U.S. and Canadian Multiborrower CMBS Rating Criteria

Sector-Specific

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This criteria report updates and replaces "Exposure Draft: U.S. and Canadian Multiborrower CMBS Rating Criteria," published March 2023, and the new issue criteria of the same title, published April 2021, and consolidates "North America and Asia-Pacific Multiborrower CMBS Surveillance Criteria," published April 2022.

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Scope

This report details Fitch Ratings' criteria for analyzing multiborrower pools of loans (aka conduits) secured by commercial real estate (CRE) within U.S. and Canadian CMBS deals, as well as certain government-sponsored enterprise (GSE) multifamily CMBS transactions. These criteria are used both for assigning new issuance ratings and monitoring existing ratings, and are applicable to conduit, fusion, multiborrower single-family rental (SFR-MB) and CRE collateralized loan obligations (CRE CLOs). The criteria are also used for monitoring legacy CRE Loan CDO (CREL CDO) transactions and Japanese multiborrower pools of fully amortizing multifamily loans.

For transactions where a limited number of loans are secured by properties within North America but outside the U.S. and Canada, ratings may be constrained by sovereign or location-specific considerations.

The criteria in this report supplement and are applied in conjunction with the related criteria listed on page 2.

Key Rating Drivers

The following key rating drivers are mutually independent and equally important. Fitch's rating commentary will disclose the key rating drivers that most affect its ratings.

Fitch Property Cash Flow: The Fitch net cash flow (NCF) reflects sustainable, long-term property performance; it informs the Fitch property value and Fitch loan leverage, and, ultimately, loan-level defaults and expected losses (ELs).

Collateral and Pool Attributes: In determining the EL, Fitch also considers property type, property quality, loan amortization, loan structure and pool concentrations. Additionally, surveillance reviews consider material changes or expected changes to post-issuance property performance, loan status, defeasance and amortization, as well as recovery estimates on non-performing loans. Consideration is also given to the sensitivity of ELs to alternative loss scenarios.

Leverage Levels: Leverage, as determined by loan to value (LTV) ratios and debt service coverage ratios (DSCRs), is a key driver in assessing default probability and loss given default. LTVs are determined by comparing the loan amount to the Fitch property value, which is determined by using the Fitch NCF and Fitch cap rates. DSCRs are determined by using the Fitch NCF and comparing it to the Fitch loan debt service, which is derived from the loan amount and Fitch constants.

Structure and Legal Analysis: Fitch reviews transaction documents and legal opinions. To the extent transaction documents or legal structures are deemed inadequate, insufficient or below industry standards, Fitch may elect not to rate a transaction.

Cash Flow Analysis: For CRE CLOs only, structural features and hedging strategies, and the timing of defaults and recoveries, are important considerations in cash flow modeling and have a meaningful impact on the transactions' performance.

Multiborrower CMBS Rating Methodology

CMBS rating methodology is applied to several types of CMBS transactions. Conduits are usually composed of newly originated loans to borrowers secured by stabilized properties. Fusion transactions generally consist of conduit loans, combined with one or more investment-grade credit opinion loans (COLs). CRE CLOs are typically pools of floating-rate loans that are generally secured by transitional properties. GSE transactions refer to pools of loans secured by MF properties originated by Freddie Mac or Fannie Mae.

A fundamental component of assessing the likelihood that CMBS notes are paid according to their terms is estimating rating case-specific losses and considering the sufficiency of credit enhancement (CE) relative to those losses.

Fitch's multiborrower CMBS loss analysis is a portfolio approach where each loan is assigned a probability of default during the loan term (term PD), probability of default at loan maturity (maturity PD), and LGD for both term (term LGD) and maturity (maturity LGD) in each rating case. Loan-level EL is calculated as follows:

Expected Loss (EL) = PD * LGD = Term PD * Term LGD + (1–Term PD) * Maturity PD * Maturity LGD

Pool-level ELs at each rating level reflect the weighted average of loan-level ELs, adjusted for pool-level considerations such as concentrations. The details of the model components and input variables are described in Appendix B.

CMBS loans' default and loss characteristics reflect quantitative and qualitative attributes of the property, tenancy and market, as well as structural features of the loan. The model's input variables reflect these quantitative and qualitative attributes and consist of factual information such as property type, location and loan amount, as well as analytical judgement such as Fitch NCF, property quality, and Fitch cap rates and constants.

Fitch undertakes a detailed analysis of a representative sample of loans and properties including site inspections. The sample review helps inform assumptions on the non-sampled loans. Fitch reviews overall property-specific underwriting guidelines at periodic internal meetings.

Key Rating Drivers in Detail

Property Cash Flow

Loan default and loss assumptions are predicated on Fitch's opinion of sustainable property-level cash flow. Fitch NCF informs property value and recovery, debt service coverage and capacity to refinance the loan. Fitch's cash flow analysis considers both the level of property cash flow, as well as the durability of individual revenue and expense components. The level of Fitch NCF is derived from the property revenue and expense adjustments described in Appendix A1 of this report, while income durability is reflected primarily in the selection of Fitch cap rates and constants; both the amount and durability of income are components in estimating loan-level leverage.

Fitch NCF may be updated over the life of the loan to reflect observed and projected changes in property performance and anticipated changes in market conditions, if Fitch deems the changes to be sustained over the remaining life of the loan.

Collateral and Pool Attributes

Fitch's real estate analysis consists of a review of a representative sample of loans and properties, including site visits, asset summaries, market rents and occupancy, and property-level cash flows.

The representative sample generally includes most of the largest 20 loans and reflects the remainder of the pool based on loan size, geographic location, property type, originator and other features. For most transactions, the sample size generally represents a majority of the pool; however, for very large, highly diverse pools, representative samples may represent a smaller proportion.

For further information on collateral and pool attributes, as well as more information on how Fitch's analysis, including site inspections, document review and cash flow determination, informs inputs to the model, see Appendices A1, A2 and A3.

Related Criteria

Global Structured Finance Rating Criteria (March 2023)

North America and Asia-Pacific Multiborrower CMBS Surveillance Criteria (April 2022)

CMBS Large Loan Rating Criteria (March 2023)

Structured Finance and Covered Bonds Counterparty Rating Criteria (March 2023)

Criteria for Rating North American Commercial Mortgage Servicers (December 2022)

U.S. RMBS Loan Loss Model Criteria (October 2022)

Concentrations

Portfolio-wide credit risk is addressed by considering three types of concentration: 1) property type, 2) geographic region (MSA for U.S. and region based on postal code for Canada), and 3) loan count and size. Fitch uses the Herfindahl-Hirschman Index (HHI) to measure these concentration metrics. For more detail on how Fitch analyzes pool concentrations, refer to Appendix A2.

Credit Opinion Loans

CMBS conduit transactions often have large loans with investment-grade characteristics. These large loans are called credit opinion loans (COLs) and are combined with conduit loans for what is commonly referred to as fusion transactions. Each component of a fusion transaction (conduit loan component and COL component) is analyzed separately and then combined. Conduit loans are analyzed pursuant to this criteria report. COLs are first analyzed pursuant to the "CMBS Large Loan Rating Criteria". Transaction concentrations are then analyzed at the fused pool level (including COLs) to arrive at overall rating-specific loss levels.

For more detail on how Fitch analyzes COLs, refer to Appendix A2.

Leverage Levels

Loan-level leverage, including subordinate debt, if any, is a key determinant of EL in Fitch's multiborrower analysis. The model employs six leverage metrics, including two DSCRs and four LTV calculations, which are calculated using balances at three points in time: as of the analysis date (total current LTV and total term DSCR); at assumed default (midpoint between current date and maturity date, the trust midpoint LTV); and at maturity (total maturity DSCR, total maturity LTV and trust maturity LTV).

In addition to the six leverage metrics mentioned under Leverage Levels to the left, Fitch uses two leverage metrics that are only used for comparing transactions. They are the Fitch LTV and Fitch debt yield; the Fitch LTV reflects current trust debt (including pari passu non-trust debt) relative to the Fitch property value, and is calculated based on the Fitch NCF and Fitch cap rate; the Fitch debt yield is calculated using the current trust debt and the Fitch NCF.

Fitch assigns a cap rate and constant to each loan, guided by the property type's Fitch standard cap rate and constant (see Appendix A3). For LTV calculations, the Fitch cap rate is blended with the then-current Fitch market cap rate. The weight on the Fitch market cap rate for total current LTV and trust midpoint LTV is 50%, while the weight for total maturity LTV and trust maturity LTV is 0%, as long as the remaining term is at least 36 months. The weighting on the Fitch market cap rate increases for all LTV calculations when the loan's remaining term falls below 36 months. How leverage levels are calculated and affect the PD and LGD in Fitch's analysis is more fully described in Appendix B.

Fitch does not typically update the Fitch cap rate or Fitch constant in surveillance reviews unless a change in property or market performance warrants it.

Structure and Legal Analysis

In its rating analysis Fitch considers borrower and transaction structure, including asset isolation, counterparty dependencies, bond-level cash flow waterfall and other considerations as outlined in its "Global Structured Finance Rating Criteria." See Appendix A5 for more detail.

Surveillance Considerations

Fitch monitors CMBS transactions after closing using these same criteria, unless a point-in-time rating is assigned. For changes in the pool post issuance, Fitch focuses on changes to loan payment status, cash flow, pool attributes (such as increasing concentrations and changes to CE), and recovery expectations on non-performing loans. Fitch may apply alternative loss scenarios to address potential future performance changes. For more information on these items, see Appendix A4. Fitch NCF may be updated over the life of the loan to reflect observed and projected changes in property performance and anticipated changes in market conditions, if Fitch deems the changes to be sustained over the remaining life of the loan.

Fitch does not typically update the Fitch cap rate or Fitch constant in surveillance reviews unless a change in property or market performance warrants it.

Rating Cases

Rating-case ELs, prior to concentration adjustments, are determined by applying static stresses for each rating case. The main stress is an assumed decline in NCF. The NCF decline is applied to each loan's Fitch NCF assumption, and ranges from 0% in the 'Bsf' rating case to 30% in the

'AAAsf' rating case. PD, LGD and EL are then calculated at the loan level for each rating case using the stressed leverage metrics. In higher rating cases, it is assumed that property NCF will be lower and, thus, losses will be higher.

Other key stresses include:

- Market liquidity for refinancing at loan maturity (credit supply-demand ratio); in higher rating cases, it is assumed that the supply and demand for CRE loans will be out of balance, thereby increasing the risk at maturity that the financing will not be available, and, thus, the effect is to increase the losses applied.
- Length of special servicing resolutions (months to resolution); in higher rating cases, it is assumed that is will take longer to resolve or liquidate defaulted loans, and, thus, the effect is to increase the losses applied.
- A haircut to the amount of seasoning credit as loans age (loan age credit); the longer the remaining term of a loan, the higher the term PD, all else equal. As the remaining term shortens (loan age grows), the term PD will fall, providing a seasoning credit for loans that have not defaulted. However, this seasoning credit phases out in higher rating cases.
- A haircut to appraisals or third-party valuations for defaulted loans and loans in special servicing; in higher rating cases, it is assumed that the recoverable value of specially serviced loans (surveillance only) will be lower, and, thus, the effect is to increase losses.
- EL adjustments for concentrated pools; in higher rating cases, additional losses are applied.

The stresses and how they are used in the model are more fully described in Appendix B.

Model

Summary

Fitch's CMBS rating analysis is conducted using the CMBS CoRE Model (the model).

The model establishes the historical relationship between drivers, and default rates and loss rates using three regression-based equations (term PD, maturity PD and LGD). The model inputs include loan-level data, transaction-specific structure and Fitch's assumptions. When combined, the equations estimate EL at the loan level for the remaining life of the loan, given the loan's attributes and Fitch's assumptions.

Identification and relative weighting of the model's input variables are primarily based on a regression analysis of historical commercial mortgage performance data. Stresses and pool-level concentration adjustments were calibrated against historical CMBS loan performance, in alignment with Fitch's structured finance rating definitions at each rating.

The model uses fixed stresses for the main default and loss drivers, LTV and DSCR, at each rating. The core stress applies declines to Fitch NCF at the loan level, such that the model produces PD, LGD and EL for each loan at each rating.

The weighted average of loan-level EL is the "raw" pool-level EL, which reflects a well-diversified pool. Poolwide EL stresses are applied for concentrations in loan count, property type and geographic region.

Model-generated EL may be rounded to the nearest 1/8 of 1% outside the model. The model-generated EL or rounded EL at each rating is then compared to the CE of each rated class to generate a model implied rating (MIR).

See Appendix B for more detail.

Transaction Comparisons

In addition to the model results, Fitch's rating case losses may be informed by transaction comparisons. Transaction comparisons may include recently rated transactions from similar platforms as well as other transactions with similar key attributes, such as leverage profiles, property-type compositions, geographic concentrations and loan concentrations, among others.

Rating Determination

While the MIR is a key consideration for the committee's determination of ratings, assigned ratings may differ from the MIR. The following outlines where this may occur.

- For transactions subject to a rating cap, individual class ratings and their MIRs will incorporate such rating cap.
- For new ratings, a credit committee may assign a particular rating to a class up to one notch higher or lower than the MIR for immaterial rounding differences, consideration for tranche thickness, or comparison with other similar transactions.
- For existing ratings, ratings will be within three notches of the model MIR (for avoidance of doubt, the difference between 'AAAsf' and 'AA+sf' is considered one notch, and the difference between 'AAAsf' and 'AAsf' is considered three notches), and if not, it will be disclosed and described in rating commentary as a criteria variation.
- For existing ratings, where an updated analysis results in an MIR three or fewer notches from the current class rating (e.g. MIR is BBBsf or AAsf, and current rating is Asf), the current rating may be affirmed, downgraded or upgraded at any level between the current rating and the MIR if Fitch expects future performance changes, such as increased CE and loan seasoning, or exposure to loans with binary risk or adverse selection, which will result in a future MIR that meets the current rating or any rating level between the current rating and the MIR. See Appendix A4 for details on rating changes.
- For MIR below 'CCCsf', Fitch will assign a rating of 'CCCsf, 'CCsf' or 'Csf', in accordance with its structured finance rating definitions. See Distressed Ratings section in Appendix A4.

Limitations

Ratings, including Rating Watches and Outlooks, assigned by Fitch are subject to the limitations specified in Fitch's ratings definitions (available at www.fitchratings.com/site/definitions). Fitch may cap the rating or elect not to rate a transaction if certain key criteria elements are lacking.

Canadian CMBS transactions are typically structured with Canadian dollar-denominated assets and liabilities, thereby eliminating currency mismatch risk. If significant currency mismatch risk did exist for any transaction, Fitch may cap the rating or elect not to rate a transaction.

Underlying mortgage loans may be structured with an anticipated repayment date (ARD) feature wherein the loan interest rate may be stepped up as an incentive for the borrower to repay the loan if not repaid by the ARD. Fitch does not model the loan's stepped-up interest that may arise after the ARD.

For more information on rating caps, see "Global Structured Finance Rating Criteria".

Criteria Disclosures

In Fitch's initial rating report or RAC, it expects to disclose when the final pool loss estimates materially differ from the model's base pool loss estimates as a result of a sensitivity and/or an additional loss scenario analysis. Additionally, Fitch will disclose PD and LGD overrides (see Appendix B) on the top 10 loans. In its initial rating report or RAC, Fitch will also disclose the rating assumption sensitivity of a defined stress of 10% increase and decrease to the Fitch NCF.

Variations from Criteria

Fitch's criteria are designed to be used in conjunction with experienced analytical judgment exercised through a committee process. The combination of transparent criteria, analytical judgment applied on a transaction-by-transaction or issuer-by-issuer basis, and full disclosure via rating commentary strengthens Fitch's rating process while assisting market participants in understanding the analysis behind our ratings.

A rating committee may adjust the application of these criteria to reflect the risks of a specific transaction or entity. Such adjustments are called variations. All variations will be disclosed in the respective RAC, including their impact on the rating where appropriate.

A variation can be approved by a ratings committee where the risk, feature or other factor relevant to the assignment of a rating and the methodology applied to it is generally included within the scope of the criteria, but where the specific analysis is absent or requires modification to address factors specific to the particular transaction or entity.

Appendix A1: Fitch Property Cash Flow

Net Operating Income

In calculating the Fitch property cash flow (Fitch net cash flow [NCF]) for new issuance, Fitch reviews issuer cash flow and issuer-provided supporting materials that typically include: historical, appraisal, budgeted and projected cash flows; rent rolls; third-party reports; and market data. Fitch's cash flow analysis is also informed by third-party data, portions of which are provided directly to Fitch.

Fitch does not give full credit to pro forma projections of cash flow growth based on borrowers' business plans.

Starting with historical or issuer-underwritten cash flow, Fitch adjusts for: nonrecurring income and expense items; above-market occupancy performance; market volatility; and normalized capital expenditures. Such adjustments are commonly referred to as a "haircut" when discussing the overall effect on property-level cash flow relative to historical results or issuer cash flow.

For revenues, Fitch generally focuses on leases in place from tenants in occupancy and paying rent.

Fitch NCF generally reflects in-place revenue and typically does not give full credit to pro forma income predicated on property improvement plans; however, CRE CLOs may include transitional assets with materially impaired or nonstabilized operating income, typically related to occupancy. In these cases, Fitch considers market rent and occupancy, historical revenue or income inferred from a dark value analysis with corresponding adjustments to expected loss (EL).

Common adjustments are outlined below.

Rent Recognition

For properties with long-term leases, such as office, industrial and retail properties, income is generally derived from leases in place from tenants in occupancy and paying rent. Above-market rents are adjusted down by Fitch to sustainable long-term market levels. This rental rate may be below current market levels if Fitch expects market performance to deteriorate beyond current levels.

Loans backed by co-ops are analyzed on an as-rented traditional multifamily property basis. Revenues are estimated based on the market (and in-place for sponsor units) rent and occupancy, and expenses are estimated based on traditional rental multifamily expense ratios.

Credit or partial credit for leased but not occupied space may be considered in a high demand location or when certainty of payment is high, such as when the tenant has executed a lease for an expansion or the tenant is creditworthy and the loan includes an appropriate in-place structure, such as reserves for free rent and outstanding tenant improvements.

For most tenants, consideration of rent steps is limited to near-term (generally, up to six months) contractual increases and by market rents. Fitch may average rents over the lesser of the loan term and the lease term for tenants with exceptional durability characteristics such as investment-grade ratings, provided the average is not above market.

For properties with short-term leases, such as multifamily properties, or no leases, such as hotels, the lesser of the trailing 12 months (TTM) or sustainable rents generally inform revenue assumptions. For these property types, the TTM revenue is generally considered more sustainable than a point-in-time analysis based on leases in place. For Canadian multifamily properties, Fitch considers a current rent roll based on the historically low vacancy rates as well as the prevalence of rent control in many provinces, which has kept new multifamily construction muted.

Percentage Rent

Retail tenants often pay percentage rent in addition to base rent upon reaching sales thresholds, and may pay percentage rent in lieu of all or a portion of base rent. Given its variability, only percentage rent with a demonstrated long-term history and deemed sustainable under expected future market conditions is included in the Fitch NCF.

Vacancy

Fitch adjusts income to reflect stabilized vacancy consistent with historical levels, projections of future vacancy levels or an assumed minimum of 5%–10%, depending on the property type. Fitch focuses on economic vacancy, which, in addition to physically vacant space, includes concessions, market rent adjustments, occupancy cost adjustments for retail properties, and management units. Exceptions to minimum vacancy amounts include demonstrated long-term property or submarket performance, and for investment-grade tenants with long-term leases.

Other Income

Fitch includes other income deemed sustainable and recurring, such as parking at commercial properties and laundry income at multifamily properties. One-time charges, such as a large lease termination fee, will not be recognized. Income deemed nonsustainable, such as management fees or joint venture income, is excluded.

Management Fee

Fitch adjusts management fees to the higher of the contractual fees and market levels. Typical management fees are 3%–6% of effective gross income, capped at $1.25 million for single property loans, if the management fee is subordinate to the mortgage. Loans secured by multiple properties are not subject to the cap.

Operating Expenses

For expenses, Fitch generally applies the most recent full year or TTM expense amount and increases it by 3%.

Issuer-underwritten operating expenses, as well as expense trends and margins, are reviewed for reasonability. The Fitch NCF typically reflects the most recent year-end amounts or TTM levels, plus 3%, and variable expenses are normalized to sustainable levels. For declining expenses, Fitch may request supporting information, such as paid bills or insurance premiums. Particular attention is paid to potential expense increases, such as ground lease payments, payments in lieu of taxes, tax abatements, insurance premiums for properties located in coastal regions or other areas susceptible to weather or other natural disaster events, and reassessments arising from property sales.

Capital Items

Leasing Costs

Fitch generally assumes market amounts for tenant improvements (TIs) and leasing commissions (LCs), which are normalized over the average lease term. Fitch generally assumes office TIs of 50%–100% of one-year's rent for a new tenant and 50% of that amount for a renewal. For LCs, Fitch assumes market amounts (commonly 4%–5% of one year's rent) for a new tenant and typically half that amount for a renewal. Exceptions to these standards often reflect the presence of upfront leasing cost reserves, investment-grade tenants with long-term leases or below-market lease structures.

Replacement Costs

A property's age, quality and engineering evaluation are key determinants in estimating replacement costs; these capital amounts are normalized over their useful lives at assumed market costs. In the U.S., the typical minimum amount is $300 per unit for multifamily or $0.15psf–$0.30psf for commercial properties, and 5% of revenue for hotels.

Leased Fee Collateral

A loan secured by the fee ownership interest in land beneath a commercial property that is ground leased to a third-party owner of the improvements is commonly referred to as leased fee collateral. Leased fee collateral is unique in its cash flow attributes and rights in the event of a ground lease default by the owner of the property improvements. Most ground leases stipulate that all property expenses including real estate taxes, insurance and capital items are paid by the lessee of the land. Therefore, a cash flow analysis of the leased fee collateral typically includes only revenue attributed to the rental payments made by the owner of the improvements to the owner of the land. Upon a ground lease default by the lessee, the leased fee owner can foreclose upon, and become the owner of, the property improvements. Owners of the improvements are extremely motivated to remain current on ground rent payments, as a default can result in the loss of ownership of the improvements.

