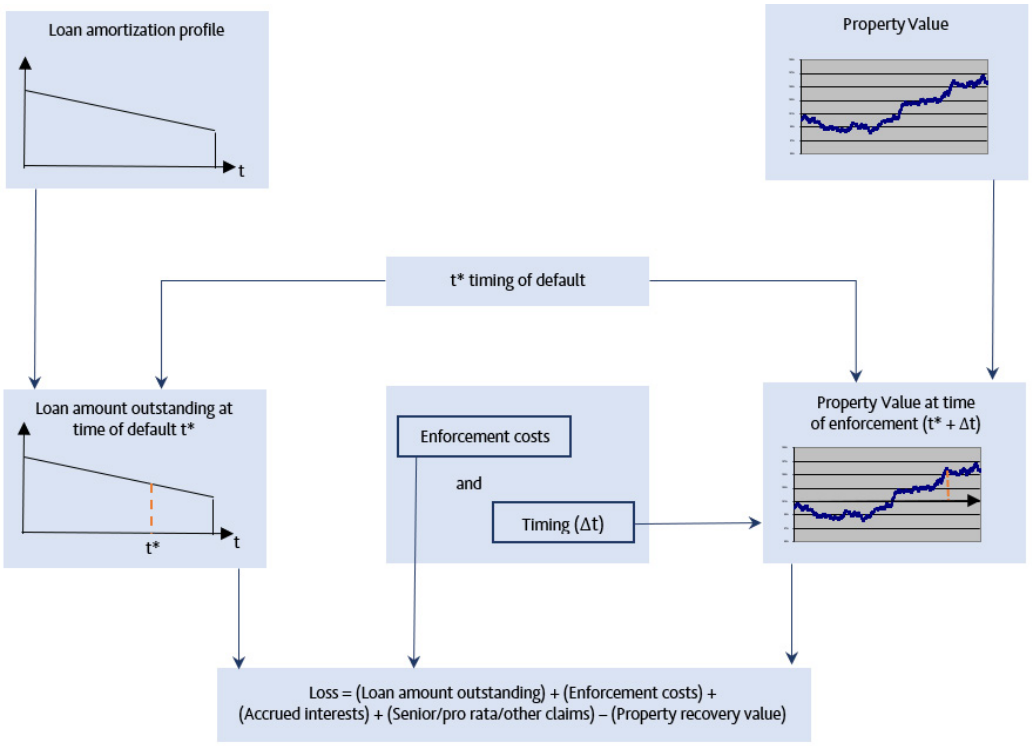
The second step towards a loss distribution is to calculate the severity upon default. Having calculated in step one, for each simulation, the probability and timing of default, the model at this stage computes the severity at default.

The model then compares the loan amount outstanding at the default date with the property value at the time of enforcement to calculate any potential loss, taking into account enforcement costs and accrued interest during the enforcement period. In the calculation of severity, additional elements can be incorporated, if relevant, such as prior or equal ranks from other debt, or swap termination payments that rank ahead of the loan repayment.

An illustration of the severity calculation is provided in Exhibit 22:

EXHIBIT 22

Severity Calculation



Source: Moody's Investor Service

Property value at time of enforcement

The value of the property at time of enforcement is not known when the portfolio is analysed. To model this uncertainty, we utilise a simulation. Empirical observation has shown that property values follow cyclical trends in which phases of property value growth are followed by phases of property value decline. Those phases of extended growth and decline are usually circulating around a long-term growth rate.

The property value at each point in time is modelled in several steps: 1) first the variation in time of the property value growth rate $dr(t)$ is modelled assuming a mean reverting process, 2) then the growth rate $r(t)$ is computed by integrating $dr(t)$ and, finally, 3) the property value $P(t)$ can be modelled by using $r(t)$, the growth rate and $P(0)$, the Initial Moody's Model Value by using the following formula:

$$P(t) = P(0)e^{\int_0^t r(u)du} \qquad \text{(Equation II)}$$

Box 6: Modelling the Property Value Growth Rate: Mean Reverting Process

To derive the inputs required to compute Equation II, the model first computes the property value growth rate. The model assumes that the variation of property value growth rates in a specific market follow a mean reverting stochastic process (first introduced by Vasicek)[32] described by the following equation.

$$dr(t) = k(\theta - r(t))dt + \sigma dW(t)$$ (Equation III)

$r(t)$ is the instantaneous annual property value growth rate

θ is the mean reversion level (i.e., the expected annual growth rate)

k is the mean reversion rate

σ is the volatility

$W(t)$ is a standard *Wiener* process

Equation III can be subdivided in two components:

1) a random component: $\sigma dW(t)$, which behaves as if past values are irrelevant for forecasting future values

2) a mean reversion component: $k(\theta - r(t))dt$, where growth rate changes are not completely independent of one another but rather are related. This component acts as a "drag" factor. For example, if $r(t)$ is below the expected annual growth rate, the mean reversion component will be positive, resulting in an upward influence on $dr(t)$. Alternatively, if the growth rate is above the expected annual growth rate, the mean reversion component will be negative, thus exerting a downward influence on $dr(t)$. Over time, this results in a growth rate path that drifts towards the mean reversion level, at a speed determined by the mean reversion rate.