The revenue in Fitch's analysis for leased fee estates is based on an average of contractual rent payments over the term of the loan. To the extent the ground lease is triple net leased (NNN), no other expenses are included in Fitch's cash flow analysis, subject to any unique provisions within the specific ground lease. Fitch expects the issuer to provide a "look through analysis" of the property improvements to provide insight as to the sufficiency of ground rent coverage maintained on the improvements.

Appendix A2: Collateral and Pool Attributes

Collateral Attributes

In addition to determining Fitch NCF for each loan in the pool, Fitch reviews the loan's collateral and assigns a Fitch: property type; cap rate and constant; property quality grade; Qualitative Risk Score (QRS); Loan Structure Score (LSS); largest tenant percentage; and credit for loans with property diversity. The Fitch standard cap rates and constants are shown in Appendix A3. Factors considered in assigning the property quality grade are discussed in greater detail in Appendix L.

Fitch Property Types

Retail

Mall Tier 1

Tier 1 malls will typically have:

- In-line tenant sales (comparable leases, < 10,000sf, same store) greater than $600psf, over the most recent three-year period (excluding Apple, Tesla and any other tenants that may skew the average).
- Primary market with institutional sponsorship.
- Primary mall in the market considered superior to direct competition, including little to no duplication of anchors in the trade area.
- Three or more high-quality anchors.
- No impactful anchor tenant vacancies.
- Current and historical in-line occupancy has remained above 90% and is stable or growing.

Anchors may include traditional department store anchors as well as other significant visitor generators.

Mall Tier 2

Tier 2 malls will typically have:

- In-line tenant sales (comparable leases, < 10,000sf, same store) ranging from $400psf-$700psf, over the most recent three-year period (excluding Apple, Tesla and any other tenants that may skew the average).
- Primary, secondary or tertiary markets.
- Direct competition may exist with malls of similar quality and anchors in the trade area.
- Two or more non-dark anchors. At most, one large anchor may be vacant; however, strong anchors still remain.
- Current and historical in-line occupancy has remained above 80%-85% and is stable.

Mall Tier 3

Tier 3 malls will typically have:

- In-line tenant sales (comparable leases, < 10,000sf, same store) lower than $500psf (excluding Apple, Tesla and any other tenants that may skew average).
- Secondary or tertiary markets.
- Typically, Tier 3 malls have tenants in bankruptcy, declining cash flow trends, weak/bankrupt sponsorship or declining sponsorship commitment.
- Multiple anchor spaces may be vacant and/or only two or fewer anchors remain.
- Anchors may be considered weak or in bankruptcy.
- Current and historical occupancy is low (e.g. below 85%).

Anchored Retail

Collateral typically includes at least one major retail tenant that provides significant drawing power; typically, this tenant is nationally or regionally recognized. Anchored retail must have the anchor

tenant as part of the collateral for the loan. Anchored retail types include community centers, power centers, freestanding centers (5,000sf–30,000sf) and neighborhood centers (30,000sf–50,000sf). Typical anchors might be a grocery store, home improvement store or pharmacy. Lifestyle centers that cater to upscale national-chain specialty stores with a dining component are typically considered anchored retail. Certain single-tenant buildings may be considered anchored retail: grocery stores, pharmacies and "high street" retail in strong central business district (CBD) markets.

Shadow Anchored

A major retail tenant provides significant drawing power to a retail center, but is itself not part of the particular shopping center or the specific collateral (for example, a shopping center consisting of several in-line stores with a large nationally recognized retailer on an outparcel that is not collateral for the loan but serves as an anchor). The shadow-anchored center may share ingress with the anchored center.

Unanchored Retail

Tenancy does not include a nationally or regionally recognized anchor tenant and primarily consists of in-line tenants. Certain single-tenant buildings may be considered unanchored retail: dollar stores, gyms, auto-repair shops, movie theaters, gas stations, and franchise and nonfranchise restaurants.

Mixed-Use

The property will be modeled based on the largest revenue driver in the Fitch NCF. If the revenue contribution consists of different property types, a combined approach (for instance, weighted average cap rate) may be used.

Office

To warrant a Fitch constant and/or cap rate below the Fitch standard, a property will be among the top tier of its property type nationally and will typically exhibit strong institutional quality characteristics, such as:

- Trophy, class A, quality asset.
- Irreplaceable location within a top-tier city.
- Very strong, long-term, stable performance statistics and expectations of maintaining this performance, including occupancy levels, rent analysis, exceptionally high in-line sales in the case of retail properties, long-term credit tenancy or similar factors.
- Green certificates such as Leadership in Energy and Environmental Design (LEED).
- Sound loan structure.

Cooperative Housing

Cooperative housing loans are loans to a corporation that owns the real estate collateral. They are analyzed on a market rental basis, accounting for traditional multifamily expense ratios and capital expenditures.

Manufactured Housing

Manufactured Housing refers to the rent from the pad on which a mobile or modular home unit is situated. The property will typically offer community amenities that are part of the collateral.

Multifamily

Some multifamily properties in densely populated stable markets, such as New York City, Washington, D.C. or Toronto, may warrant treatment below the Fitch standard.

Multifamily Senior Housing

- Loans backed by age-restricted properties, but with limited to no services provided to residents.

Multifamily Student Housing

- Loans backed by properties catering to university housing will be considered multifamily student housing. Fitch will consider comparables on a per-bed basis and will also consider assigning Fitch cap rate above the standard when enrollment statistics are falling.

Hotel/Lodging

Fitch may consider applying a more favorable cap and constant (25bps–100bps lower than the default) for full-service hotels in premier locations with superior amenities, diversified revenue streams and high barriers to entry. The properties generally have institutional sponsorship and significant recent investments, with significant upside reflected in the hotel's historical performance. These hotels generally have very strong penetration rates compared to their competitive sets, and strong forward bookings.

Full Service

Typically, full-service hotels include luxury, boutique, upper upscale, upscale and midscale (with food and beverage [F&B]).

- Provides a wider range of services and amenities than limited-service hotels.
- Typically has multiple F&B options with full-service restaurants with top-name executive chefs, boutique lounge/bar concepts and room service, as well as meeting/convention and banquet facilities.
- Diversified revenue streams that may include high-end spas, retail venues, gaming options, tennis courts, golf courses and membership clubs, beach-frontage, multiple pools and spacious grounds.
- Typically, urban in-fill location or destination resort/beach setting.
- Higher barriers to entry due to high costs of development,
- Caters to business executives, group and leisure travelers.

Limited Service

Typically, limited-service hotels include midscale without F&B, economy/budget hotels.

- Offers fewer amenities and services than full-service hotels. Appeals to business and transient travelers.
- Limited (if any) food service other than continental breakfast. Select-service hotels are limited service with some F&B options. Some now offering marketplace/bistro type shops with snacks and grab-and-go type offerings.
- Fewer barriers to entry, more financially feasible to develop than full-service hotels.

Extended Stay

Extended-stay hotels are a type of limited-service hotel that caters to guests typically staying five days or longer, such as contractors.

- Usually has lower expense margins, since very little service is provided and room service is completed on a weekly basis.
- Typically, units will include a full kitchen and a separate seating/living room work area.
- Guests stay longer than at limited- and full-service hotels, and, as a result, typically have higher occupancies.
- May be the most recent concept built. May be located in CBD areas, but typically located near suburban office parks with plenty of land and low barriers to entry.
- Can fall within the upscale, midscale and economy/budget price segments.

Industrial

Fitch considers ceiling height, transportation access and the percentage of rentable area that is office for the industrial property type. Traditional industrial properties with amenities and features consistent with the market will be assigned the Fitch standard cap rate.

Self Storage

Self-storage properties provide customers with excess storage capacity. Fitch considers amenities and features consistent with the market and location.

Leased Fee Properties

A loan secured by the leased fee interest in land beneath a high-quality asset with strong cash flow generation in an infill location will be assigned a property type of leased fee if the leasehold value represents the substantial majority of the combined fee simple value (leased fee plus leasehold value). For leased fee loans that do not have these characteristics, the loan will be assigned the leasehold property type.

Other

Fitch may assume cap rates or constants well above the Fitch standards for individual properties or markets with greater cash flow or property value uncertainty. Examples include operating businesses, special-use properties or buildings that may have material costs to convert to traditional use. Market examples include smaller markets dependent on a single industry, such as oil drilling.

Property Quality Grade

Fitch arranges property site visits for a subset of the sample to provide an indication of the quality of the underlying real estate. Fitch assigns a property quality grade from "A" (highest) to "D" (lowest) to each visited property. The property quality grade reflects the property location, condition, tenancy, amenities, competitive position in the market and other relevant information that may affect the volatility of property-level cash flows (see Appendix L for more details). Fitch typically applies the neutral property quality grade of "B" to the non-inspected properties. Property quality affects a loan's LGD, as more fully detailed in the model description in Appendix B. Fitch does not typically conduct property site visits during the surveillance period and will rely on the initial property quality grade from new issuance unless a change is warranted based on a review of servicer commentary and/or general knowledge of the property or market. During times of travel restrictions, site visits may not be performed.

Qualitative Risk Score and Loan Structure Score

Fitch reviews the asset summaries of the sample to assess the qualitative risks associated with the loans or properties in the pool. Qualitative Risk Scores (QRS) range from 1–5, with 1 the least risky and 5 the riskiest. QRS are meant to account for loan characteristics not easily quantifiable for modeling purposes.

Fitch also reviews the asset summaries of the sample to assess the loan structure relative to industry best practices and relative to the qualitative risks present in the loan. Loan Structure Scores (LSS) range from 1–3, with 1 receiving a credit and 3 receiving a penalty. Loans originated using best practices by lenders, such as reserves for real estate taxes and insurance, lockbox/cash management, etc., will receive a neutral score of 2.

QRS and LSS affect a loan's PD components, as more fully detailed in the model description in Appendix B. Fitch does not typically update either score in surveillance unless a change is warranted based on changes to property, performance or market attributes.

Largest Tenant Percentage

The issuer data tape will provide information on the largest tenant percentage for commercial properties. In surveillance, Trepp or the servicers provide largest tenant percentage data.

Property Diversity

Fitch considers diversity at the loan level by using an effective property count for multiproperty loans and cross-collateralized loan groups. A PD credit is applied to reflect that greater diversity in the collateral means lower risk on the loan. The credit is applied at the loan level and also by counting the multiproperty loan as more than one loan (by up to two loans), thereby raising the effective loan count of the pool. When calculating the effective loan count for the pool, multiproperty and cross-collateralized loans are counted as more than one loan, resulting in a higher effective loan count and, thus, a lower EL concentration add-on. For example, a $100 multiproperty loan would be treated as up to two $50 loans in the context of calculating the pool effective loan count, even though the number of properties backing the $100 loan may be much higher than two.

Binary Risk and Potentially High Loss Given Default

For assets with performance concerns and potentially high loss severity, such as malls with poorly trending tenant sales and low occupancy rates, Fitch may employ a recovery-based analysis rather than or in addition to the NCF analysis, limiting debt proceeds to a maximum value (or value psf).

Assets with substantial binary performance risk, such as single-tenant properties or properties with a non-investment-grade-rated tenant making up greater than 75% of rents, are subject to a "go dark" analysis. Assuming the tenant vacates the property, the dark value analysis determines a stabilized market value for the property and deducts reasonable costs required for the property to reach stabilization net of any reserves. Loan-specific proceeds at 'AAAsf' may be limited to the dark value when the loan is greater than 2% of the pool. The loan structure, including cash flow sweeps, amortization and upfront reserves, may ultimately inform the application of any dark-value loan proceed constraints.

Pool Attributes

Concentration

Loan-level EL in each rating case is increased when property type and geographic region concentrations breach certain thresholds; higher ELs are applied to pools with an effective property type count lower than five and to pools with an effective MSA/region count lower than 15. Effective property type and geographic counts are calculated using property-level data, with each property's allocated current trust balance as the weight in the HHI calculation. In the HHI calculations, property types are grouped based on the 12 primary property type groupings (see Fitch Standard Cap Rates and Constants by Fitch Property Type, Including Benchmarks and Mappings for Model Components table in Appendix A3), while geographic regions are grouped by MSA for U.S. transactions and by postal code for Canadian transactions. See Appendix B for more detail.

Small pools, or those with disproportionately large loans, concentrate risk in a relatively small number of assets. Fitch measures loan concentration risk with an effective loan count, which accounts for both the number and size of loans in the pool. Fitch increases EL at rating levels 'Bsf' through 'AAAsf' for pools with an effective loan count below 40. Multiproperty and cross-collateralized loans are counted as more than one loan, up to two, based on the effective property count of the loan itself, within the HHI calculation. Refer to Appendix B for more detail. In surveillance, concentrated transactions with loan counts below 40 or those closer to maturity with expected near-term concentrations may warrant additional paydown scenarios or recovery and liquidation analysis. Significant concentrations by sponsor may warrant the application of additional losses. Significant concentrations of underperforming or defaulted assets may warrant rating caps. See Appendix A4.

Credit Opinion Loans

For credit opinion loans (COLs) contributed to fusion transactions, Fitch first performs a standalone analysis using its "CMBS Large Loan Rating Criteria". A pooling benefit is then applied to reflect the greater diversity provided by other loans in the fusion pool. The pooling benefit is applied as an increase to the LTV hurdle assumed in the standalone analysis.

The standalone LTV hurdles at 'AAAsf' are increased additively by 15%. There is no pooling benefit applied to the 'BBB-sf' standalone LTV hurdle. The rating case hurdles will be linearly interpolated between the 'AAAsf' pooled LTV hurdle and the 'BBB-sf' standalone LTV hurdle (for avoidance of doubt, the BBB-sf standalone LTV hurdle is equal to the BBB-sf pooled LTV hurdle) with a minimum spacing of 5% between the 'AAAsf' and 'BBB-sf' pooled LTV hurdles.

An example of how conduit proceeds, COL proceeds and concentration-related adjustments are fused to produce the final model loss levels for a hypothetical fusion transaction are shown in the table, Hypothetical Final Model Losses Calculation Example, in Appendix B: Pooling Benefit for COLs. This final model loss calculation represents the maximum losses that can be sustained at each rating.

Appendix A3: Leverage Levels

Fitch Cap Rates and Constants

Leverage, as determined by loan to value (LTV) ratios and debt service coverage ratios (DSCRs), is a key driver in assessing probability of default (PD) and loss given default (LGD). LTVs are determined by comparing the loan amount to the Fitch property value, which is itself determined by using the Fitch NCF and Fitch cap rates. DSCRs are determined by using the Fitch NCF and comparing it to the Fitch loan debt service, which is derived from the loan amount and constants. See Appendix B: Leverage Metrics for detail on LTV and DSCR calculations.

The Fitch standard cap rates and constants are shown in the table below. The Fitch cap rate and constant for a particular loan will generally be within +/- 200bps of the standard characteristics, positive or negative. These characteristics include superior or inferior construction quality, tenant quality, infill, established locations versus less established, secondary or tertiary locations, and historical stable cash flows versus unproven cash flows, among other credit qualities. Many of these same factors are considered in the assignment of a property quality grade.

For example, a highly productive drugstore in a dense, urban environment could be assigned caps or constants below the Fitch standard for anchored retail. Similarly, office properties with green certification, such as LEED, may also receive Fitch cap rates and constants below the standards because these properties may attract stronger tenants at higher rental rates, achieve lower operating costs and be less susceptible to the impact of regulations, or policies pertaining to climate change. A Tier 3 mall in a tertiary location with declining cash flow and materially weak tenant sale trends may warrant a Fitch cap rate and constant above the standard. The magnitude of the sale declines will influence the selection of the Fitch cap rate.

Fitch will consider assigning higher than Fitch standard cap rates for industrial loans backed by specialized or manufacturing properties. The cap rate for flex properties will typically start slightly higher than the standard cap rate. Fitch will consider a lower than standard cap rate for industrial properties with investment-grade tenancy, institutional sponsorship or mission-critical characteristics.

Fitch will assign lower than Fitch standard cap rates for superior self-storage properties and portfolios with institutional sponsorship.

The Fitch standard cap rate and constant for leased fee properties are below that of the corresponding property type. The treatment of leased fee collateral reflects the strong position owners have in land beneath CRE, as a ground lease default by the leasehold owner can result in the leased fee owner acquiring any site improvements. Fitch will assign a higher than standard cap rate for the leasehold component, such that the weighted average cap rate for the leased fee and leasehold combined will equal the cap rate that would have been assigned had the property interest not been divided.

For exceptionally strong or weak credit characteristics, Fitch may adjust its cap rates and constants more than 200bps. High-quality trophy properties in dominant real estate markets have expectations for certainty of recovery and could warrant cap rates and constants more than 200bps lower than the standard. In contrast, properties with characteristics that materially differ from the Fitch property type, property types in tertiary markets, properties with higher reliance on operating income and special-use properties lack certainty in recovery, particularly under stress scenarios, and could warrant cap rates and constants more than 200bps higher than the standard.

Loans within CRE CLOs are often assigned cap rates and constants lower or higher than the standard to reflect Fitch's assessment of the efficacy of the sponsor's business plan relative to cash flow durability, value stability and expected loan performance.

Fitch Standard Cap Rates and Constants by Fitch Property Type, Including Benchmarks and Mappings for Model Components

Primary Property Type	Property Type	Model Code	Fitch Standard Cap Rate (%)	Fitch Standard Constant (%)	ACLI Property Type	Benchmark Market Cap Rate (%)	Benchmark VR Cap Rate (%)	Term PD Property Type Coefficient Grouping
IN	Industrial	IN	9.00	10.00	IN	9.00	9.00	Group 4
SS	Self Storage	SS	9.50	10.50	IN	9.00	9.50	Group 2
HC	Healthcare-Assisted Living	HC_AL	10.50	11.50	LO	11.50	11.00	Group 7
HC	Healthcare-Skilled Nursing	HC_SN	11.50	12.50	LO	11.50	11.00	Group 7
LO	Lodging-Extended Stay	LO_ES	11.50	11.25	LO	11.50	11.50	Group 10
LO	Lodging-Full Service	LO_FS	11.25	11.00	LO	11.50	11.50	Group 10
LO	Lodging-Limited Service	LO_LS	11.50	11.25	LO	11.50	11.50	Group 10
OT	Other	OT	11.00	12.00	LO	11.50	11.00	Group 10
CH	Co-Op Housing	CH	8.50	9.50	MF	8.75	8.50	Group 1
LF	Leased Fee	LF	7.00	8.00	MF	8.75	7.00	Group 1
MF	Freddie Multifamily	MF_FR	8.75	9.75	MF	8.75	8.75	Freddie
MF	Multifamily	MF	8.75	9.75	MF	8.75	8.75	Group 4
MF	Multifamily-Senior	MF_SR	9.00	10.00	MF	8.75	8.75	Group 4
MF	Multifamily-Student	MF_ST	9.25	10.25	MF	8.75	8.75	Group 8
MH	Manufactured Housing	MH	8.75	9.75	MF	8.75	8.75	Group 3
MU	Mixed Use	MU	9.00	10.00	OF	9.00	9.00	Group 6
OF	Office-Medical	OF_MD	9.00	10.00	OF	9.00	9.00	Group 4
OF	Office-Suburban	OF_SU	9.00	10.00	OF	9.00	9.00	Group 4
OF	Office-Urban	OF_UR	9.00	10.00	OF	9.00	9.00	Group 4
RT	Retail-Anchored	RT_AN	9.00	10.00	RT	9.50	9.25	Group 5
RT	Retail-Mall Tier 1	RT_ML1	8.00	9.00	RT	9.50	9.00	Group 5
RT	Retail-Mall Tier 2	RT_ML2	10.00	11.00	RT	9.50	9.00	Group 9
RT	Retail-Shadow Anchored	RT_SA	9.25	10.25	RT	9.50	9.25	Group 9
RT	Retail-Un-Anchored	RT_UA	10.50	11.50	RT	9.50	9.25	Group 9
RT	Retail-Mall Tier 3	RT_ML3	12.00	13.00	RT	9.50	9.00	Group 11

Note: Primary Property Type is used to calculate effective property type count, described in Appendix B: Pool-Level Model Components. The univariate chart for property type in Appendix B is displayed using the Property Type Model Codes. ACLI property type is used to determine the Fitch market cap rate assumption, described in Appendix B: Loan to Value Ratio. The benchmark market cap rate is used to determine the Fitch market cap rate as described in Appendix B: Loan to Value Ratio. Benchmark VR cap rate is used to calculate the Value Resiliency (VR) Score as described in Appendix B: Value Resiliency Score. The Term PD Property Type Coefficient Groupings show which property types have the same term PD property type coefficient.
Source: Fitch Ratings

Appendix A4: Surveillance Considerations

Loan Performance

Loans with significant changes in DSCR, occupancy or tenancy issues, and other loans identified through Fitch's review of servicer watchlists and overall industry trends, such as tenant bankruptcies and submarket performance, may be modeled with more conservative cash flow haircuts and/or cap rates than other loans in the pool. These loans are typically labeled as Fitch Loans of Concern (FLOCs).

Loan Status

A loan has an elevated risk of default when it has missed its current payment, is 30 days delinquent or has been delinquent in the past 12 months. A loan also has an elevated risk of default when it has been previously modified.

The current and prior loan status affect a loan's PD. Loans defeased with 'AAA'-rated collateral are assumed to pay off in full. In the case when loans are defeased with non-'AAA' rated collateral, Fitch will consider the magnitude of the exposure to the pool in relationship to the available credit enhancement as well as the remaining tenor of the exposure relative to the remaining tenor of the bonds to determine if ratings would be affected. Specially serviced loans and loans that are 60 days or more delinquent are assumed defaulted. For defaulted loans, LGD is based on a haircut applied to the Fitch property value compared to the current loan amount, including any servicer advances.

Fitch may override the current delinquency status for loans expected to default or transfer to special servicing imminently. Likewise, a loan that was previously delinquent in the past 12 months may not be treated as having experienced a delinquency if the stress was caused by extenuating circumstances (such as pandemic-related delinquencies).

Fitch may override the PD for loans with a heightened expectation of default not reflected in the 'Bsf' rating case PD assumption. PD overrides will be based on the significance of potential performance decline and expected default timing. Higher PD assumptions will be applied on loans with more significant performance issues and with near-term default expectations; lower PD adjustments are made for loans with lower likelihood of default.

For example, if a loan's largest tenant, which occupies 50% of the NRA, is expected to vacate within three months, which will result in the loan's DSCR falling below 1.0x, the PD would be adjusted to 75% or higher as the loan is now considered highly likely to default in the near term. If the same tenant has its lease expiring within 12 months, but there is no available information on a renewal, the PD would be adjusted to 50% or lower. PD adjustments will be used whenever the 'Bsf' rating case PD does not accurately reflect Fitch's expectation of future delinquency.

Fitch NCF in Surveillance

Fitch receives historical and most-recent loan and property-level net operating income (NOI) from Trepp or servicers. In surveillance, the sustainable Fitch NCF is either Fitch NCF from issuance, or updated due to expectations of sustained performance changes. In the first three years of a transaction, Fitch expects to use Fitch NCF from issuance based on limited updated reporting that is common in the early years of a transaction. Sustainable Fitch NCF for top 15 loans and larger FLOCs, if it differs from issuance, will be determined in a manner consistent with issuance with adjustments for updated performance or expected performance.

For smaller loans or non-sampled loans, Fitch will compare the prior sustainable Fitch NCF (issuance or prior review) to the most recently reported NOI less a standard haircut (see table at right) to approximate NCF. If the approximated NCF is more than 10% different than the prior sustainable Fitch NCF, Fitch will consider assigning a new sustainable Fitch NCF. Standard adjustments at the pool level or loan and property level may also be applied for portfolio reviews and stress testing.

Fitch reviews current operating statements, rent rolls, market conditions and sales reports (when available) for the largest loans to assess whether actual or expected performance may affect sustainable NCF. Analysts review servicer-reported financials to determine and understand any differences from the Fitch NCF used in previous reviews.

Standard Haircut to Most Recently Reported NOI

(%)	
Healthcare	5.0
Retail	7.5
Mixed Use	7.5
Multifamily	7.5
Industrial	10.0
Office	10.0
Hotel/Lodging	15.0
Other	7.5

Source: Fitch Ratings

Actual operating performance may fluctuate from year to year. For surveillance, the Fitch NCF from issuance will continue to be used unless Fitch determines that a sustained material change in NCF has occurred, or will occur, in which case, an updated Fitch NCF is used. Changes to NCF that Fitch might account for include, among others: a significant, and expected to be prolonged, increase or decrease in vacancy due to long-term changes in the market; changes due to newly signed leases with rents that are significantly below or above those at issuance; and increases in expenses such as those for taxes or insurance. Updates to Fitch NCF would not necessarily occur for declines in reported cash flow that stem from downtime between leases in a market that has stable vacancy and one-off expense increases that are expected to be reimbursed by tenants sometime in the future.

If Fitch believes the reported cash flow does not reflect recoverable value, Fitch will use a Fitch NCF, either reflecting sustainable performance or a dark value analysis, often in conjunction with other means of valuation, such as comparable sales or recent purchase price.

Non-Performing Loans

When a loan is non-performing, or property cash flow is impaired, is not reflective of value or is not provided, the Fitch value is informed by third-party valuations, workout strategies provided by the servicer, sales comparables, dark value analyses or alternative approaches deemed most reliable.

When relying on third-party valuations, haircuts are applied to account for the reliability and age of the information, as well as anticipated expenses and fees related to workouts. Appraisals and brokers' opinions are typically "point-in-time" values that could be outdated relative to the review date of the transaction. Furthermore, the servicer valuation could be an "as-is" or "stabilized" value.

The starting point for the haircut is 20% and the haircut is increased in higher rating categories by the defined stress, Additional Appraisal Haircut add-on (see Loan Level Stresses in Appendix B). Factors that influence adjustments to the base 20% haircut include collateral attributes — such as current and expected occupancy, performance, and property and market conditions — and current and expected servicer advances, expenses and fees. Servicers make advances for loan principal and interest payments and for property protection, including taxes and insurance payments, and maintenance of the property, as well as for any legal fees or workout expenses. More conservative haircuts are applied when the information regarding the collateral is limited or when the workout is expected to be prolonged or there is binary risk. Fitch may also apply a multiple to the additional appraisal haircut add-on for loans where there is increased risk of higher losses in higher rating cases. The higher losses resulting from the application of the multiple will be disclosed in the RAC, if relevant to the ratings.

Upgrades, Downgrades and Rating Outlooks

To avoid rating volatility, prior to upgrading, downgrading or revising Rating Outlooks, Fitch may consider alternative loss scenarios in determining the ratings to reflect expected or potential performance changes given the idiosyncratic risk inherent in CRE. These alternative loss scenarios incorporate potential future model runs and are reviewed, if used, prior to rating changes. For instance, prior to downgrading or revising a Rating Outlook, Fitch may consider the following:

- A paydown scenario to reflect expected amortization and loan repayment as well as actual defeasance.
- Overrides to delinquency, special servicing status or other factor for what are expected to be short-term property-performance issues.

Prior to upgrading or revising a Rating Outlook, Fitch may consider the following:

- Loan-level stresses, such as defaulting currently performing loans that have a heightened expectation of future default.
- Poolwide or property-specific stresses on performing loans such as NCF declines or other stresses to address potential factors not addressed in Fitch's rating case.
- Conservative assumptions regarding future pool composition to address adverse selection, increased concentration, tail-risk and the potential for interest shortfalls.

Special Cases for Updating Ratings Outside the Model

Outside-the-model analysis is required in special cases such as extreme concentration, extreme levels of underperformance or market stress, and potential for interest shortfalls. For very concentrated pools, Fitch may rely on a look-through analysis of the underlying collateral, whereby loans (including other assets for CREL CDOs) are grouped by the expectation of their recovery and the payment priority of the transaction. For example, a class completely collateralized by defeasance could be considered 'AAAsf', although consideration for potential interest rate shortfalls might limit the upgrade, consistent with the Global Structured Finance Rating Criteria. Similarly, Fitch may assume conservative default and recovery assumptions on SFR-MB transactions due to limited updated loan-level reporting.

Examples of Outside-the-Model Analysis

- Concentrations by loan, property, tenant, sponsor, geography, etc.
- Subordinate and/or junior debt positions for CREL CDOs.
- Binary risk due to a single tenant, maturity concentration or an otherwise uncertain default probability with a high loss severity that could cause an outsized loss or recovery.
- Macroeconomic considerations.
- Transaction performance and structure including interest shortfall risk, limited reporting, and imminent repayments or liquidations.

For very concentrated pools, Fitch may rely on a look-through analysis of the underlying collateral, whereby loans (including other assets for CREL CDOs) are grouped by the expectation of recovery and payment priority of the transaction. Grouping the loans relative to the transaction's existing ratings and CE provides a way to determine if any rating movements are warranted. For example, a class completely collateralized by defeased loans would be considered 'AAAsf', although consideration for potential interest shortfalls may limit an upgrade, consistent with the Global Structured Finance Rating Criteria. Conversely, classes reliant on the repayment of non-performing loans may be capped at 'CCCsf'. Classes covered by currently performing loans with binary risk, such as significant tenant roll prior to the loan's maturity in a tertiary market, could be capped below investment grade. Classes covered by performing loans or defaulted loans with a high degree of certainty of loan work-out details and recovery prospects may be rated investment grade.

Interest Shortfalls

If there is a likelihood of interest shortfalls, Fitch may limit upgrades consistent with Global Structured Finance Rating Criteria; while Fitch does not conduct cash flow modeling for most CMBS transactions, it considers the differences in accrued interest against interest that has been paid, the amount of existing interest shortfalls, the number and performance of remaining loans, the potential for accrued or future special servicing fees, and other factors that could limit the timeliness of interest payments.

Interest shortfalls are typically caused by repayment of servicer advances and appraisal reductions on individual loans. The potential for future interest shortfalls can be assessed by the likelihood of additional loans moving into special servicing, the servicer's recoverability of advances (from servicer non-recoverability determinations), servicer fees from prior loan modifications and legal fees associated with loans subject to litigation. The level of existing interest shortfalls relative to the capital structure is reviewed for each class, taking into account the thickness of class sizes.

Time-Tranched Classes

Many outstanding transactions have several time-tranched classes with the same CE at a given rating level. Should these classes' CE not meet or exceed the rating losses for its current rating, Fitch would not necessarily downgrade all the time-tranched classes to the same rating, as there is an expectation for certain classes to pay off sooner, providing a greater certainty of full recovery.

Distressed Ratings

For distressed ratings of 'CCCsf', 'CCsf' or 'Csf', default risk is defined as possible, probable and inevitable, respectively. While ratings are ultimately made by rating committee and reflect Fitch rating definitions, 'Csf' ratings often correspond to estimated losses from foreclosed properties and imminent liquidations, 'CCsf' ratings reflect estimated losses from defaulted loans (includes assets for CREL CDOs) where resolution amounts or timing are less certain, and 'CCCsf' ratings may reflect expected losses from loans not yet defaulted and/or that recently transferred to special servicing where value and recovery estimates are preliminary.

Appendix A5: Structural and Legal Analysis

Borrower Structure

U.S. CMBS borrowers are typically special-purpose entities (SPEs) designed to mitigate the likelihood of insolvency or the impact of the insolvency of owners or other related entities. Borrowers in Canadian transactions are not typically structured as SPEs. Unlike U.S. bankruptcy law, there is no "cram down" risk under the Companies' Creditors Arrangement Act (CCAA), which allows debt restructuring for insolvent debtors. In bankruptcy within Canada, each class of creditor, to which the restructuring plan is proposed, must approve the plan.

Rated Final Date

Typically, 33 years after closing, the rated final date should allow sufficient time for loans to amortize and for defaulted loans to be worked out or foreclosed and liquidated.

Representations and Warranties

Loans made under appropriately rigorous loan documentation are expected to have lower losses than those with subpar documentation. Fitch expects mortgage loan seller's representations and warranties to be consistent with current industry standards.

The transaction documents generally state that the mortgage loan seller must cure breaches of reps and warranties or repurchase the loan plus accrued interest, fees and expenses within a specified number of days. Fitch also considers the quality of the entity making the reps and warranties as an indication of the likelihood of collecting on any breaches that may occur.

Fitch expects mortgage loan seller reps and warranties to be from an investment-grade-rated entity or a wholly owned subsidiary of an investment-grade-rated entity. For transactions where mortgage loan seller reps and warranties are not from an entity that meets Fitch's criteria, Fitch considers placing greater emphasis on the relative strengths and weaknesses of the collateral analysis, third-party due diligence and originator reviews. In limited situations, Fitch may also consider the availability of additional CE or the presence of other structural mitigants in its analysis.

Counterparty Risk

Securitized transactions' reliance on commercial mortgage servicers as the primary provider of liquidity, as well as for loan administration functions, creates potential counterparty risk. Fitch's minimum standards and methodology for evaluating both types of counterparty risks are included in our counterparty criteria, "Structured Finance and Covered Bonds Counterparty Rating Criteria".

Liquidity and Collections

To ensure timely payment of interest in the event of a loan default, master servicers traditionally advance delinquent loan payments (as well as property protection expenses) subject to a recoverability standard. The trustee provides backup advancing for principal and interest (as well as property protection expenses) in the event the servicer fails to advance such amounts. Servicers and trustees also collect and administer transaction funds — minimum standards for deposit accounts and liquidity providers are included in the counterparty criteria.

Operational Risk

Securitized transactions also rely on servicers for loan and transaction administration functions and Fitch's counterparty criteria also address minimum standards for evaluating servicers' operational capacity, the risk of discontinuity, servicer de-linkage and appropriate mitigants to these risks.

For each multiborrower securitization rated by Fitch, the respective master and special servicers are assessed in relation to the principles highlighted in the counterparty criteria; however, given the size and maturity of the securitization market, the assessments further reflect Fitch's commercial mortgage servicer rating criteria ("Criteria for Rating North American Commercial Mortgage Servicers").

Discontinuity risk is mitigated by the depth of the servicing market and standard provisions for replacement servicing in transaction documents. The depth of the servicing market is considered robust, including the approximately 40 servicers annually assessed by Fitch. The risk of servicing

discontinuity is also mitigated by standard transaction language that includes clear provisions for servicer compensation, termination and replacement, as well as the obligation of the trustee to fulfill the responsibilities of the servicer following a servicer default until a replacement servicer is engaged. These obligations include, but are not limited to, advancing of principal, interest and property protection expenses.

Originator

Fitch evaluates originators' origination practices relative to historical policies and to review any significant changes to their processes or product lines over time. Originators with experienced staff, training, well-defined policies and procedures, formal approval processes, appropriately aligned incentives, quality control, loan documents with appropriate covenants, quality borrowers and primary supporting documents typically originate better-quality loans with lower ELs.

Originator reviews are performed for entities that typically contribute greater than 15% by balance. Originator reviews normally include an on-site management meeting by Fitch to assess the originator's policies and procedures. See Appendix D for a more detailed discussion of originator reviews.

Appendix B: CMBS CoRE Model

The CMBS CoRE Model (the model) is a proprietary model used in the CMBS rating analysis of multiborrower transactions. The model also implements the rating analysis described in the "CMBS Large Loan Rating Criteria". The model entails the analysis of both loan-level and pool-level characteristics. The rating case probability of default (PD) and loss given default (LGD) at the loan-level are based on each loan's risk attributes. To determine a pool's rating case expected loss (EL), the sum of the individual loan ELs and concentration add-ons, based on the pool-level characteristics, is calculated. To determine ELs higher in the capital structure, rating-specific NCF stresses and other stresses are applied.

The following describes each variable and demonstrates the sensitivity to changing the value of key input variables. For a list of input variables, see Appendix J.

Loan-Level Model Components

The primary components of loan-level EL in Fitch's multivariate CMBS multiborrower model are PD and LGD. PD and LGD each has a term component and a maturity component.

$$Term\ PD * Term\ LGD + (1 - Term\ PD) * Maturity\ PD * Maturity\ LGD = Expected\ Loss$$

Primary Model Components

Term PD Variables	Maturity PD Variables	Term and Maturity LGD Variables
Total Current LTV	Total Maturity LTV	Trust Midpoint LTV
Total Term DSCR	Total Maturity DSCR	Trust Maturity LTV
Value Resiliency Score	Value Resiliency Score	Value Resiliency Score
Delinquency Status	Delinquency Status	Modified in Past
Modified in Past	Modified in Past	Largest Tenant Percentage
Property Type	Credit Supply Demand Ratio	Property Quality Grade
Original and Remaining Term		Months to Resolution
Canada-Recourse		Default Type

Source: Fitch Ratings

The charts in this report are based exclusively on the characteristics of a hypothetical sample loan delineated in Appendix K, except where noted. Loan characteristics other than those of the hypothetical sample loan will result in different estimates of term PD, maturity PD, and LGD.

Leverage Metrics

The model uses six leverage statistics, two in each model component. The table below shows the loan balances considered and the weighting on the Fitch market cap rate and Fitch cap rate in each LTV calculation.

Leverage Metrics[a]

Leverage Metric[a]	Input for Model Component	Balance Timing	Balance Considered (%) Trust + Pari Passu	Subordinate Secured	Subordinate Unsecured	Cap Rate[bc]	Weight on Fitch Market Cap Rate >= 36 Mos. Remaining (%)[d]	Weight on Fitch Market Cap Rate <= 0 Mos. Remaining (%)[d]	Constant
Total Current LTV	Term PD	Current	100	100	33	Blend of Fitch Cap Rate and Fitch Market Cap Rate	50	80	N.A.
Total Term DSCR	Term PD	Original	100	100	33	N.A.	N.A.	N.A.	Loan Rate, 360 Mo. Amortization[e]
Total Maturity LTV	Maturity PD	Balloon	100	100	100	Blend of Fitch Cap Rate and Fitch Market Cap Rate	0	80	N.A.
Total Maturity DSCR	Maturity PD	Balloon	100	100	100	N.A.	N.A.	N.A.	Fitch Constant[f]
Trust Midpoint LTV	LGD	at Assumed Default[g]	100	0	0	Blend of Fitch Cap Rate and Fitch Market Cap Rate	50	80	N.A.
Trust Maturity LTV	LGD	Balloon	100	0	0	Blend of Fitch Cap Rate and Fitch Market Cap Rate	0	80	N.A.

[a]Credit opinion loans are analyzed using the "CMBS Large Loan Rating Criteria." [b]Fitch Cap Rate starting point is consistent with long-term averages based on data reported by the American Council of Life Insurers (ACLI) by property type. [c]Fitch market cap rate for a loan is based on the Fitch market cap rate assumption. [d]For remaining term between 0 and 36, the weight on Fitch market cap rate is interpolated. For loans at and beyond maturity, the weight is 80%. [e]For loans with an amortization period less than 360, the assumed amortization period is the average of the actual period and 360. [f]Fitch Constant starting point is consistent with long-term averages based on data reported by the American Council of Life Insurers (ACLI) by property type. [g]Assumed default is the midpoint between the analysis date and maturity date. PD – probability of default. N.A. – Not applicable.
Source: Fitch Ratings

Loan to Value Ratio

LTV is a measure of leverage using the loan balance and the Fitch value of the property. The property value is calculated by dividing the Fitch NCF by the capitalization (cap) rate specific to the property based on a blend of the Fitch cap rate and the Fitch market cap rate as described in the table above. The Fitch loan specific cap rate selection generally starts with the standard Fitch cap rate for the property type, as indicated in the table, Fitch Standard Cap Rates and Constants by Fitch Property Type, Including Benchmarks and Mappings for Model Components, in Appendix A3 and may be adjusted according to the property's market and asset quality.

The Fitch standard cap rates are based on historical long-term averages, and the Fitch loan specific cap rates are typically more than 200bps above the loan's actual cap rate. When this is not the case, Fitch may adjust the Fitch loan specific cap rate to maintain a cushion of up to 200bps above the loan's actual cap rate.

The Fitch market cap rate for a particular loan is the Fitch market cap rate assumption for the loan's ACLI property type (one of five) adjusted by the difference between the loan's Fitch cap rate and the benchmark market cap rate for the property type. The Fitch market cap rate assumption is based on the 8-quarter average (weighted by the number of observations in the quarter) of the quarterly fixed cap rate reported by ACLI for each of the five ACLI property types. Fitch updates and discloses publicly the Fitch market cap rate assumption annually. If the ACLI data are based on a small sample of transactions, Fitch may use a longer than 8-quarter average to capture a more robust sample. See the table, Fitch Standard Cap Rates and Constants by Fitch Property Type, Including Benchmarks and Mappings for Model Components, in Appendix A3 for the mapping of the Fitch property type to the ACLI property type and the benchmark market cap rate for each.

To illustrate using an example: XYZ Office has a Fitch cap rate of 8%. The Fitch market cap rate assumption for Office is 5.53% and the benchmark market cap rate is 9%. Since the Fitch cap rate for XYZ Office is 1% lower than the benchmark market cap rate for office, the Fitch market cap rate for XYZ Office is 1% lower than the Fitch market cap rate assumption, or 4.53%.

Debt Service Coverage Ratio

DSCR measures the ability of the property to pay debt service. DSCR is used to assess the credit risk during the term and at maturity.

In calculating term DSCR, Fitch uses a debt service that assumes 360 months amortization schedule, unless the actual amortization term is shorter. This is to account for the observed difference in historical performance of interest-only (IO) loans relative to amortizing loans. In calculating the maturity DSCR, Fitch uses a debt service that assumes a hypothetical refinance mortgage constant and the balance at maturity.

For floating-rate loans, the assumed loan interest rate will depend on whether the loan has a conforming interest rate cap or not. For loans with a conforming interest rate cap, the capped loan rate is used for calculating the term DSCR. For loans without a conforming interest rate cap, the assumed loan interest rate for the term DSCR is derived from the corresponding Fitch constant. The cap is considered non-conforming if the cap provider is not rated 'BBB' or 'F2', or higher, when the category of the highest rated class is 'Asf' or higher; the term of the cap does not match the term of the loan; or the borrower is not contractually obligated to renew the cap at any loan extension.

Fitch constants address interest rate risk should maturing loans refinance in a higher interest rate environment. Fitch's approach generally is to start with the standard Fitch constant as indicated in the Fitch Standard Cap Rates and Constants by Fitch Property Type, Including Benchmarks and Mappings for Model Components table in Appendix A3, and it may be adjusted according to the property's market and asset quality.

In cases where a loan's actual mortgage constant is higher than Fitch's constant, Fitch generally assumes the higher actual mortgage constant, unless the high constant is the result of a short amortization schedule rather than an above-market loan spread. Fitch may also increase the Fitch constant to maintain a 100-bp spread to the Fitch cap rate.

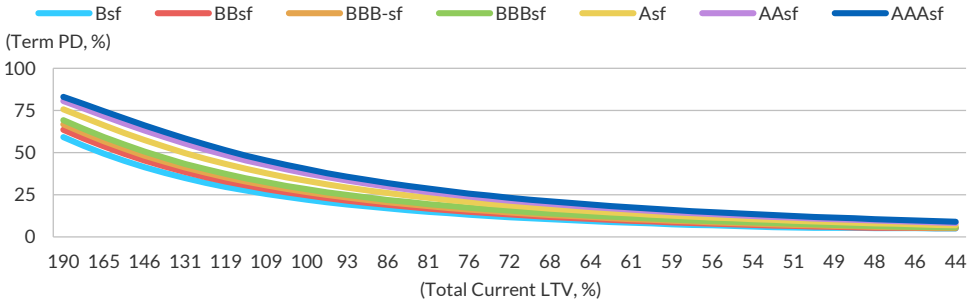
Term Probability of Default Variables

The term PD variables are listed in the Primary Model Components table above. This section discusses all these variables in detail. The combined effect of all term PD variables in the model indicates a loan's term PD.