Integration of Equation III enables the simulation of the property value growth rates $r(t)$.

The model also incorporates correlation assumptions in Equation II to reflect the degree of diversity of the property pool.

[32] Information on the mean reverting process can be found in the following article by OA Vasicek, "An Equilibrium Characterization of the Term Structure", Journal of Financial Economics 5 (1977), pages 177-188.

Box 7: Correlation Parameters in Severity Calculation

We incorporate two different correlation types in the severity calculation:

1) Correlation between severities: Property values of similar properties within the pool are correlated. If the property value of a given asset decreases, the model assumes that other properties within the same market and/or property type are also likely to experience a downward influence on values, and vice versa.
2) Correlation between default and severities: If loans secured by a specific property type/market experience high default rates, the model assumes that all properties with similar characteristics are likely to experience a downward influence on values, and vice versa.

The simulation tool uses a two-factor model framework to model the correlation parameters in the severity calculation.

Each loan is secured by a specific number of n properties. For a given loan, each property q, for $q = 1,...,n,$ has an associated severity factor S_q described by:

$$S_q = w_D D + w_S S + \varepsilon_q \sqrt{(1 - w_D^{\,2} - w_S^{\,2})} \qquad \text{(Equation IV)}$$

D, S, and ε_q are all independent random variables with a given distribution. As shown in Equation IV, severities are assumed to depend on two systemic factors: 1) a severity factor S and 2) a default factor D.

The severity factor S incorporates, through w_S, correlations between property values of properties having common characteristics. So, when modelling the property values using the mean reverting process, the property path of these properties will have some degrees of correlation if they have common characteristics.

The default factor D is itself constructed with a number of primary variables contained in the multifactor model used for the loan defaults (Equation I). This way, it is possible to link Equations I and IV, and to include correlations between default and severities through w_D. The default factor will be correlated with the default rates of the loans having in common the same location and/or the same property type.

The correlation framework for CMBS portfolios assumes correlation between severities (w_S^2) ranging from 30% to 40% and correlation between default and severities (w_D^2) ranging from 15% to 25%.

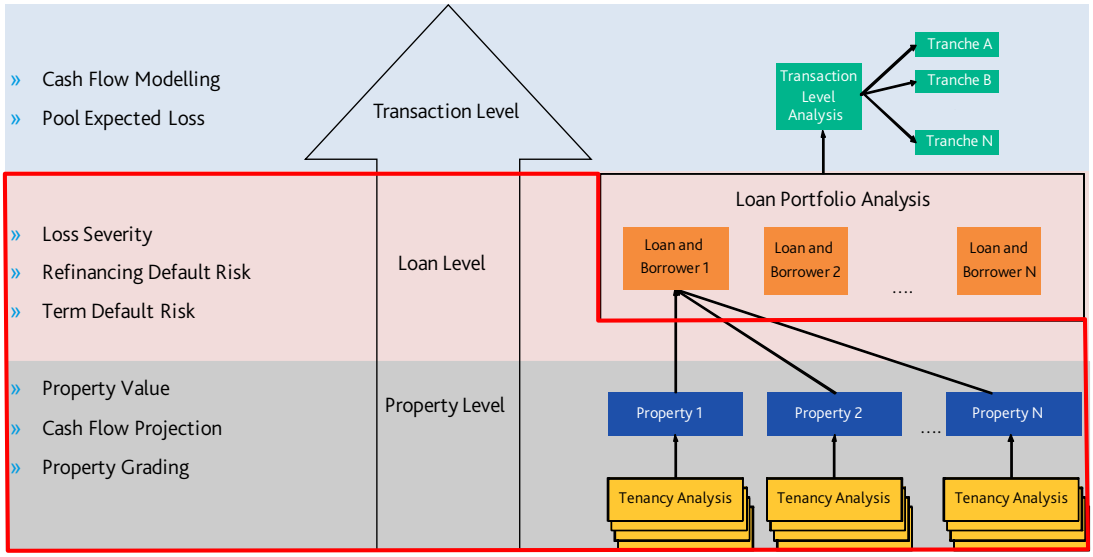
S_q is calculated through Equation IV and then integrated into Equation II to reflect the correlations into the property values previously presented.