Current Loan to Value

The total current LTV and term PD are directly related; the lower a loan's total current LTV, the lower the term PD. Additional debt can lead to less available cash flow for capital improvements and less cushion for revenue and expense fluctuations. The risk of additional debt is typically factored into the PD by calculating the total current LTV on the total debt stack, including all pari passu debt, and secured subordinate debt such as B-notes, C-notes, etc. Additionally, one-third of all unsecured subordinate debt, such as mezzanine debt and preferred equity with debt-like provisions, is included. For certain types of debt with limited rights and remedies such as intercompany loans or EB-5 financing, Fitch will consider the impact such debt might have on potential default when determining whether to include or not. For example, certain intercompany loans are between related parties and the presence of such would not increase the PD. The presence of sub-debt is recognized in surveillance reviews and, if updated levels of sub-debt are not available during the term, the amount of sub-debt at issuance date is used as a proxy.

Term PD by Total Current LTV for Sample Loan

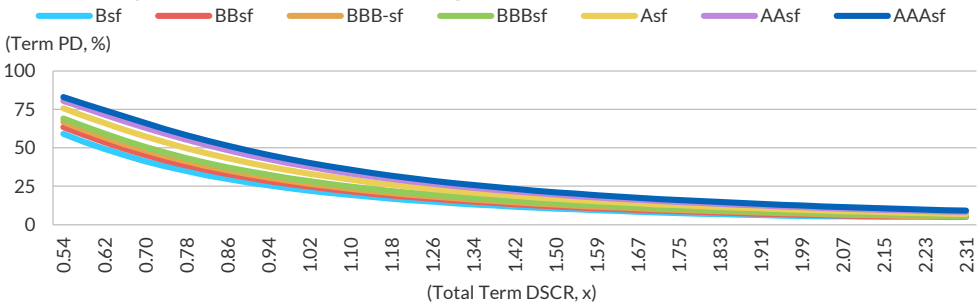


Source: Fitch Ratings

Term DSCR

Total term DSCR and PD are inversely related; loans with a higher total term DSCR have lower PDs than those with lower total term DSCR. The total term DSCR is also calculated using additional debt, per the preceding paragraph.

Term PD by Total Term DSCR for Sample Loan

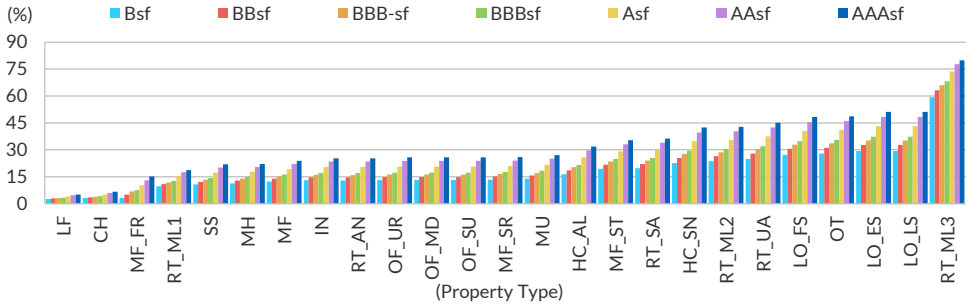


Source: Fitch Ratings

Property Type

Some CMBS property types have a higher average likelihood of default than others, all else equal. The major CMBS property types are ranked by their likelihood of default from lowest to highest in the chart below (assuming all other loan characteristics are unchanged from the sample loan described in Appendix K, except for Fitch cap rate, constant and market cap rate). Varying likelihoods of default are driven primarily by differing revenue volatility, demand drivers, cost structures and ease of construction/barriers to entry. See the Fitch Standard Cap Rates and Constants by Fitch Property Type, Including Benchmarks and Mappings for Model Components table in Appendix A3 for the property type coefficient grouping, as well as the property type model codes used in the line chart below.

Term PD by Property Type for Sample Loan



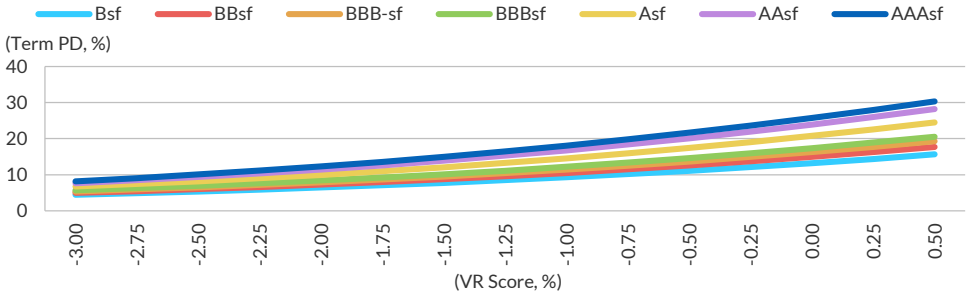
Note: The Fitch standard cap rate and constant are used for each Fitch property type. See "Fitch Standard Cap Rates and Constants by Fitch Property Type, Including Benchmarks and Mappings for Model Components" in Appendix A3 for the standards and the property type model code.
Source: Fitch Ratings

Value Resiliency Score

Value Resiliency Score (VR Score) is a numerical variable that influences the probability of term default. It reflects Fitch's view of value resilience and is measured by the difference between the loan's assigned Fitch cap rate and the benchmark VR cap rate for the property type. The benchmark VR cap rates are shown in the Fitch Standard Cap Rates and Constants by Fitch Property Type, Including Benchmarks and Mappings for Model Components table in Appendix A3. The VR Score reflects the quality and durability of the property's value and is capped and floored at +0.5% and -3.0%, respectively. VR Score and term PD are directly related; negative VR Scores have lower probability of term default relative to positive VR Scores, which have higher probability of term default, all else equal.

Some loans may have a lower likelihood of default notwithstanding they have the same total current LTV as loans secured by similar properties. This could be attributed to a resilience of value; their values do not fluctuate as much as the average given certain characteristics. An example of this is comparing two urban office building loans, one of which is LEED-certified in Manhattan and one in Cleveland, OH. Both buildings could have a total current LTV of 100%, but the Manhattan office building may have a Fitch cap rate of 7% and the Cleveland building a Fitch cap rate of 10%. The VR Score for the Manhattan loan is -2.0% (7% Fitch cap rate minus 9% benchmark VR cap rate), whereas the VR Score for the Cleveland loan is +0.5% (10% Fitch cap rate minus 9% benchmark VR cap rate, for a difference of +1.0%, which is then capped at +0.5%). A lower than average Fitch cap rate (i.e. the assigned Fitch cap rate is less than the benchmark VR cap rate) indicates a less risky, more resilient value, meaning that strong expected performance may be captured, even if the asset is more highly leveraged.

Term PD by VR Score for Sample Loan

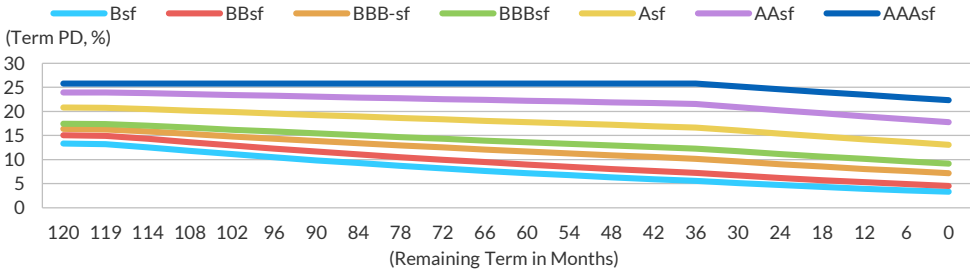


Note: The VR Score and Fitch cap rate change in tandem, except when the VR Score has been capped and floored.
Source: Fitch Ratings

Original and Remaining Term (Seasoning Credit)

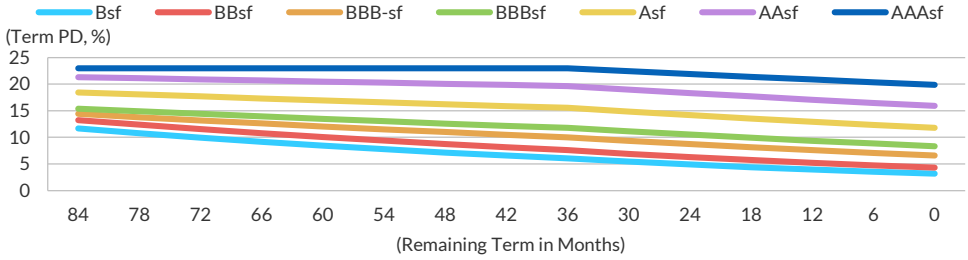
The shorter the remaining term of a loan, the lower the term PD, all else equal. As the remaining term shortens, the term PD will fall. This also provides a seasoning credit in surveillance for loans that have not defaulted. This seasoning credit, however, phases out in higher rating cases (see Loan Age Credit in Loan Level Stresses table). Seasoning credit is not applied to loans that are delinquent or have been delinquent in the past 12 months. A loan's original term to maturity is considered in conjunction with its remaining term. For example, assume Loan A has a five-year term to maturity and is newly originated, and Loan B has a 10-year term to maturity but was originated five years ago. Both loans have the same remaining term (five years), but Fitch assigns a lower term PD to Loan B in the 'Bsf' rating case, all else equal, to account for its five years of demonstrated performance (seasoning credit). Due to the phaseout of seasoning credit, the term PD becomes higher for Loan B in the 'BBBsf' and higher rating cases.

Term PD by Original and Remaining Term for Sample Loan (120 Month Loan)



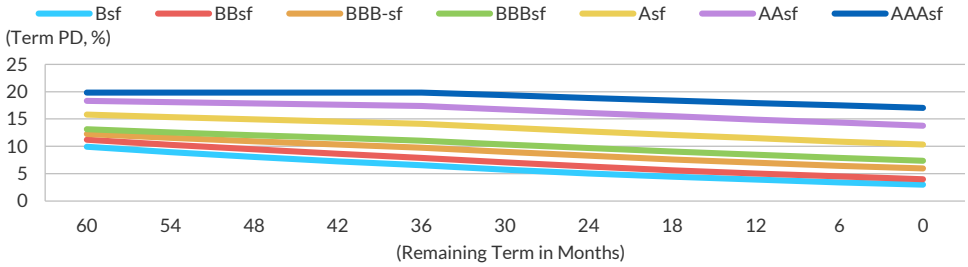
Note: Sample loan has an original term of 120 months. For the purposes of this chart, the Fitch market cap rate assumption was held constant throughout the analysis.
Source: Fitch Ratings

Term PD by Original and Remaining Term for Sample Loan with 84 Month Term



Note: Sample loan with an original term of 84 months. For the purposes of this chart, the Fitch market cap rate assumption was held constant throughout the analysis.
Source: Fitch Ratings

Term PD by Original and Remaining Term for Sample Loan with 60 Month Term

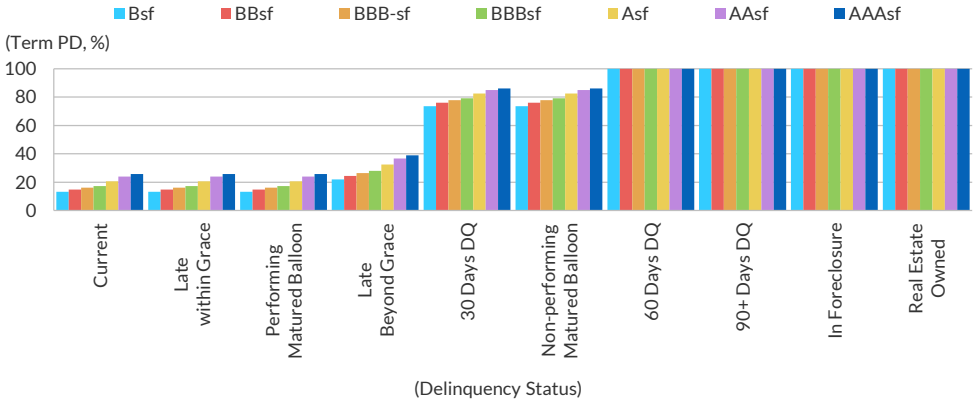


Note: Sample loan with an original term of 60 months. For the purposes of this chart, the Fitch market cap rate assumption was held constant throughout the analysis.
Source: Fitch Ratings

Delinquency Status and Modified in Past

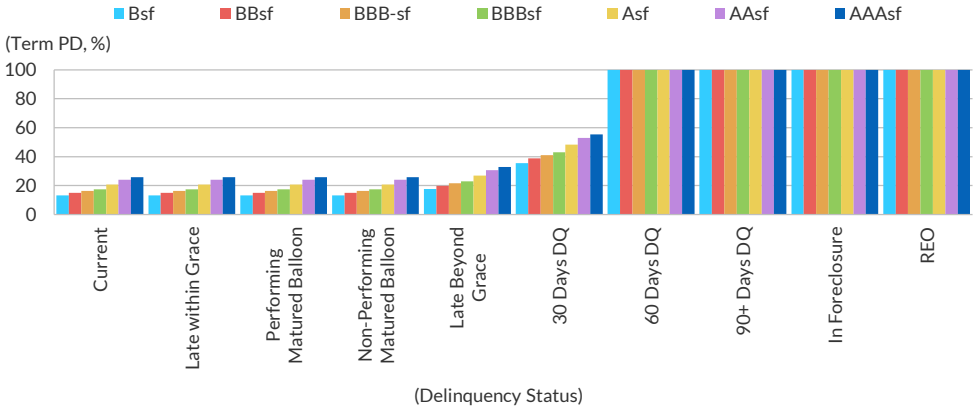
Loans currently delinquent, delinquent in the previous 12 months or modified in the past will be applied a higher term PD than an always-performing loan, all else equal. However, a loan that was modified or previously delinquent in the past 12 months may not be treated as modified or having experienced a delinquency if the stress was caused by extenuating circumstances (such as lockdowns due to a pandemic).

Term PD by Current Delinquency Status for Sample Loan



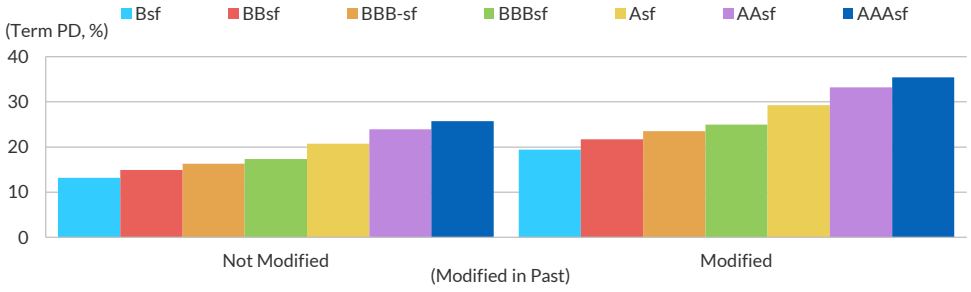
DQ – Delinquent
Source: Fitch Ratings

Term PD by Worst DQ Status Previous 12 Mos. for Sample Loan



DQ – Delinquent. REO - Real estate owned.
Source: Fitch Ratings

Term PD by Modified in Past Status for Sample Loan



Source: Fitch Ratings

Canada and Recourse

Canadian loans have a lower PD than those originated in the U.S., all else equal. The superior performance demonstrated by Canadian assets is attributed to lender-friendly foreclosure laws and sponsor recourse provisions. All Canadian loans will receive a PD credit to reflect the lender-friendly Canadian foreclosure laws.

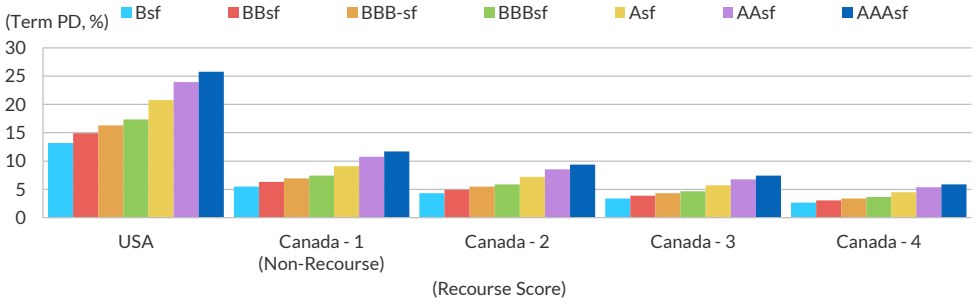
Almost all U.S. CMBS conduit loans are nonrecourse to the sponsor/borrowing entity, except for certain carveouts for fraud, misappropriation, bankruptcy and environmental issues. However, Canadian loans frequently feature recourse provisions. To reflect this reduced risk, Fitch will assign each Canadian loan a Canada recourse score based on the extent of recourse and the financial wherewithal of the party providing the recourse. PD credits will then be applied based on each loan's score. Generally:

- full recourse to an investment-grade entity receives a score of 4, and receives the maximum PD credit;
- partial recourse to an investment-grade-rated entity or full recourse to an individual, non-investment-grade entity, or non-rated entity receives a score of 3; a score of 3 receives 2/3 of the full credit;
- partial recourse to an individual, non-investment-grade entity, or non-rated entity receives a score of 2; a score of 2 receives 1/3 of the full credit; or
- no recourse or recourse to a shell entity receives a score of 1, and receives no PD credit.

For avoidance of doubt, entities rated 'CC' or 'C' will be treated as having no recourse and the loan will receive a score of 1; for entities rated 'CCC', the loan will receive a score of 2.

To the extent a non-rated corporate entity provides substantial recourse, the CMBS group will typically consult the Corporates team in determining the financial wherewithal of the entity providing recourse. The determination of an entity's financial substance is considered relative to the loan size and amount of recourse provided.

Term PD by Canada and Recourse Score for Sample Loan



Source: Fitch Ratings

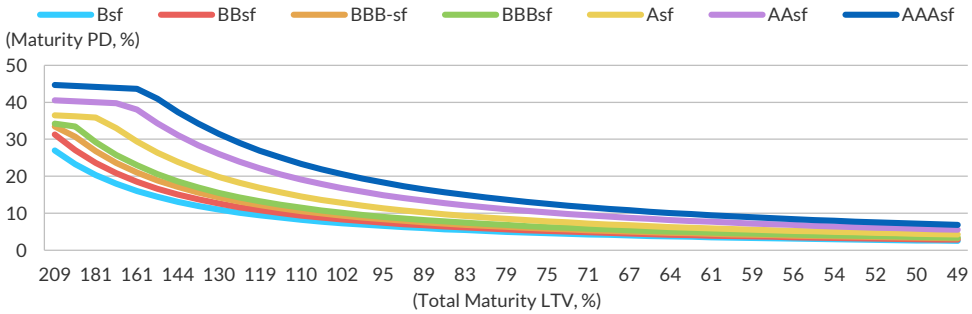
Maturity Probability of Default Variables

The maturity PD variables are listed in the Primary Model Components table above. This section discusses all the maturity PD variables in detail. The combined effect of all maturity PD variables in the model indicates a loan's maturity PD.

Total Maturity LTV

Total maturity LTV and maturity PD are directly related; loans with a higher total maturity LTV have higher maturity PDs than those with a lower total maturity LTV. The total maturity PD is also calculated using additional debt as previously described.

Maturity PD by Total Maturity LTV for Sample Loan

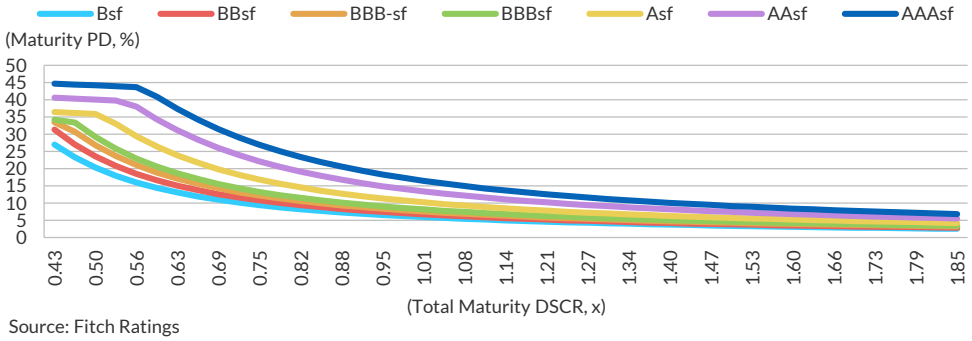


Source: Fitch Ratings

Total Maturity DSCR

Total maturity DSCR and maturity PD are inversely related; loans with a higher total maturity DSCR have lower PDs than those with a lower total maturity DSCR.

Maturity PD by Total Maturity DSCR for Sample Loan

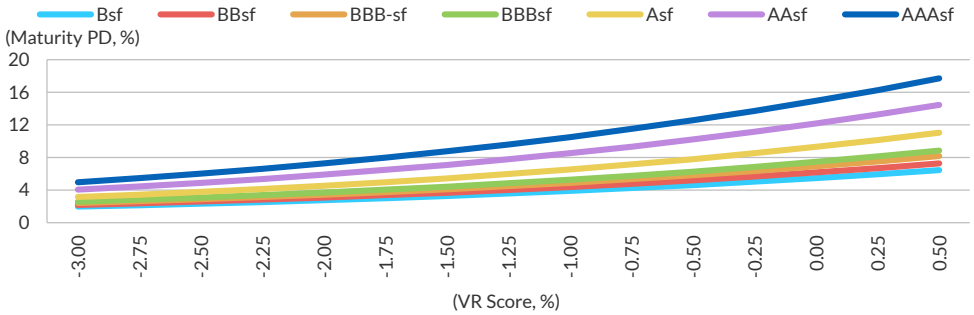


Source: Fitch Ratings

Value Resiliency Score

VR Score is also a variable for maturity PD. A negative VR Score lowers the probability of maturity default; see the description above and chart below.

Maturity PD by VR Score for Sample Loan

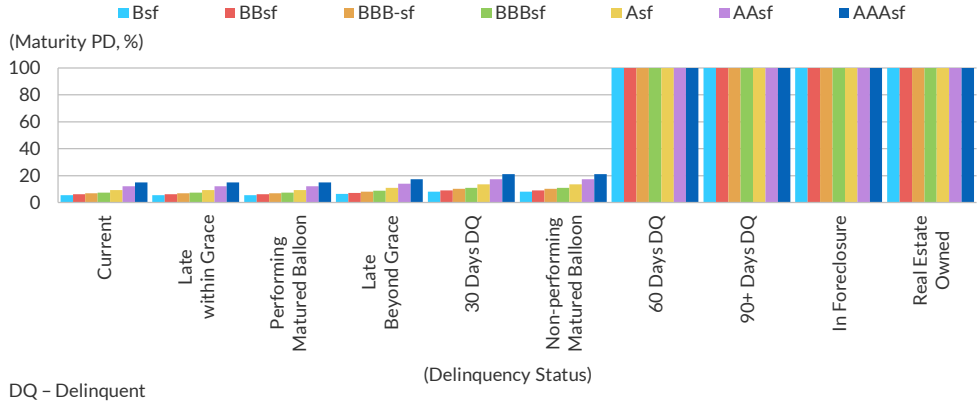


Note: The VR Score and Fitch cap rate change in tandem, except when the VR Score has been capped and floored.
Source: Fitch Ratings

Delinquency Status and Modified in Past

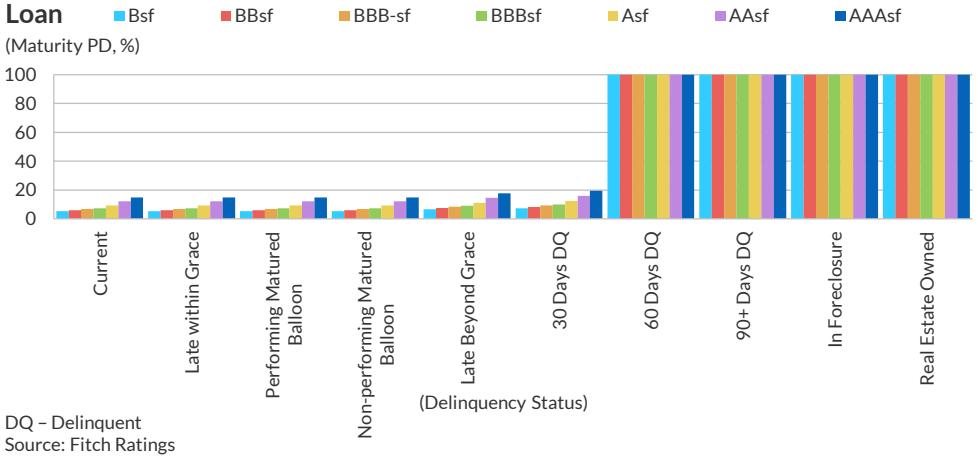
Delinquency status, both previous and current, and whether modified in the past are variables for maturity PD. See the description above and chart below.

Maturity PD by Current Delinquency Status for Sample Loan



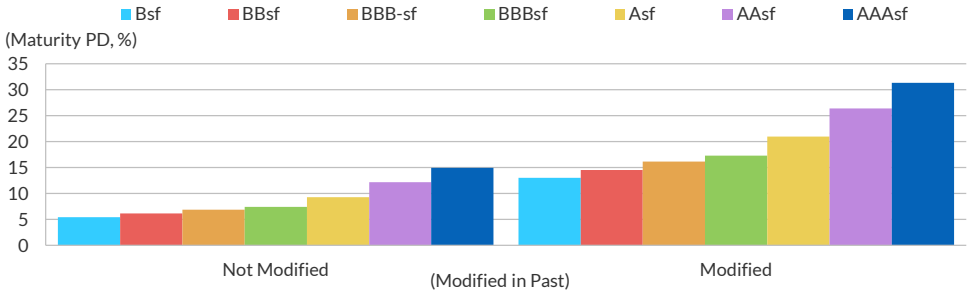
DQ – Delinquent
Source: Fitch Ratings

Maturity PD by Worst DQ Status Previous 12 Months for Sample Loan



DQ – Delinquent
Source: Fitch Ratings

Maturity PD by Modified in Past Status for Sample Loan



Source: Fitch Ratings

Credit Supply-Demand Ratio

The credit supply-demand ratio is a stressing variable that is the same for every loan in a given rating case. The model assumption is an increased penalty in higher rating cases. It assumes an imbalance in the supply and demand for CRE loans, thereby increasing the risk at maturity that financing will not be available, and, thus, applies penalties in higher rating cases (see Loan-Level Stresses section).

Additional Probability of Default Adjustments

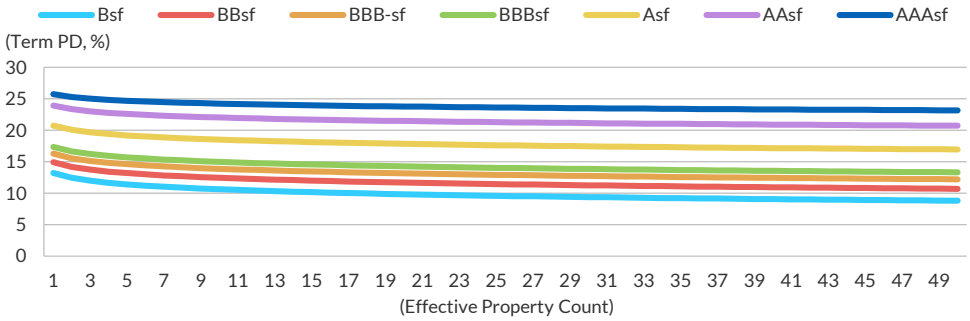
Based on industry experience, Fitch has identified several factors that are important but have limited discernable performance differentiation based on Fitch's historical CMBS data set. Fitch uses three variables, property count, QRS and LSS to express its opinion in aggregate of these factors. Both term PD and maturity PD are adjusted by the following.

Property Count

Loans secured by multiple properties exhibit lower PDs than those backed by a single property, as shown in the chart below.

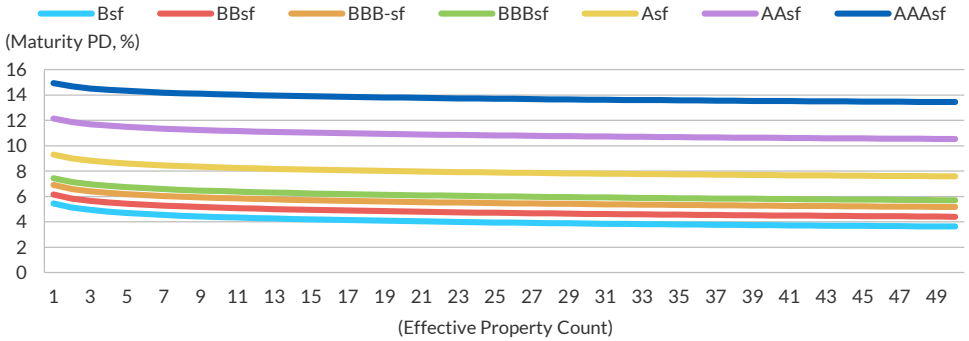
Multiproperty loans allow stronger-performing properties in the loan pool to support poorer-performing properties. Furthermore, an owner is more likely to continue making timely loan payments if the aggregate cash flow of the pooled properties is sufficient to cover debt service. Similarly, cross-collateralized and cross-defaulted loans also exhibit a lower PD than non-crossed loans. However, the PD is not adjusted down for loans with multiple properties in the same business park or geographic location (i.e. state or MSA) or with a high level of dependency on a single tenant. The benefit is capped at an effective property count of 50.

Term PD by Effective Property Count for Sample Loan



Source: Fitch Ratings

Maturity PD by Effective Property Count for Sample Loan



Source: Fitch Ratings

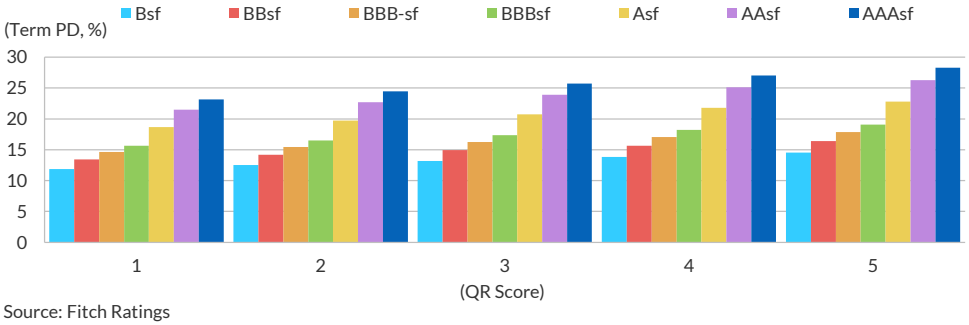
Qualitative Risk Score

The Qualitative Risk Score (QRS) is a qualitative assessment of risk factors not fully captured in the model. A five-point scale score will adjust the PD components in each rating case multiplicatively. The score ranges from 1 to 5 and corresponds to a -10% (credit) to a +10% (penalty) stress, with 5%-width buckets in between. The default value of 3 (and for non-sampled loans) is the neutral score.

A non-neutral score may be made to reflect factors that may affect performance volatility. Some of the factors of note are: tenant quality and rollover during the term; market rent relative to in-place rent; management/sponsor experience; loan psf relative to market comparables; the presence of or ability to incur additional debt; single-tenant exposure; and the number of years of historical operating information. Further, based on industry experience, the loans with sponsors that have a history of litigiousness, prior bankruptcies or other adverse factors may have a higher QRS.

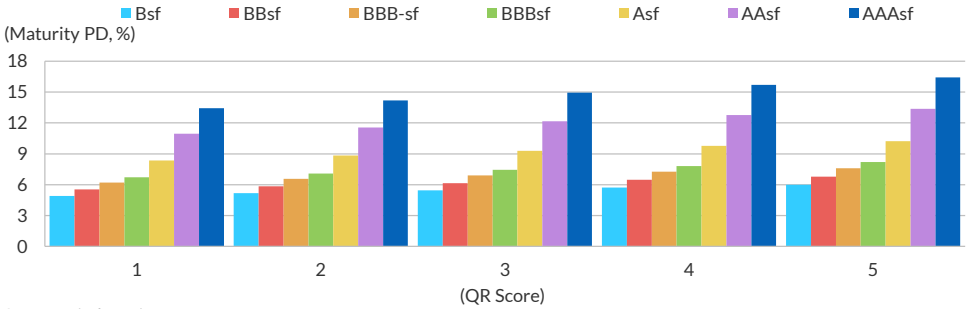
Environmental: Fitch expects Phase I environmental site assessments, with adequate scope, to be conducted on each property by a contractor with national or regional standing. The assessment is typically completed within 12 months prior to the securitization. In instances where consultants have recommended further investigation, Fitch expects investigative work to be completed before securitization. If environmental issues are not mitigated, Fitch may raise the QRS to reflect this additional risk, depending on such factors as property type and the nature of the environmental issue.

Term PD by QR Score for Sample Loan



Source: Fitch Ratings

Maturity PD by QR Score for Sample Loan



Source: Fitch Ratings

Loan Structure Score

The Loan Structure Score (LSS) is a qualitative credit/stress for risk factors pertaining to loan structure that are not fully captured in the model. The score ranges from 1 to 3 and corresponds to a -5% (credit) to a +5% (penalty) stress. A neutral score of 2 reflects a lender applying best lending practices in structuring loans. Loans without such best practices will be treated with higher PD, while loans with structures above best practices will be treated with lower PD. For instance, loans without a structure to address a large tenant rollover or other term or maturity risk may be treated with higher losses. The score will adjust the PD components in each rating case multiplicatively. The default value (and for non-sampled loans) is the neutral score. While a loan may have some structural deficiencies, these deficiencies will not necessarily trigger a score of 3, if mitigants are present or the deficiencies are not considered material. Below are the parameters considered when applying the LSS.

Reserves: Loans without ongoing reserves for capital expenditures (capex), or upfront or ongoing reserves for tenant improvements/leasing commissions (TI/LCs), may be assigned a higher LSS (a penalty) if the property has large tenant rollover risk.

Fitch expects all loans to have tax and insurance reserves and all properties to have terrorism insurance coverage included as part of their standard, all-risk insurance policies; loans without tax and insurance reserves may receive a higher LSS (a penalty). Fitch may not apply the penalty to loans where the lender has waived the escrow for insurance premiums as a result of the insurance being provided under a blanket policy for a large institutional sponsor.

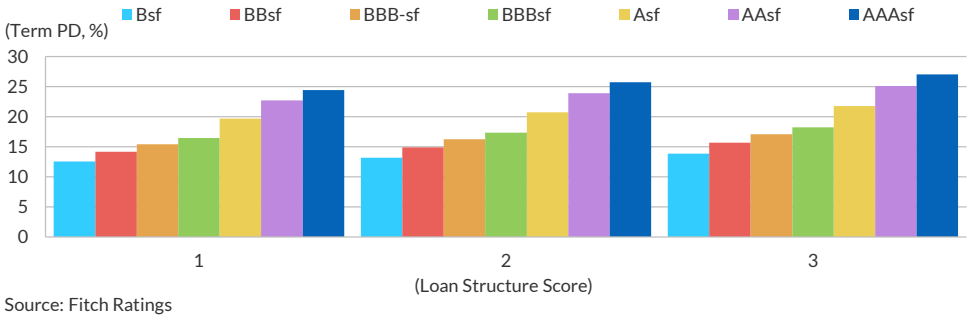
Lockbox: Fitch expects loans to have some minimum structure regarding cash management and lockboxes. Fitch may apply a credit to loans with hard lockboxes in place (retail, office, industrial and other) or soft lockboxes (hotel, multifamily, manufactured housing community, healthcare and self-storage). Loans with springing lockboxes are treated the same as those without lockboxes, reflective of the difficulty to institute, and the limited benefits of, springing lockboxes in a stressed environment.

Natural Disaster Risk: Fitch assumes loans secured by properties located in areas prone to natural disasters, such as hurricanes and earthquakes, are riskier than those secured by properties not susceptible to natural disasters, all else equal.

Windstorm Risk: Fitch assumes all properties have full windstorm insurance coverage, where appropriate.

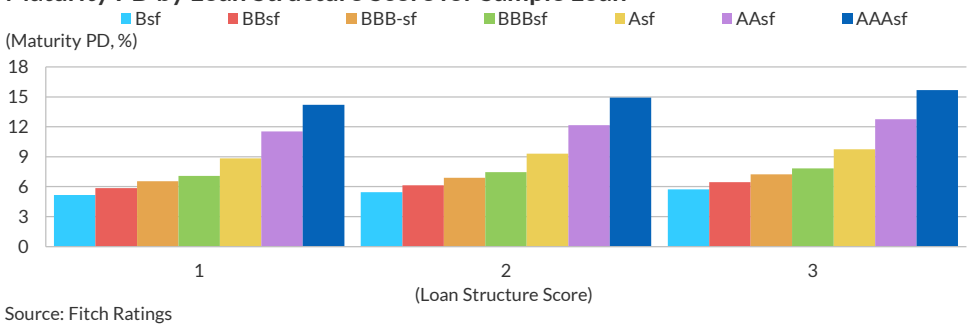
Earthquake Risk: Fitch expects the probable maximum loss (PML) for a property to be less than or equal to 20% for loans with properties located in earthquake-prone areas (seismic zones 3 and 4). If the PML is greater than 20%, Fitch assumes there is earthquake insurance in place to cover the property's replacement cost.

Term PD by Loan Structure Score for Sample Loan



Source: Fitch Ratings

Maturity PD by Loan Structure Score for Sample Loan



Source: Fitch Ratings

Encumbered Interest

A fee interest means the borrower owns the land and building, whereas a leasehold interest means the building owner leases the land from another party. The leasehold lender generally requires the ground lease maturity to extend beyond the loan maturity on the building. Fitch also considers ground rent step-ups and leasehold mortgagee rights of notice and cure, among other aspects. See Appendix A3 for details on how Fitch cap rates and constants are assigned for leased fee and leasehold properties.

Term and Maturity LGD Variables

This section discusses all the loss given default (LGD) variables in detail. The combined effect of all LGD variables in the model indicates a loan's LGD. The LGD represents a loan's expected loss (EL) on its securitized or current balance in the event it defaults. A key variable in LGD is leverage.

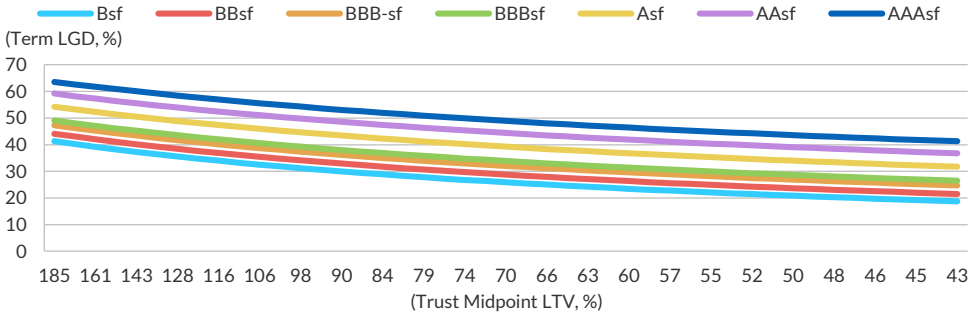
Default Type

While the LGD calculations are based on a single regression analysis, the regression dataset included loans that defaulted both during their term and at maturity. A binary default type flag was used as a regression variable, and showed that all else equal, LGD is higher on loans that default during their term than on loans that default at maturity. In practice, Fitch does not attempt to predict whether a loan will default during its term or at maturity. Rather, the model assumes a probability of both types of defaults, and produces both a term LGD and maturity LGD for each loan. For a given loan, term LGD will always be higher than maturity LGD. The two LGDs are then multiplied by their respective PDs, per the EL equation shown at the beginning of this Appendix B. Term and maturity LGD are calculated using the same variables, except term LGD uses trust midpoint LTV and maturity LGD uses trust maturity LTV.

Midpoint LTV Trust Debt

The trust midpoint LTV represents the LTV at the time of the assumed term default, which is assumed to occur midway between the time of the analysis and the maturity of the loan. The trust midpoint LTV is used in the term LGD model. The trust midpoint LTV and term LGD are directly related; the lower a loan's trust midpoint LTV trust amount, the lower the LGD, as shown in the chart below. For purposes of calculating the time of the assumed term default, Fitch assumes the original loan term is no greater than 180 months.

Term LGD by Trust Midpoint LTV for Sample Loan

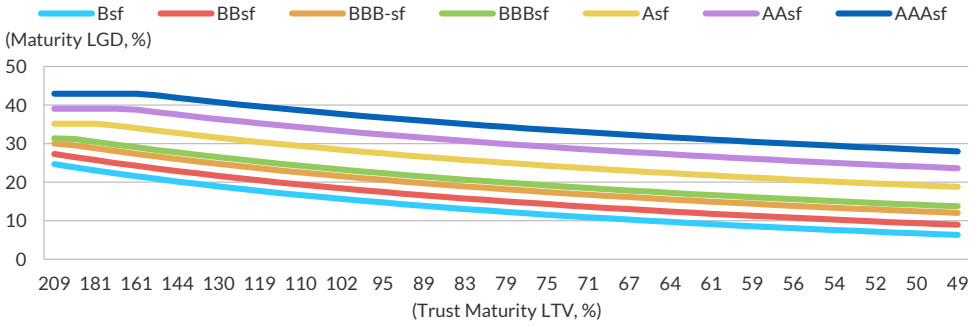


Source: Fitch Ratings

Maturity LTV Trust Debt

The trust maturity LTV represents the LTV at maturity. The trust maturity LTV is used in the maturity LGD model. Trust maturity LTV and maturity LGD are directly related; the lower a loan's trust maturity LTV, the lower the LGD, as shown in the chart below.

Maturity LGD by Trust Maturity LTV for Sample Loan

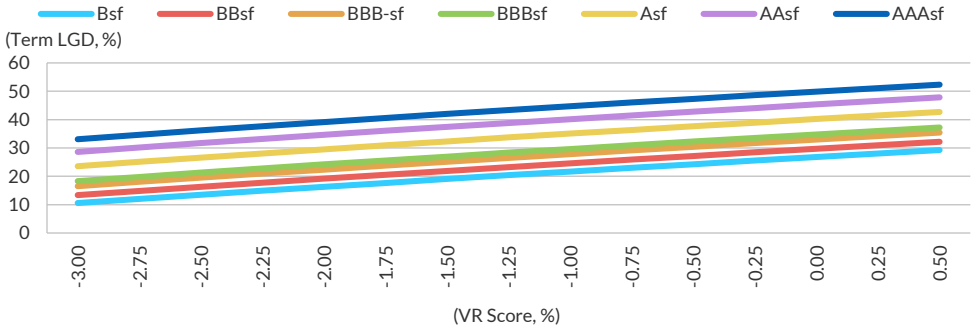


Source: Fitch Ratings

Value Resiliency Score

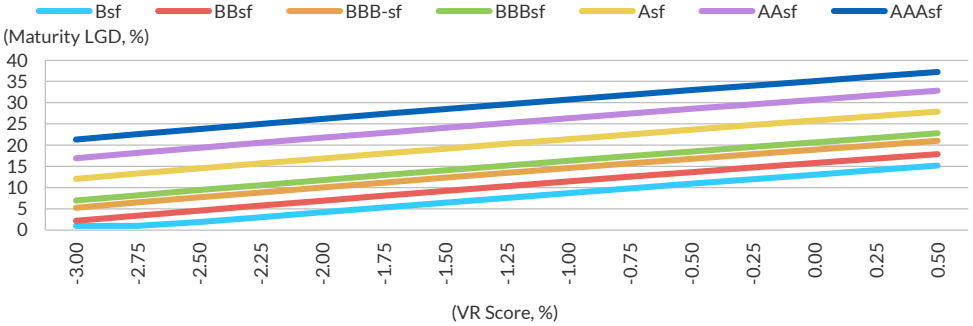
VR Score is also a variable for both term and maturity LGD. See the description above and chart below.