Appendix 8: Approach to Rating EMEA Commercial Real Estate Loans

When assigning ratings to CRE loans that are not part of a securitisation structure, we generally apply in the loan analysis the same methodology as for securitised loans, which is described in Sections 3 and 4 of this report. The relevant part of the CMBS analysis is shown in the red box in Exhibit 23. The CMBS transaction level analysis is not applicable to loan ratings.

EXHIBIT 23

Flow of Moody's Bottom-Up Analysis for EMEA CMBS



Source: Moody's Investors Service

In addition, we include the following considerations in our rating analysis to reflect the differences between CRE loans and CMBS transactions.

Expected loss considerations

The ratings assigned to CRE loans address the expected loss posed to lenders by the loan maturity date. In our approach we assess the probability of a loan defaulting prior to its maturity. In addition, we assess the loss given default of such loan by taking into account our assessment of recoveries, including proceeds coming after the loan maturity. We determine the relevant recovery periods based on our country tiering.[33]

In our approach, if a loan is not repaid at its scheduled maturity date, we consider it as defaulted. In determining the rating of a defaulted loan, we take into account expected recoveries and apply our general guidance for defaulted or impaired securities.[34] Generally, we would not rate a defaulted loan higher than B1. The rating would be subject to withdrawal at this point if there is insufficient information available to monitor the rating.

Maximum achievable rating

The main driver of the loan rating is the default risk of the loan during the term and at the maturity date. CRE loans usually do not benefit from external liquidity support, which increases the risk of non-payment of interest according to the terms of the loan. In addition, CRE loans usually do not benefit from a tail period between a scheduled and a final repayment date.

[33] For more information, refer to Section 4.3.

[34] For more information, see *Rating Symbols and Definitions.* A link can be found in the "Moody's Related Publications" section.

The uplift from the assessed loan default risk that we allow by considering expected recoveries to determine the loan rating is limited. Similar to our approach for CMBS notes that are approaching legal final maturity and face increased refinancing risk, we apply a cap to the loan ratings.[35]

Generally, the maximum achievable rating level is Baa3. In addition, an LTV and exit debt yield test for the Baa3 rating must be met. The LTV threshold is based on a Moody's whole loan refinancing LTV of no greater than 65%. The Moody's exit debt yield guidance is 8% for EUR denominated loans and 9% for GBP denominated loans.

The uplift and therefore the rating level can only be higher

» if the loan includes features similar to CMBS structures that effectively lead to a tail period between a scheduled and final repayment date.

» for fully amortising loan structures without refinancing risk.

» for fully-amortising credit-tenant-lease (CTL) type transactions without refinancing risk. The credit analysis of CTL transactions depends primarily on the property tenant's credit rating and the "bondable" quality of the net rent stream, rather than on a traditional real estate analysis of the collateral.

For the determination of the default risk of the respective CRE loan we use the same approach as for securitised loans in EMEA CMBS transactions, which is described in detail in Section 4 of this report.

Transaction governance

For our initial rating analysis and the on-going monitoring, it is necessary that we receive information on the borrower's financials including audited financial statements and information on the underlying properties. The lack of this information would impact the rateability of a loan. As part of the analysis we therefore review the loan documentation for the rights and obligations of the lender and borrower. Usually, information undertakings are included in standard loan agreements, which oblige the borrower to provide on an ongoing basis this information.

Operational risk considerations regarding payment disruptions on rated instruments as explained in Section 8 of this report are not applicable for loan ratings. In contrast to CMBS transactions, in the loan structure there is no cash manager, trustee or liquidity facility provider involved. Therefore, no reports from a servicer are required to make periodical payments to the lender. For loan ratings, we assess the ability of the lender or servicer to provide the information required to monitor the rating.

No representations and warranties of a loan seller

Similar to 'agency' style CMBS transactions, in which the issuing SPV directly grants a loan to the borrower and does not acquire a loan originated by a financial institution, CRE loans are usually not sold and therefore there is no loan sale agreement including representations and warranties of a loan seller.

In the absence of representations and warranties of a loan seller, we assess the quality of the representations and warranties provided by the borrower in the loan agreement in determining rating levels. The representations and warranties provided by borrowers under CRE loans typically relate, inter alia, to the title to the financed assets, solvency of the borrower and correctness of delivered financial statements and that the borrower is not involved in other businesses. Additionally, the property undertakings relate to occupational leases, property management and maintenance. The further general undertakings include negative pledges, compliance with existing law or limitations on property disposals.