Term LGD by VR Score for Sample Loan



Note: The VR Score and Fitch cap rate change in tandem, except when the VR Score has been capped and floored.
Source: Fitch Ratings

Maturity LGD by VR Score for Sample Loan

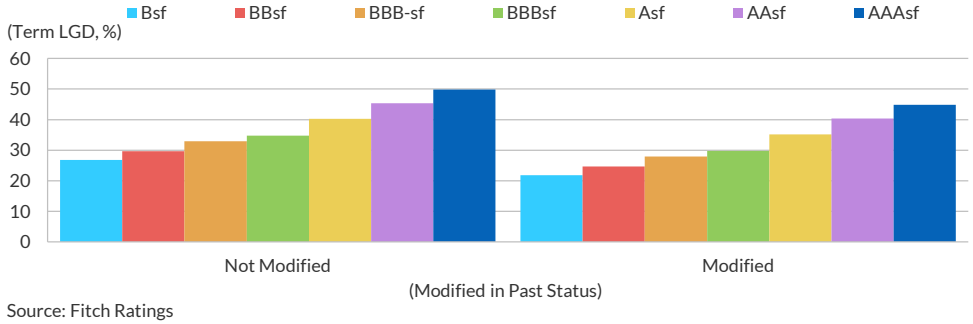


Note: The VR Score and Fitch cap rate change in tandem, except when the VR Score has been capped and floored.
Source: Fitch Ratings

Modified in Past

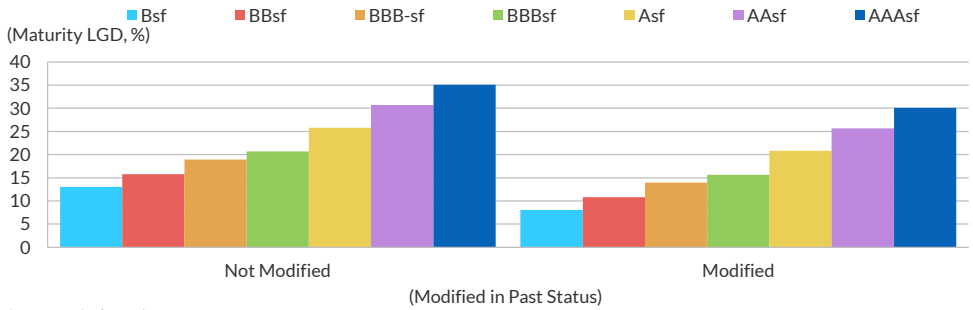
Modified in the past is also a variable for both term and maturity LGD. However, in contrast to both PD model components, in this model component, a loan that has been modified in the past has a lower LGD than one that has not been modified in the past because the regression data showed that previously modified loans had lower loss severity, all else equal.

Term LGD by Modified in Past Status for Sample Loan



Source: Fitch Ratings

Maturity LGD by Modified in Past Status for Sample Loan



Source: Fitch Ratings

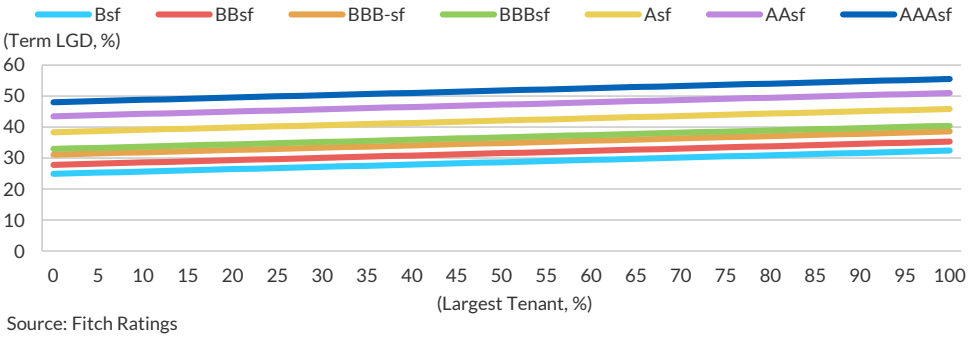
Largest Tenant Percentage

Largest tenant percentage is directly related to both term and maturity LGD. As a property's exposure to a single tenant increases, the loan has an increased exposure to the credit performance of this tenant. When a loan defaults due to problems with its main tenant, such as its bankruptcy, it is more likely the loan will suffer a greater loss. Single-tenant properties and properties with a large exposure to one tenant have higher losses than multitenant properties, all else equal, irrespective of tenant rating or length of lease.

Single-tenant properties with highly rated tenants on long-term leases may receive a lower QRS (see the Qualitative Risk Score section).

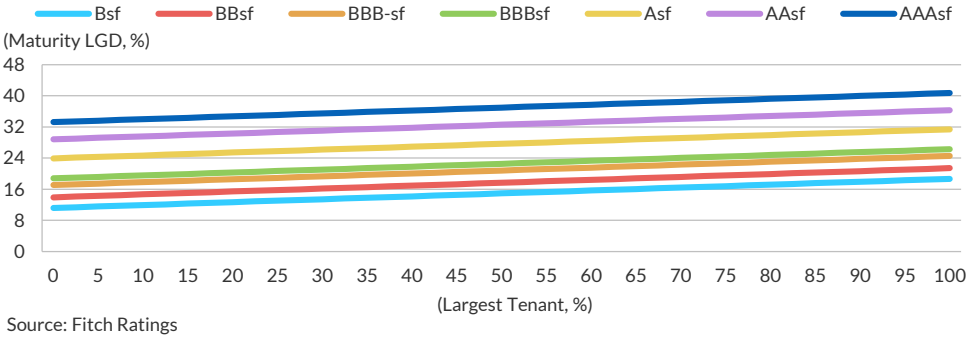
Property types without traditional long-term leases such as multifamily, self storage, lodging (hotels), healthcare and others are assumed to have a 0% largest tenant percentage, given the variable is not applicable.

Term LGD by Largest Tenant Percentage for Sample Loan



Source: Fitch Ratings

Maturity LGD by Largest Tenant Percentage for Sample Loan



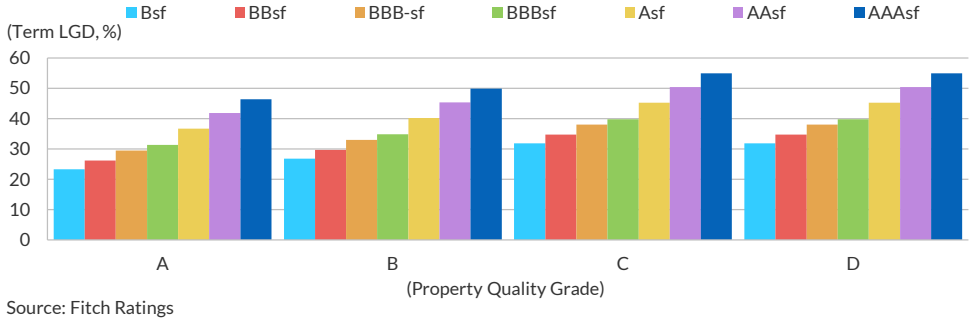
Source: Fitch Ratings

Property Quality

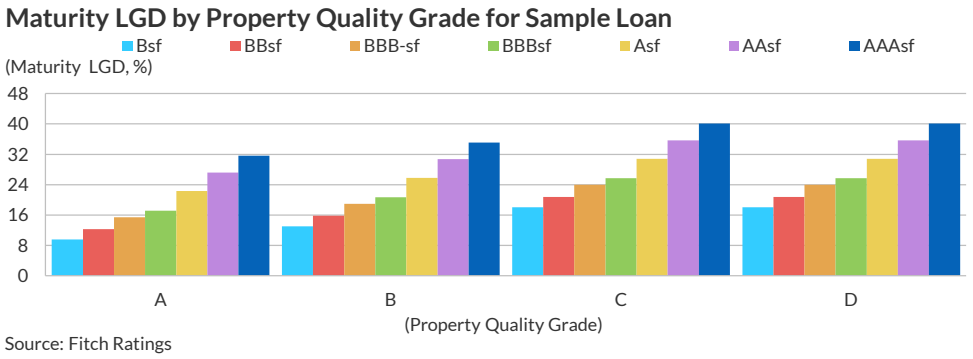
Property quality is inversely related with both term and maturity LGD; the lower a loan's property quality, the higher the LGD, as shown in the chart below. Property quality grades range from "A" (highest) to "D" (lowest). Property quality grades are assigned using a notched (+/-) letter grade to communicate finer distinctions between individual properties; however, notched grades within the same category will receive consistent model treatment. For example, properties with property quality grades of "B+" and "B–" are analyzed in the same "B" category for purposes of determining the loan's LGD. See Appendix L for more details.

Property quality can influence the likely recoveries upon default. For example, lower property quality may make it likely that the property is more difficult to turn around once a default occurs and more difficult to liquidate, resulting in a longer liquidation period, both of which cause higher LGD. Higher property quality properties may have higher recoveries, all else equal.

Term LGD by Property Quality Grade for Sample Loan



Source: Fitch Ratings



Source: Fitch Ratings

Months to Resolution

Months to resolution is a stressing variable that is the same for every loan in a given rating case for both term and maturity LGD. However, in higher rating cases, it is assumed it takes longer to liquidate defaulted and specially serviced loans, and penalties are applied (see Loan-Level Stresses section below).

LGD for Non-Performing Loans

Analysis of Specially Serviced Assets: As specially serviced loans are assumed to default, given delinquency or imminent default characteristics, loss estimates are a function of recoverable value and a loan's total exposure. Total exposure consists of the unpaid principal plus any outstanding servicer advances. Advances consist of principal and interest, as well as expenses associated with the property protection and collateral preservation, including, but not limited to, taxes, insurance, life safety and other capital expenditure items, as well as for any legal fees or expenses.

Recoverable Value: When property cash flow is impaired, is not reflective of value or is not provided, Fitch value is informed by third-party valuations, workout strategies provided by the servicer, sales comparables, dark value analyses or alternative approaches deemed most reliable.

When relying on third-party valuations, haircuts are applied to provide a cushion as well as anticipate recent or future value degradation. Appraisals and brokers' opinions are typically "point-in-time" values that could be outdated relative to the review date of the transaction. Furthermore, the servicer valuation could be either an "as-is" or a "stabilized" value.

The standard haircut is 20%, but analysts may adjust the haircut in the 'Bsf' rating case. Factors that influence the haircut include collateral attributes — such as current and expected occupancy, performance, and property and market conditions — and current and expected servicer advances. More conservative haircuts are applied when the information regarding the collateral is limited or when the workout is expected to be prolonged. The resulting Fitch value is compared to recent sales comparables on a per-unit basis when available.

In higher rating cases, an additional appraisal haircut is added to the haircut to arrive at the recoverable value in the rating case. The additional appraisal haircut add-on for each rating case is shown below in the table in the Loan-Level Stresses section.

Fitch may apply a multiple to the additional appraisal haircut add-on (in rating cases) for specially serviced loans with binary risk. For example, Fitch may assume a loss in a 'Bsf' rating case model run based on a haircut on a signed contract amount; however, an alternative loss scenario may be run assuming losses on a lower valuation. This alternative scenario may be used to test the viability of rating changes to different resolution outcomes. The higher losses resulting from the application of the multiple will be disclosed in the RAC, if relevant to the ratings.

PD and LGD Overrides

In very rare cases, a loan's PD and/or LGD may be adjusted up or down to reflect the risk level not captured by the variables in the model. Examples of risks that may not be captured are difficult to anticipate.

- A highly specialized asset with limited alternative use or replacement tenants could warrant an LGD override.

- Potential performance declines that could result from low probability, high loss events, could warrant a PD or LGD override.
- When there is a disconnect between the current in-place cash flow and the recent Fitch value and market comparables, it could warrant a PD or LGD override.
- An asset located in a sovereign without a 'AAA' rating.

Fitch will disclose PD and LGD overrides on the top 10 loans in the presale or rating action commentary (RAC).

Loan-Level Stresses

The following table shows the stresses applied to each loan in each rating case.

Loan-Level Stresses

Rating Case	NCF Decline (%)	Credit Supply-Demand Ratio	Additional Appraisal Haircut (%)	Special Servicing Timeline	Loan Age Credit (%)	Max Collateral Diversity PD Credit (%)
AAAsf	30.0	2.5	30.00	36.0	0.00	10.00
AA+sf	28.0	2.3	28.00	33.0	5.00	11.67
AAsf	27.0	2.0	27.00	30.0	10.00	13.33
AA–sf	25.0	1.8	25.00	28.0	13.33	15.00
A+sf	23.0	1.7	23.00	26.0	16.67	16.67
Asf	21.0	1.5	21.00	24.0	20.00	18.33
A–sf	18.3	1.4	18.33	22.0	23.33	20.00
BBB+sf	15.7	1.3	15.67	20.0	26.67	21.67
BBBsf	13.0	1.3	13.00	18.0	30.00	23.33
BBB–sf	10.0	1.2	10.00	16.0	40.00	25.00
BB+sf	8.0	1.1	8.00	14.0	50.00	26.67
BBsf	6.0	1.0	6.00	12.0	60.00	28.33
BB–sf	4.0	1.0	4.00	11.0	63.33	30.00
B+sf	2.0	0.9	2.00	10.0	66.67	31.67
Bsf	0.0	0.9	0.00	9.0	70.00	33.33
B–sf	-1.7	0.9	-1.67	8.0	80.00	35.00
CCC+sf	-3.3	0.8	-3.33	7.0	90.00	35.00
CCCsf	-5.0	0.8	-5.00	6.0	100.00	35.00

Source: Fitch Ratings

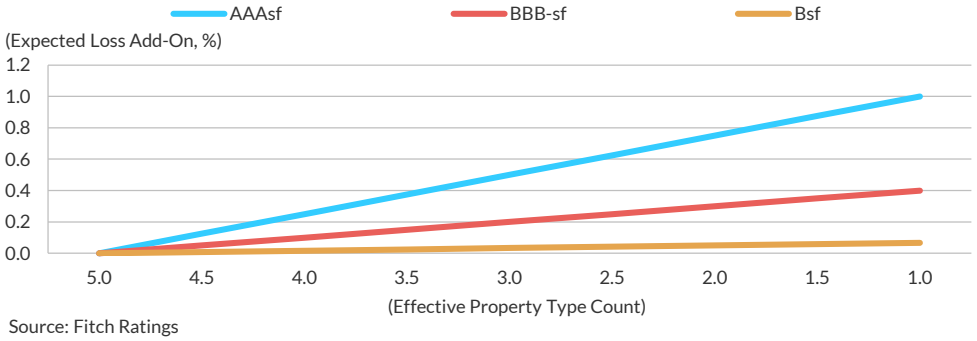
Pool-Level Model Components

Portfolio credit risk is addressed by considering three types of concentration: property type, geographic region (MSA for U.S. and region based on postal code for Canada) and loan count. Fitch uses the inverse of the Herfindahl-Hirschman Index (HHI) to measure these concentrations based on the loan balance in the pool. The HHI is calculated by squaring the percent of the balance for each loan or grouping in the pool and then summing the resulting numbers. The effective count is the inverse (1 / HHI). Pools with lower effective counts have higher concentrations.

Property Type and Geographic Concentrations

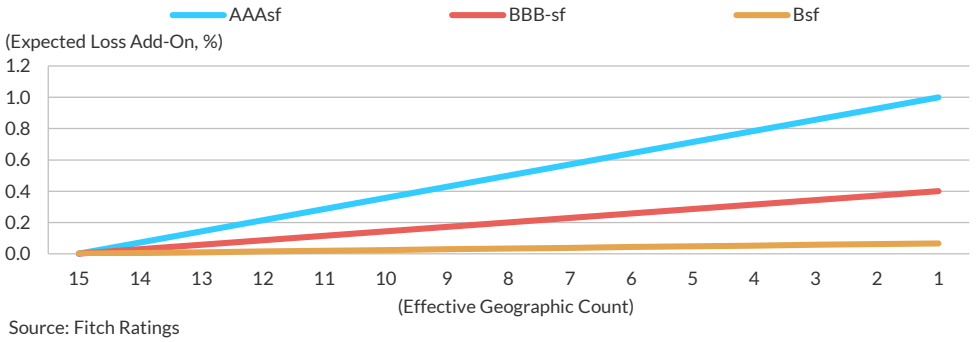
Pools that have a greater concentration by property type and/or greater concentration by geographic region are at greater risk of losses, all else equal. Fitch therefore raises the overall losses for pools with effective property type counts below five property types, and with effective geographic counts below 15 MSAs (regions for Canada). Transactions with close to 100% multifamily concentration would generally have effective property type counts close to one, Fitch does not raise the overall losses for this concentration, as multifamily properties have diversity of tenants, and correspondingly, diversity of employment.

Property Type Concentration Add-On by Effective Property Type Count



Source: Fitch Ratings

Geographic Concentration Add-On by Effective Geographic Count



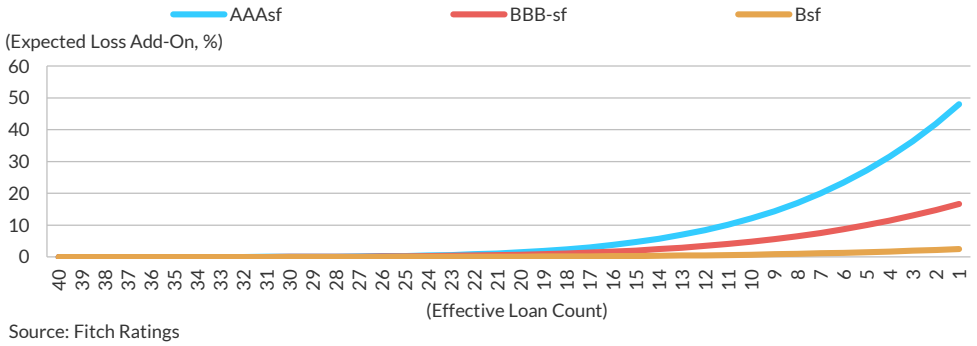
Source: Fitch Ratings

Loan Count Concentration

Fitch views diversity as a key mitigant to idiosyncratic risk. Fitch raises the overall loss for pools with effective loan counts below 40. The magnitude of the add-on increases as effect count decreases and also increases in higher rating cases. There is no loan count concentration add-on below the 'Bsf' rating case. The chart below shows the loan count concentration add-on for the 'AAAsf', 'BBB-sf' and 'Bsf' rating cases.

In poolwide effective loan count calculations, multiproperty and cross-collateralized loans are counted as more than one loan to give benefit for diversity within the loan, resulting in a higher effective loan count and, thus, a lower EL concentration add-on. The magnitude of the benefit is tied to effective property count (or override, if any). For multiproperty loans and crossed loans, the benefit is capped at an effective property count of 2.00 (this is equivalent to one $100 loan being treated as two $50 loans in the context of calculating pool effective loan count) regardless of the actual loan count.

Loan Concentration Add-On by Effective Loan Count



Source: Fitch Ratings

Pooling Benefit for Credit Opinion Loans

For credit opinion loans (COLs) contributed to fusion transactions, Fitch adjusts the standalone analysis of the loan to reflect the pooling benefit provided from the presence of other loans in

the pool. The pooling benefit is applied as an increase to the standalone LTV hurdle derived from the analysis of the loan using the "CMBS Large Loan Rating Criteria". See also Appendix A2.

The large loan module of the model implements the standalone analysis for COLs as described in the "CMBS Large Loan Rating Criteria." The model also implements the pooling benefit for fusion transactions. See a worked example in the table below, Hypothetical Final Model Losses Calculation Example.

Hypothetical Pool Characteristics

	Pool Statistic	% of Pool
Conduit Pool Balance ($)	719,680,236	89
COL Pool Balance ($)	88,500,000	11
Total Pool Balance ($)	808,180,236	100
Effective Loan Count	27.8	
Effective Property Type Count	4.4	
Effective Geographic Count	20.2	
Total Term DSCR (x) (Conduit)	1.46	
Total Current LTV (Conduit) (%)	75.6	
Total Maturity LTV (Conduit) (%)	90.3	
Total Maturity DSCR (x) (Conduit)	1.05	
Trust Midpoint LTV (Conduit) (%)	73.91	
Trust Maturity LTV (Conduit) (%)	89.4	
Fitch LTV (Fusion) (%)	91.2	
Fitch Debt Yield (Fusion) (%)	11.1	

LTV – Loan to value. DSCR – Debt service coverage ratio. COL – Credit opinion loan.
Source: Fitch Ratings

Hypothetical Pool Final Model Losses Calculation Example

COL Proceeds Before and After Pooling Benefit				Hypothetical Pool Fusion Losses					
Rating Case	COL Standalone Cumulative Proceeds	COL Pooled Cumulative Proceeds	Modeled Loss from COL (%)	Rating Case	Modeled Loss from Conduit Collateral (%)	Modeled Loss from COL (%)	Modeled Loss Before Concentration Add-Ons (%)[a]	Concentration Add-On (%)	Final Modeled Loss (%)[b]
AAAsf	60,729,293	79,747,234	9.89	AAA	19.76	9.89	18.68	0.26	18.93
AAsf	69,604,332	82,292,314	7.01	AA	16.23	7.01	15.22	0.23	15.45
Asf	78,479,371	85,161,869	3.77	A	12.24	3.77	11.31	0.19	11.50
BBBsf	85,400,998	88,031,423	0.53	BBB	8.82	0.53	7.91	0.15	8.06
BBB–sf	88,500,000	88,500,000	0.00	BBB–	7.81	0.00	6.95	0.13	7.08
BBsf	88,500,000	88,500,000	0.00	BB	5.90	0.00	5.25	0.06	5.31
Bsf	88,500,000	88,500,000	0.00	B	5.06	0.00	4.50	0.02	4.52
CCCsf	88,500,000	88,500,000	0.00	CCC	4.08	0.00	3.64	0.00	3.64

[a]Modeled Loss Before Concentration Add-Ons: Weighted average of the modeled loss from the conduit collateral and the modeled loss from the COL collateral.
[b]Final Modeled Loss: Modeled Loss Before Concentration Add-On plus Concentration Add-On. May not add due to rounding. COL – Credit opinion loan.
Source: Fitch Ratings

Appendix C: Data Sources

Data Sources for Key Assumptions

Fitch utilizes data provided by multiple sources to derive historical default and loss rates, cap rates, refinance constants and cash flow adjustments that are primary components to the agency's multiborrower model. Fitch publishes annual U.S. CMBS default and loss studies, as well as periodic Canadian default and loss studies.