As with CMBS transactions, we expect standard third-party reviews of key information that we cannot verify through provided transaction documents. If deemed appropriate, we would expect additional information

[35] For more information on considerations regarding rating caps for CMBS transactions in the tail period, refer to Section 7.2.

and documents to investigate and verify key information. These documents could include copies of main commercial lease agreements or alternatively summaries of legal due diligence or security documents.

Surveillance

We apply the same procedures in ongoing surveillance of loan ratings as described in Section 9 of this report.

Given the relevance of the refinancing risk of the respective loan in our loan rating analysis, an even more important factor in the surveillance process than for CMBS transactions is the monitoring of the state of the CRE lending market as it determines the availability of financing.

To assess the likelihood of a timely repayment of the loan on the scheduled maturity date, we expect to receive incremental information ahead of the loan maturity date. The information could include a specific refinancing strategy of the borrower 12-18 months before loan maturity and proof of refinancing closer to loan maturity. Proof of refinancing could include a commitment letter from a refinancing bank or evidence of funds available to the borrower to repay the loan. In the absence of any evidence of refinancing we would generally assume an increasing probability of default closer to maturity and downgrade the loan rating accordingly.

Counterparty risk

For operational risk and counterparty risk related to hedging counterparties and account banks, the considerations described in Section 8 of this report also apply. In most cases, we do not expect any impact on the loan ratings.

Box 8: Illustration of rating analysis outcome

The following table illustrates the outcome of the EMEA CRE loan rating analysis, which relies on the CMBS property and loan level approach described in Sections 3 and 4 this report, combined with the rating cap. Lending market liquidity and property quality (prime vs. secondary/ tertiary) are further relevant considerations in the rating analysis.

The table indicates the CRE loan rating levels based on two key parameters, the Moody's Refinancing Whole Loan LTV and the Moody's Debt Service Coverage Ratio. These parameters are determined in our property and loan level analysis.

The table shows the range of the parameter metrics, which are derived for European loans secured by standard property types with average tenant quality, limited tenant diversification and an SPV borrower. In determining the metrics for the rated loan, we take into account certain adjustment factors.

The indicated rating levels reflect the maximum uplift from the default probability of the loan and change depending on the factors that drive each parameter's metrics. For the final loan rating level, we also consider other factors such as operational risk and counterparty exposures as described above.

EXHIBIT 24

Illustration of Rating Analysis Outcome for European Loans

	MDY Refinancing (Whole Loan) LTV				
Moody's Average Debt Service Coverage (DSCR)	<40%	<65%	65%-75%	>75%-90%	>90%
>2.00	Baa3	Baa3	Ba	Ba/B	B/Caa
>1.50-2.00	Baa3	Baa3	Ba	Ba/B	B/Caa
>1.35-1.50	Baa3	Baa3	Ba	Ba/B	B/Caa
>1.20-1.35	Baa3	Baa3	Ba	Ba/B	B/Caa
>1.05-1.20	Baa3/Ba	Ba	Ba/B	B/Caa	Caa
<1.05	Ba	Ba	Ba/B	Caa	Caa

Source: Moody's Investor Service

Key Parameter Metrics

Moody's Refinancing LTV is the ratio of the expected whole loan balance at maturity and Moody's collateral value assessment at loan maturity.

EXHIBIT 25

Adjustment Factors for Moody's Refinancing LTV

Factors	Key Considerations
Property	» Property type, quality and location attributes » WA lease term and tenant composition at loan maturity
Loan	» Moody's exit debt yield – ratio of Moody's cash flow and balloon balance » To address the un-hedged position of the borrower after loan maturity, an LTV adjustment will be made depending on the exit debt yield compared to a stressed interest rate assumption » Exit debt yield guidance for Baa3 rated loans GBP denominated loans: 9% EUR denominated loans: 8% » Loan size
Lending Market	» Availability of financing » Interest rate environment

Source: Moody's Investor Service

Moody's Average DSCR is the ratio of Moody's stressed cash flow and the actual debt service for fixed rate or hedged loans. For un-hedged floating rate loans, we stress the interest rate to determine the relevant debt service.

EXHIBIT 26

Adjustment Factors for Moody's Average DSCR

Factors	Key Considerations
Property	» Tenancy profile: credit tenants vs. unrated tenants; tenant diversification » Lease expiry profile
Loan	» Debt service reserves, other reserves, guarantees, sponsor commitments » Hedging: floating vs. capped/interest rate swap
Borrower Entity	» SPV vs. operating entity » Sponsor quality (financial strength/experience)

Source: Moody's Investor Service

Moody's Related Publications

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

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

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

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MOODY'S CLIENT SERVICES:
London: +44.20.7772.5454
New York: +1.212.553.1653
Frankfurt: +49.69.2222.7847
Madrid: +34.91.414.3161
Milan: +39.02.3600.6333
Paris: +33.1.7070.2229

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