Fitch NCF adjustments are based on actual historical performance data, as well as current and forecast market-specific performance as provided by third-party sources such as Costar. Fitch refinance constants and cap rates are based on averages of long-term historical data provided by ACLI (see the Fitch Standard Cap Rates and Constants by Fitch Property Type, Including Benchmarks and Mappings for Model Components table in Appendix A3). Periodic internal meetings address current performance observations for primary property types and geographical markets; conclusions from these meetings inform Fitch NCF, Fitch cap rate, Fitch market cap rate assumption and Fitch constant assumptions.

Criteria Development

The following data have been used in the development of the criteria assumptions.

Loan-Level Term PD, Maturity PD and LGD Assumptions

- Regression analysis of historical U.S. and Canadian loan performance on loan-level attributes and variables, Trepp LLC.
- Implied market cap rates based on appraised value and issuer NCF, Trepp LLC.

Fitch Cap Rates and Fitch Constants

- Historical market cap rates and constants, ACLI, long-term averages.
- Historical market cap rates, Japan Real Estate Institute.

Haircuts to Most Recent Reported NOI

- Historical average difference by property type for reported NOI to reported NCF, Trepp LLC.

Credit Supply-Demand Ratio

- Commercial Real Estate Mortgage Origination, Mortgage Bankers Association.
- US CMBS Issuance, Commercial Mortgage Alert.

Subordinate Debt to Include in Leverage Metrics

- Historical loan-level performance data of loans with subordinate debt in Fitch-rated CMBS transactions.

Default Haircut for Non-Performing Loans

- Regression analysis of historical liquidated loans, Trepp LLC.

Appendix D: Originator Reviews

Fitch reviews multiborrower originators to assess the quality of the originator's practices focusing on: personnel; underwriting and due diligence practices; principal and borrower review process; the credit-approval process; and quality control.

Fitch typically reviews new originators expected to make material contributions (approximately 15% or more) to CMBS transactions on an ongoing basis. Update reviews are conducted in cases where there have been material changes in management or procedures, or when any other credit-driven circumstance arises.

The key components of an originator's platform include:

- Corporate history and business plan, and sources of funding for origination and operations.
- Final credit committee decision factors, members, process and quorum requirements.
- Origination personnel — experience, department structures, separation of duties and compensation.
- Underwriting and due diligence for property income and expense, market trends, borrower/sponsor financial condition and experience, ordering and reviewing third-party reports, and use of outsourcing firms to perform these functions.
- Quality control/legal — in-house legal resources; standardized loan documents and credit memos; established delegations of authority; and representations and warranties.

Fitch typically conducts an on-site management meeting with the originator to discuss the loan origination practice from application through closing and securitization. Fitch may perform a loan file review for new issuers or issuers with significant changes to their program, if any additional review is warranted. As part of its evaluation process, Fitch reviews information, such as organizational charts, employee biographies and sample credit memo forms, from the originator. Management meetings typically include the originator's senior management, and may include representatives from the loan origination, credit, underwriting, legal and closing departments.

Fitch's goal is to assess the quality of the originator's established controls and its commitment to originating high-quality, diligently underwritten loans by evaluating originators on four different quality measures — credit policy, origination personnel, underwriting and due diligence practices, and quality control. Examples of best practices observed within each of the categories are highlighted in the table below.

Commercial Mortgage Originator Quality Areas

	Examples of Best Practices
Personnel	• Origination team consists of seasoned professionals experienced with various property types, with designated, specific and non-overlapping responsibilities between originators and underwriters. In-house staff can complete all due diligence.
	• Compensation for both loan origination and underwriting depends on the quality of loans.
Originator Underwriting and Due Diligence Practices	• Originator has written policies and procedures for all practices, which are consistently followed. An independent review procedure is used to verify underwriting assumptions. The underwriting system generates standard documents.
	• Originator has developed a standard scope of services for third-party reports, has a select list of nationally or regionally known consultants, and provides for expert and legal review of reports. Expert verifies the adequacy of insurance coverage.
	• Prior to loan approval, the in-house underwriter visits the property, meets with the manager, visits comparable properties and reviews current market information.
Property Income/Expense Verification	• Originator uses three years of historical property-level audited financial statements and other original source documents to verify borrower income and expenses or has an outside accountant perform agreed-upon procedures with substantial scope. Uses current market data and considers new construction information. Has strong understanding of collateral. Incorporates detailed lease abstracts.
Escrows and Reserves	• Rarely waives escrows for taxes, insurance, replacement reserves and other items, including using leasing costs, when appropriate.
	• Escrows for deferred maintenance at 125% of consultant recommendations.
Principal/Borrower/Sponsor Review Process	• Rejects borrowers/sponsors with a criminal history or history of litigious activity. Lends to borrowers/sponsors with substantial real estate experience and capital resources.
	• Requires well-capitalized principals or entity to provide nonrecourse carveouts and environmental indemnification. Verifies financial strength of principals or entity.
	• Maintains specific criteria for single-purpose entities, such as independent board members, when appropriate.
Quality Control	• Detailed asset summary information and underwriting are consistent with credit-approval memo. Asset summaries contain thorough line-by-line explanations of income and expense assumptions.
	• Uses standardized loan documents and tracks exceptions for securitization representations and warranties.
	• Post-closing items are minimal and promptly resolved.
Credit Approval	• Loan-approval authority is separate from origination and underwriting; approvals are signed and dated; approval requirements increase with loan size; formal delegations of authority used for approving exceptions to standard practice. Comprehensive credit-approval memo describes issues and mitigants.
Legal Review	• In-house counsel responsible for closing loans and overseeing outside counsel. Outside counsel firms are experienced in securitization work. Attorneys review all ground leases and confirm zoning compliance.
	• Representations and warranties are thorough and compare favorably with other CMBS originators. Loan repurchase requests are infrequent.

Source: Fitch Ratings

Appendix E: Determining Sufficiency of Data

Data Provided by Issuers

The receipt of adequate property- and loan-level data is critical to Fitch's analysis of multiborrower transactions. The absence of certain key items may result in assumptions of higher risk reflected in the Qualitative Risk Score (QRS), Fitch NCF or other factors affecting loan-level or pool-level losses, or, in some cases, may prevent Fitch from rating the transaction altogether. Fitch expects to receive the following information from the issuer for use in its analysis:

- An overview of the transaction and the proposed structure.
- A comprehensive data tape of key loan and property-level fields reviewed by a third-party accounting firm.
- Descriptive materials about the collateral, property descriptions, maps, photographs and relevant market data.
- Background information on loan sponsors and property managers.
- Three or more years of property operating history, cash flow projections, rent rolls and a summary of the banker's underwriting with detailed footnotes, as well as a discussion of strengths, concerns and mitigants.
- Third-party reports completed by outside vendors within the previous 12 months, providing property appraisals, environmental and engineering reviews, and seismic reports, where applicable.
- Summary of the terms and conditions of the underlying loan and loan documents completed by legal counsel, as requested. Requested documents may include the loan agreement, mortgage, cash management agreement, borrower formation documents, legal opinions and intercreditor agreements, if applicable.
- Transaction documents, including the pooling and servicing agreement; the offering document, including the waterfall description; and the mortgage loan purchasing agreement, including reps and warranties, exceptions to reps and warranties and legal opinions.

Surveillance Data Sources

For U.S. and Canadian CMBS, Trepp, LLC provides industry-standard trustee-and servicer-reported data at the property, loan and bond level. For larger and underperforming loans, Fitch typically requests operating statement analysis reports (OSARS) and rent rolls from master and/or special servicers; special servicers also provide values frequently used to estimate recoveries on specially serviced loans. For CREL CDOs, Fitch requests updated information on CDO assets from collateral asset managers; in the absence of updated information, Fitch may rely on Trepp, use market data or make more conservative assumptions. In the U.S. and Canada, Fitch also uses market data from expert sources, such as Costar and Smith Travel Research (STR).

For Japanese CMBS of multiborrower fully amortizing multifamily loans, data at property, loan and note level are provided by servicers and trustees. Fitch may request additional information from the servicers, especially for non-performing loans, such as a special servicing report, updated property data and appraisal report.

A list of common input variables is listed in Appendix J.

Appendix F: GSE Multifamily CMBS Transactions

The criteria described in this report also apply to transactions collateralized by pools of multiborrower multifamily loans, historically originated by Freddie Mac, subject to the following.

Given the substantial similarity in loan features, property attributes and transaction structures to CMBS, GSE Multifamily transactions share the same key rating drivers and loan and property credit considerations. However, certain model coefficients and concentration add-ons have been adjusted for GSE Multifamily transactions based on the historical losses specific to these transactions, which are, generally speaking, orders of magnitude lower than that of conduit transactions.

Variables with different coefficients from conduit transactions include:

Term PD Variables:	Property Type Total Current LTV
Maturity PD Variables:	Total Maturity LTV

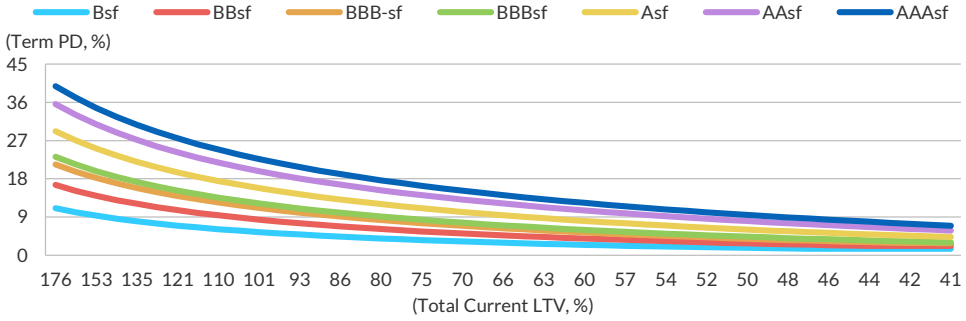
Property Type

The property types, Multifamily-Senior, Multifamily-Student, and Manufactured Housing, in GSE Multifamily CMBS transactions will be treated as Multifamily for purposes of applying the property type coefficient in the Term PD calculation.

Property Type Concentration Add-on

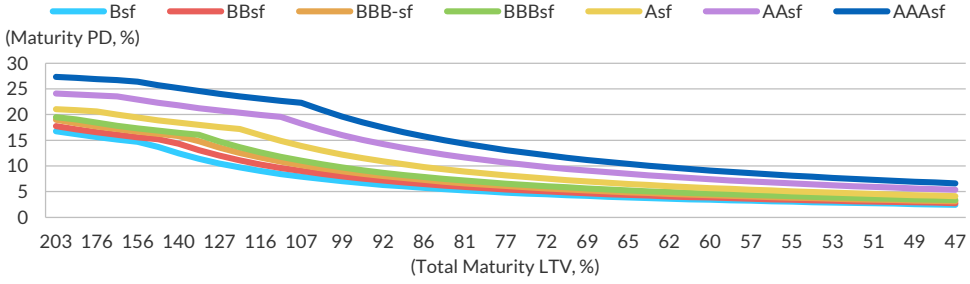
While GSE Multifamily transactions generally have effective property type counts close to one (1), Fitch does not raise the overall losses for property type concentration, as multifamily properties have diversity of tenants, and correspondingly, diversity of employment.

Term PD by Total Current LTV for Sample Loan as GSE Multifamily Property Type



Note: Changes to the sample loan include: the property type model code to MF_FR, the largest tenant percentage to 0%, the Fitch cap rate to 8.75% and the Fitch constant to 9.75%.
Source: Fitch Ratings

Maturity PD by Total Maturity LTV for Sample Loan as GSE Multifamily Property Type



Note: Changes to the sample loan include: the property type model code to MF_FR, the largest tenant percentage to 0%, the Fitch cap rate to 8.75% and the Fitch constant to 9.75%.
Source: Fitch Ratings

Appendix G: CRE CLOs

Summary

Commercial real estate collateralized loan obligations (CRE CLOs) typically consist of loans secured by transitional properties, or those undergoing some kind of improvement plan. The improvement plan may be "light" in the form of a multifamily property getting new flooring, appliances and kitchen cabinets; "medium" where rentable space may be offline for some time as more extensive renovations are carried out; and "heavy" where there may be significant construction or a change in the use of the property.

The criteria described in this report also apply to CRE CLOs, subject to the additional analysis, methodological differences and limitations noted in this appendix.

Given the substantial similarity in loan features and property attributes to conduit loans, CRE CLOs share the same key rating drivers, and loan and property credit considerations. As such, Fitch's CMBS CoRE model is used to estimate losses based on property and loan attributes, and output from the CoRE model is a key consideration in the rating process.

CRE CLOs also have structural features at the deal level that are not present in multiborrower conduit transactions. As the CMBS CoRE model does not analyze these structural features specific to CRE CLOs, Fitch will conduct a cash flow analysis using the Global CLO Cash Flow Model (CFM), using assumptions set out in this appendix.

Structural Features Specific to CRE CLOs

CRE CLOs can be divided into two broad categories: static CRE CLOs and managed CRE CLOs. Managed CRE CLOs have the ability to add additional loans and loan proceeds during the term of the deal. This flexibility can be in the form of future funding, reinvestment or ramp-up, and all three will typically be in a managed deal. Future funding refers to additional advances on existing loans, often related to capital improvements or leasing costs. Ramp-up generally refers to purchasing loans post-closing with cash assets of the trust, and the ramp-up assets are sometimes reviewed and included in the new issuance ratings. Similarly, reinvestment refers to using principal payments to acquire new loans rather than paying down trust liabilities. In static CRE CLOs, the initial pool of loans remains constant but for loan pay-offs and disposals, although there can also be future funding options. Static CRE CLOs are essentially multiborrower loan portfolios with some future funding component. For both managed and static transactions, the structure also allows the issuer the option, but not the obligation, to remove delinquent loans.

For the avoidance of doubt, Fitch will not rate, or will provide a rating cap, for transactions that initially have few loans and a large cash component to be used for ramp assets, unless Fitch has had the ability to review the ramp assets as part of its initial rating review, and the ratings reflect their credit attributes.

Often the notes of a CRE CLO are termed "offered" and "retained". The offered notes are the notes sold to third parties; the retained notes are held by the issuer.

A structural feature common to many CRE CLOs, both managed and static, are the note protection tests consisting of minimum thresholds for interest coverage (IC) and overcollateralization (OC). In the event one of these metrics falls below the pre-set minimum, principal and interest payments to the issuer-retained notes are diverted and used to pay down the principal balance of the offered notes sequentially. The payment diversion will continue until the metrics are once again at or above the minimum thresholds.

CRE CLOs typically have floating-rate loans. Most common terms are an initial two-year term followed by three, one-year extension options; or an initial three-year term followed by two, one-year extension options. However, there may be longer- or shorter-term loans. Regardless of the initial term, Fitch will always model the loan assuming all extension options are taken. Extension options will have a performance test (debt yield or DSCR) that must be achieved to qualify for any extension, and the extended term often includes scheduled principal amortization. If not in compliance with the test at the time of the extension, borrowers have the option of paying down the loan to cure any deficiency or refinancing the loan out of the pool.

For floating-rate loans in a CRE CLO, the assumed loan interest rate will depend on whether the loan has a conforming interest rate cap or not. For loans with a conforming interest rate cap, the capped

rate is used for calculating the term DSCR. For loans without a conforming interest rate cap, the assumed loan interest rate for the term DSCR is derived from the corresponding Fitch constant. The cap is considered nonconforming if the cap provider is not rated 'BBB' or 'F2', or higher, when the category of the highest rated class is 'Asf' or higher; the term of the cap does not match the term of the loan; or the borrower is not contractually obligated to renew the cap at any loan extension.

The rated final maturity for a CRE CLO transaction will typically be the longest loan's fully extended maturity plus seven years.

Managed CLO Considerations

For many managed CRE CLOs, ramp and reinvestment loans are not identified at closing; rather, the addition of new loans is typically conditioned on rating agency review as well as deal-specific eligibility criteria and the terms of the indenture.

For new loans during the ramp and reinvestment period, Fitch typically updates its expected losses to reflect current performance of existing loans as well as loss expectations for the new loans; these updated losses are then compared to current subordination levels. Ratings would remain unchanged to the extent updated subordination exceeds updated pool losses.

Except for nonmaterial changes to the pool, the analysis of the new loans during the ramp and reinvestment periods is consistent with Fitch's initial ratings process and these criteria, and includes property-level cash flow analysis, asset summary reviews and, perhaps, site inspections of a representative sample of the updated pool.

For the purpose of assessing leverage and credit enhancement (CE), Fitch assumes the future funding amounts are not advanced if conditional upon improved property and/or loan performance, such as achieving a specific debt yield. Alternatively, advances without accretive conditions are assumed to be advanced and the loan balance used in the Fitch CoRE model will reflect this. For example, a property with planned capital expenditures, which may not necessarily increase cash flow, may be considered non-accretive. Fitch will model the loan balance at issuance plus the amount of the future advance agreed for the planned capital expenditures.

For managed CRE CLOs, Fitch will also consider the operational risks associated with the manager. A review, in conjunction with or in addition to an originator review, will address topics including company and staffing, investment strategy, operations and controls, technology and the manager's past performance on previously issued CRE CLO transactions. This review will lead to a pass/fail determination on whether Fitch is comfortable rating the proposed transaction without a cap on high investment-grade ratings.

Ramp and Reinvestment Considerations

When the ramp period ends - typically six to nine months from the transaction's closing date - any remaining ramp balance is typically used to amortize the outstanding notes sequentially, per the transaction documents. However, the deals do not change from managed to static at that time. The reinvestment period and any optional loan upsizing still allow the collateral manager to add collateral or increase the loan size(s).

In CRE CLO transactions, the cash set aside for the ramp period purchases is typically 10% or less of the original pool balance. This limits the number of assets that can be purchased by the collateral manager.

The eligibility criteria in the transaction documents typically specify that a reinvestment loan's margin cannot bring the pool weighted average margin (WAM) below a specified threshold set at closing. This threshold is usually 50bps-70bps lower than the pool's actual WAM at closing.

Cash Flow Modeling

To determine the rating of a given tranche of notes, Fitch analyzes a series of scenarios in the Global CLO Cash Flow Model (CFM). Using the CFM, Fitch determines whether a particular class of notes will receive payment in full, under a series of defined interest rate and default timing stress scenarios, according to the terms and conditions of the offered notes, for a given rating case. If the class has received payment in full, it is deemed to have passed that stress scenario. While the CFM analysis is an important consideration in determining the final rating,

ratings are ultimately assigned by a Fitch rating committee that also considers other quantitative and qualitative factors.

Breakeven default rates (BDRs) are an output of Fitch's CFM that show the maximum portfolio default rates a class of notes can withstand in stress scenarios without experiencing a loss. BDRs for a class are then compared with the CoRE model-generated probability of default (PD) (calculated as term PD + (1 – term PD) * maturity PD), with allowance for poolwide concentrations at the corresponding rating case. The table below shows the standard scenarios Fitch runs for a CRE CLO.

Summary of Standard Scenarios

Default Distribution	Interest Rate Trend
Front Loaded	Rising Stable Decreasing
Middle Loaded	Rising Stable Decreasing
Back Loaded	Rising Stable Decreasing

Source: Fitch Ratings

Each transaction's customized cash flow model accounts for the CLO's capital structure and unique structural features, including but not limited to:

- the interest and principal priority of payments, including provisions for various fees and expenses;
- coverage tests (e.g. OC tests, IC tests and reinvestment OC tests);
- any interest rate or currency swaps or hedges; and
- other relevant structural features.

Timing of Defaults

The timing of CMBS loan defaults showed no pattern in the regression study; there was no compelling evidence that loans were more likely to default early in their term, later or at maturity. Therefore, Fitch runs three default distributions: front loaded; middle loaded; and back loaded. The total number of defaults is always the same regardless of which default distribution is being run. Loans in CRE CLOs are typically outstanding for five years, assuming all extension options are taken. The tables at the end of this appendix outline how the defaults are applied according to the weighted average life (WAL) of the transaction.

When conducting cash flow analysis, Fitch's cash flow model first projects the portfolio scheduled amortization proceeds for each reporting period of the transaction life, assuming no defaults and no voluntary terminations, when applicable. In each rating case scenario, these scheduled amortization proceeds are then reduced by a scale factor equivalent to the overall percentage of loans that are not assumed to default, when applicable.

Interest Rates Stresses

Fitch analyzes rising, falling and flat interest rate scenarios in its cash flow analysis. Rising and falling scenarios are in accordance with Fitch's "Structured Finance and Covered Bonds Interest Rate Stresses Rating Criteria".

Timing of Recoveries

Recoveries on defaulted loans will come from either a loan foreclosure, and subsequent sale of the property, a buy-out of the loan from the pool by the issuer or a discounted pay-off (DPO). When cash flow modeling in corporate CLOs, Fitch would account for this period of time when interest on the loan is not received. In CMBS, including CRE CLOs, any non-payment of interest, is advanced to bond holders by the servicer. Non-payment of property expenses is also advanced by the servicer. Upon recovery, the total amount advanced by the servicer is repaid to the servicer

before the remaining proceeds are distributed to bondholders. Fitch's regression uses the property recovery amount, net of servicer advances, as the basis for determining loss given default at each rating case. Therefore, the recovery lag is not modeled in cash flow analysis for CRE CLOs to avoid double-counting the cost of the advances.

Available Cash Investments

Fitch assumes cash balances held in a transaction's interest and principal collection accounts between payment dates will earn interest at a spread of 50bps below the relevant reference index, typically SOFR or USD Libor, floored at zero. Fitch will adjust these assumptions if the contractual rates are less favorable to the issuer than the above assumption.

Senior Fees and Asset Spreads

The cash flow modeling is based on contractual management fees, which reflect market rates. Fitch may stress the senior fees on a case-by-case basis, if the contractual rates are deemed to be below the market rate. The basis for the fees may vary between transactions. Most commonly, the senior fees are calculated based on the balance at the beginning of the period including defaulted assets at par. Fitch will model loan spreads based on their actual spread, subject to any floors.

Call Options

Historically, most CRE CLO notes have been repaid through exercise of the call option, which typically is controlled by the CRE CLO equity investors. Fitch's analysis assumes that the call option is not exercised and the CLO notes are repaid through asset repayments. Our ratings are therefore de-linked from the creditworthiness of the call option holder. Fitch expects CLO indentures to specify that principal and accrued interest on all notes is paid in full as a condition to exercise the call option.

Long-Dated Assets

CRE CLO structures for managed transactions do not allow collateral managers to invest in loans with maturity dates after the legal final maturity of the bonds; otherwise, the bonds may be exposed to market risk. Fitch expects limitations to be in place to restrict the ability of the manager to invest in such long-dated assets during the term of the transaction.

The servicer has the ability to extend existing loans in the transaction, according to the "servicing standard", which considers all note holders and not what is necessarily the best outcome for the individual loan. Fitch expects this will occur only on a loan-by-loan basis. However, such an option may expose the notes to the market value of those loans. Fitch views the OC test haircuts applied to long-dated assets (as they fall under modified loans) as a disincentive to use such provisions opportunistically. Additionally, if a loan or loans were extended beyond the legal final maturity, Fitch would discount the value of the loan(s) to zero.

Overcollateralization and Interest Coverage Tests

Two tests are typically found in CRE CLO transaction documents; they are designed to support the highest rated tranche in periods when the performance of the transaction's loans is weakened. These are the OC test (sometimes called the par value test) and the IC test.

The OC test is the following calculation: the aggregate collateral interests plus cash (and its earned interest) and eligible investments divided by the sum of the offered notes plus the amount of any unreimbursed interest advances. In the aggregate collateral interests calculation, modified loans (defaulted loans that have been returned to the loan pool) and defaulted loans that have not been removed from the loan pool are typically accounted for at the recovery rates prescribed in the transaction documents. In its cash flow modeling, Fitch will use recovery rates determined by the CoRE Model (1- LGD, with allowance for poolwide concentrations, at the corresponding rating case). The offered notes are those that have not been retained by the issuer and are typically the total amount of bonds above the first tranche that the OC test references for interest diversion. The OC test hurdle is typically set at about 112% to 115%, and typically has a 2% or lower cushion. Whenever the threshold less the actual calculation exceeds the cushion, interest is diverted from the bonds referenced by the OC test and redirected to the senior-most tranche. For example, assume the OC threshold at issuance is set at 115% with a 2% cushion, making the threshold 113%; after one year, the OC calculation results in 113.5% - there is no diversion of interest. At year two, the OC test

results in 112.5%, below the 113% minimum, which trips the test and payment is diverted to the senior-most tranche until such time that the OC test returns above the minimum.

The IC test is the following calculation: the sum of: cash (and its earned interest), scheduled interest payments due from the loans, any dividends and distributions from eligible investments, and servicer's interest advances divided by the sum of the offered notes and the amount of any unreimbursed interest advances. The IC test is typically set at about 120%. If the ratio falls below the 120% threshold, payment is diverted from the retained notes to the senior-most tranche.

Cash Flow Model Application

The CFM may not be utilized at transaction closing or updated for transactions where all the following conditions are met:

- all rated notes are rated at the highest possible level (e.g. AAAsf or non-model-related rating cap);
- loan composition has been consistent with expectations since the last full rating review;
- loan performance and cash flow distributions have been consistent with expectations since the last CFM analysis;
- there have been no material changes to asset or cash flow assumptions since the last CFM analysis; and
- the rating committee determines that updated cash flow analysis is not relevant to the rating.

For transactions featuring revolving periods, the CFM may not be updated during the revolving period where all the above conditions, except for the first condition, are met.

Fitch will conduct CFM model updates when it determines they are warranted by individual transaction circumstances. Such changes may include, but are not limited, to:

- the identification of a transaction-specific event or performance issue; or
- the identification of material changes in CFM assumptions.

Default Timing Tables by WAL

Share of RDR (%)

Year[a]	WAL-1	WAL-2	WAL-3	WAL-4	WAL-5	WAL-6	WAL-7	WAL-8	WAL-9	WAL-10 and Above
Front-Loaded Default Timing										
1	100	50	50	44	41	37	35	33.5	33	32.5
2	–	50	35	30	27.5	24.5	23.5	22.5	22	21.5
3	–	–	15	13	10.5	10	9	8	7	6
4	–	–	–	13	10.5	10	9	8	7	6
5	–	–	–	–	10.5	10	9	8	7	6
6	–	–	–	–	–	8.5	9	8	7	6
7	–	–		–	–	–	–	8	7	6
8	–	–	–	–	–	–	–	–	–	6
9	–	–	–	–	–	–	–	–	–	–
10	–	–	–	–	–	–	–	–	–	–
Mid-Loaded Default Timing										
1	100	50	35	30	27.5	9.5	8	–	–	–
2	–	50	50	44	41	24.5	8.5	7.25	–	–
3	–	–	15	13	10.5	37	23.5	8	6	6
4	–	–		13	10.5	9.75	35	22.5	6	6
5	–	–	–	–	10.5	9.75	8.5	33.5	22	6
6	–	–	–	–	–	9.5	8.25	7.5	33	21.5
7	–	–	–	–	–	–	8.25	7.25	7	32.5
8	–	–	–	–	–	–	–	7	7	6
9	–	–	–	–	–	–	–	–	7	6
10	–	–	–	–	–	–	–	–	–	5
Back-Loaded Default Timing										
1	100	50	30	20	16	13	10	–	–	–
2	–	50	35	22.5	17	14	12.5	10	–	–
3	–	–	35	27.5	17	14	12.5	12.5	10	–
4	–	–	–	30	25	14	12.5	12.5	12.5	10
5	–	–	–	–	25	22.5	12.5	12.5	12.5	12.5
6	–	–	–	–	–	22.5	20	12.5	12.5	12.5
7	–	–	–	–	–	–	20	20	12.5	12.5
8	–	–	–	–	–	–	–	20	20	12.5
9	–	–	–	–	–	–	–	–	20	20
10	–	–	–	–	–	–	–	–	–	20

[a]Fitch uses these annual default curves and interpolates quarterly assumptions in its cash flow modeling. Within those interpolations, the weighted average life (WAL) of the portfolio is rounded to the nearest quarter to determine the corresponding default timing curve. RDR – Rating default rate.
Source: Fitch Ratings

Appendix H: Multiborrower Single-Family Rental Rating Approach

Summary

The criteria described in this report also apply to transactions collateralized by pools of multiborrower single-family rental loans (SFR-MB), subject to the additional analysis, methodological differences and limitations noted in this appendix.

Given the substantial similarity in loan features, property attributes and transaction structures to CMBS, SFR-MB transactions share the same key rating drivers and loan and property credit considerations. As such, Fitch's multiborrower model is used to estimate losses based on property, loan and transaction attributes, and output from the model is a key consideration in the rating process.

Because the model does not include SFR as a property type, SFR is modeled as multifamily; as described below, Fitch constants, cap rates, sustainable cash flow considerations, QRS, LSS and property quality typically begin with more conservative assumptions that reflect SFR-specific attributes, limited third-party reports and limited ongoing property-level reporting requirements. Losses are also adjusted for properties in markets Fitch views as overvalued, a concept described in Fitch's "U.S. RMBS Loan Loss Model Criteria", available on Fitch's website.

Limitations

The SFR-MB market currently consists of a limited number of transactions with relatively similar characteristics. These criteria, intended for transactions with tenant, borrower, manager, property, loan, transaction structure and diversity characteristics similar to existing transactions rated by Fitch, do not apply to transactions with materially different attributes.

Fitch views diversity as a key mitigant to idiosyncratic risk; to the extent loans lack tenant diversity or the transaction has material sponsor, property management, tenant or geographic concentrations, Fitch may cap the ratings or choose not to rate the transaction.

Typical Cash Flow Analysis Assumptions

Rent Recognition: Lesser of actual rents in place or market rents.

Vacancy: Greater of 10%, in-place or market vacancy, except for core markets where minimum vacancies as low as 5% may be considered.

Management Fees: Greater of 8%, market or actual.

Real Estate Taxes: Based on actual costs.

Insurance: Based on actual costs.

Repairs and Maintenance/Turnover/Capex: In the aggregate, typically the greater of 1.5% of property value or $1,500 per property; 1.0% of value may be considered for new properties or properties in high value markets, or if average rehabilitation costs per unit exceed $10,000.

Leasing/Marketing Expenses: Higher of underwritten amount or one full month of Fitch effective gross income (EGI) every three years.

Home Owners Association Expense: Based on actual costs.

Modeling Assumptions

Property Type: For the purposes of modeling, properties are generally classified as multifamily.

Constants: 9.5% to 11.5%.

Cap Rate: 8.5%–10.5%; up to 13% for two- to four-family properties.

Additional Loss for Overvalued Markets: For properties in markets identified as overvalued, pursuant to Fitch's U.S. RMBS loan loss model criteria and the U.S. RMBS Sustainable Home Price Model, an additional loan loss amount will be applied. For any loan where the sustainable market value decline (sMVD) exceeds 10%, the 'Bsf' rating case loss amount will be increased by the difference between the sMVD and 10%; rating case-specific adjustments will be applied

at the same relative differences to 'Bsf' case losses. For example, the loss amount for a loan with a 15% sMVD would be increased by 500bps.

Differences from Core Criteria

For SFR-MB transactions, automated cash flow analysis and asset summary reviews typically cover all the loans in the pool. For property quality assessments on larger assets, Fitch may review a representative sample of interior/exterior pictures provided in the asset summaries, as well as from Google "street view" or similar images. However, properties physically inspected by Fitch will represent a de-minimis portion of the pool.

For SFR-MB transactions, environmental and engineering reports are not typically provided; however, an assessment of the property condition should be included in the appraisal for each property.

Surveillance

Based on the limited reporting information available for SFR-MB loans, post-closing reviews generally assume conservative assumptions of defaults and recoveries in addition to issuance assumptions. Current CE is compared to expected CE from EL and recoveries. Information received from servicers is also used to inform default and recovery expectations.

Appendix I: Rating Assumption Sensitivity

Fitch's analysis of multiborrower CMBS transactions typically results in an overall Fitch net cash flow (NCF) below the preceding year's reported NOI. The Defined Stresses and Defined Sensitivity tables below describe how the ratings of a hypothetical pool would react to further NCF changes from Fitch's NCF.

Deal Statistics for Hypothetical Pool

Hypothetical Pool

Pool type	Fusion
Effective Loan Count	43.0
Effective Geography Count	16.3
Effective Property Type Count	5.9
Percent of Pool COL	4.5
Fitch LTV (Fusion) (%)	106.1
Fitch DY (Fusion) (%)	8.5
Total Current LTV (Conduit) (%)	87.9
Total Maturity LTV (Conduit) (%)	104.7
Trust Midpoint LTV (Conduit) (%)	86.8
Trust Maturity LTV (Conduit) (%)	104.6
Total Term DSCR (Conduit) (x)	1.55
Total Maturity DSCR (Conduit) (x)	0.89

Source: Fitch Ratings

Defined Stresses

Defined stresses describe the impact of three defined stress assumptions: Fitch NCF reduced by an additional 10%, an additional 20% and an additional 30% to Fitch NCF. Declines to NCF result in lower DSCRs and higher LTVs, which constitute the most significant drivers of default and loss in Fitch's multiborrower model.

The implied rating sensitivity results below should only be considered as potential outcomes from changing one variable for a hypothetical transaction, and do not consider other risk factors to which the transaction is exposed.

Defined Stresses

	Additional NCF Decline		
Original Rating	-10%	-20%	-30%
AAAsf	AAsf	Asf	BBB+sf
AAsf	Asf	BBB+sf	BBB-sf
Asf	BBB+sf	BB+sf	B+sf
BBBsf	BB+sf	Bsf	Below B–sf
BBsf	Bsf	Below B–sf	Below B–sf
Bsf	Below B–sf	Below B–sf	Below B–sf

Source: Fitch Ratings

Defined Sensitivities

Defined sensitivities describe the stresses to the assumptions required to reduce a rating by one full category, to non-investment grade and to 'CCCsf'. The primary variable stressed in this analysis is Fitch's NCF. Declines to NCF result in lower DSCRs and higher LTVs, which are two of the most significant drivers of default and loss in Fitch's multiborrower model.

The table below shows the NCF decline required to reduce the ratings for each defined sensitivity for a hypothetical transaction.

Defined Sensitivities

(%)	Additional NCF Decline		
Original Rating	One Full Category	Non-Investment Grade	To CCCsf
AAAsf	8	35	50+
AAsf	10	27	45
Asf	12	16	37
BBBsf	11	1	26
BBsf	8	–	15
Bsf	–	–	6

Source: Fitch Ratings

Appendix J: Key Input Variables

Fitch has a standard list of data fields it uses to analyze pools of CRE loans. Key data fields are outlined below.

Key Input Variables

No.	Variable Name	Description
1	Originator	Loan originator name
2	Seller	Loan seller name
3	Loan Name	Loan name
4	Property Name	Property name
5	Crossed Loan Group	Flag if crossed with other loans in pool
6	Street Address	Street address of property
7	City	City where property is located
8	State/Province	State or province where property is located
9	Zip Code/Postal Code	Zip code (Postal code Canada) where property is located
10	Property Type	General property type
11	Property Subtype	Detailed property type
12	Net Rentable SF or Units	Property size (sf, units, pads, rooms)
13	Largest Tenant Percentage	Proportion of property/portfolio occupied by the largest tenant, by net rentable sf (%)
14	Largest Tenant No. 1	Name of largest tenant
15	SF of Tenant No. 1	sf of largest tenant
16	Largest Tenant No. 2	Name of second largest tenant
17	SF of Tenant No. 2	sf of second largest tenant
18	Largest Tenant No. 3	Name of third largest tenant
19	SF of Tenant No. 3	Sf of third largest tenant
20	Original Loan Balance	Original loan balance on trust amount (allocated by property) ($)
21	Cutoff Date Loan Balance	Cutoff date loan balance on trust amount (allocated by property) ($)
22	Pari Passu	Pari passu (Y/N)
23	Whole A-Note Balance	Cutoff date loan balance on whole A-note (allocated by property) ($)
24	Appraised Value	Appraised value ($)
25	Balloon Balance	Balloon balance on trust amount (allocated by property) ($)
26	UW Net Cash Flow	Issuer's underwritten net cash flow ($)
27	Monthly Debt Service	Monthly debt service on trust amount ($)
28	Interest Rate	Loan mortgage rate on trust amount (%)
29	Interest Rate Margin	Margin for floating-rate loans (%)
30	Interest Rate Index	Index rate for floating-rate loans (%)
31	Fixed/Floating Loans	Indicate if loan is fixed/floating
32	Loan Origination Date	Origination date of the loan MM-DD-YYYY
33	First Payment Date	First payment date of the loan MM-DD-YYYY
34	Maturity Date	Loan maturity date MM-DD-YYYY
35	ARD Date	Anticipated repayment date MM-DD-YYYY
36	Original Loan Term	Loan term to maturity date in months
37	Original Amortization Term	Amortization term in months
38	Remaining Loan Term	Remaining loan term to maturity date in months
39	Remaining Amortization Term	Remaining amortization term in months
40	Existing Subordinate Debt	Is there secondary debt currently in place? (Y/N)
41	Existing Subordinate Debt Type	Type of existing subordinate debt (mezzanine, B-note, preferred equity, other)[a]
42	Existing Subordinate Debt Amount	Amount of existing subordinate debt ($)[a]
43	Existing Subordinate Debt Note Rate	Interest rate of existing subordinate debt (%)[a]

Key Input Variables

No.	Variable Name	Description
44	Existing Subordinate Debt Monthly Debt Service	Monthly debt service on subordinate debt[a]
45	Future Subordinate Debt	Is future subordinate debt allowed (Y/N)
46	Future Subordinate Debt Type	Type of future subordinate debt allowed (mezzanine, B-note, preferred equity, other)
47	Leasehold	Ownership interest (fee, leasehold, fee/leasehold)
48	Lien Type	Lien type (first, second)

[a]For each existing subordinate debt component (i.e. secured and unsecured).
Source: Fitch Ratings

Appendix K: Sample Loan Characteristics

Sample Loan Characteristics

As of date	11/15/2021
Current Trust Amount ($ Mil.)	10
Property Type	Office-Urban
Property Count	1
Property Quality	B
Largest Tenant Percentage (%)	25.0
Original Loan Term (months)	120
Remaining Loan Term (months)	119
IO Period (months)	36
Amortization Period (months)	360
Current Pari Passu Amount ($ Mil.)	0
Current Subordinate Secured Amount ($ Mil.)	0
Current Subordinate Unsecured Amount ($ Mil.)	0
Current Note Rate (%)	6.00
M.S.A.	Charlotte-Concord-Gastonia, NC-SC
Country	U.S.
Qualitative Risk Score	3
Loan Structure Score	2
Fitch Cap Rate (%)	9.00
Fitch Constant (%)	10.00
Fitch Market Cap Rate Assumption for Office (%)[a]	5.705
Total LTV Current (%)[b]	76.1
Total LTV Maturity (%)[b]	83.5
Trust LTV Midpoint (%)[b]	74.1
Trust LTV Maturity (%)[b]	83.5
Total DSCR Term (x)[b]	1.34
Total DSCR Maturity (x)[b]	1.07
Fitch LTV[b]	93.1
Fitch DY[b]	9.67
Loan-Level Expected Loss (prior to concentration add-on) (%)[b]	4.2

[a]As of fourth-quarter 2021. [b]Calculated value at the 'Bsf' stress.
Source: Fitch Ratings

ACLI Market Cap Rate Assumptions by ACLI Property Types for the Sample Loan Above[a]

ACLI Property Type	ACLI Market Cap Rate Assumption (%)
OF	5.705
MF	4.863
IN	5.497
LO	6.728
RT	6.266

[a]As of fourth-quarter 2021. Note: These rates are for illustration purposes as the actual ACLI data to be used in rating transactions will be released publicly in late third quarter and used in the model beginning Jan. 1, of the following year.
Source: Fitch Ratings

Appendix L: Property Quality Grades

The factors and considerations that typically influence property quality grades are listed in the table below. Not every property quality grade is influenced by every factor or consideration.

Factors	Relative Considerations
Strength of Market, Demand Drivers, Demographics, Geographic Location	• Metropolitan Market Type (Major Metro, Urban, Suburban, Rural) • Metropolitan Market (e.g. High Growth or Declining) • Neighborhood/Local Market (Status Relative to Metro Area) • Linkages (Freeway Access, Arterials, Mass Transit) • Traffic (High Travel/Wide Roads or Low Travel/Narrow Roads)
Relative Market Positioning	• Competitive Set (Relative Superiority or Inferiority of the Subject) • Observed Vacancy (Signs or Many Signs of Vacancy) • Growth Stage (Very Built-Out or Sparsely Built-Out) • Growth Trends (Signs of New Construction/Rehab or Stagnation) • Vacant Land (Few Parcels or Numerous Sites)
Location and Site Attributes	• Accessibility: Ingress/Egress (Turn Lanes, Curb Cuts, Signaled Access) • Visibility/Corner Location/Signage • Abutting Land Uses (Complementary vs. Conflicting) • Parking (Amount and Proximity to Buildings) • Landscaping/Aesthetics (Relative Curb Appeal) • Vehicle Movement (Adequate Space vs. tight) • Environmental or Sustainability Attributes
Physical Condition	• Construction Materials (Durability of Construction Brick/Siding/Wood) • Maintenance (Like-New vs. Significant Deferred) • Property Renovation (within 1 Year vs. More than 10 Years) • Parking (Like-New/Abundant/Covered, Cracking/Holes) • Interior-Public Area (Quality, Good Condition vs. Dark/Run-Down, Security) • Interior Units (Quality, Good Condition vs. Dark/Run-Down) • Amenities (Exceeds vs. Lags Comparables)

Source: Fitch Ratings

The property quality grade is a relative score that analysts assign based on a relative comparison to other properties. General guidelines are described in the table below. A property quality grade of "D" is considered inferior to "C-" and is rarely used.

	A, A–	B+, B, B–	C+, C, C–
Attributes	Usually a trophy property: • Looks beautiful, has a remarkable location and high visibility. • Often newly constructed. Has a higher replacement cost (psf) than other buildings in its market. • Above-average tenant quality. • Likely to be sought after by tenants, even in a down market. • Rents and occupancy typically outperform market. • An insurance company would give long-term financing on the property. • Has no deferred maintenance. • Building systems represent the latest technology including environmental and sustainability attributes.	An average property: • Rent and occupancy consistent with market. • Good, but not extraordinary, construction and design features. • Average location. • Located in a market with average local and regional market conditions. • No significant plusses/minuses.	A property with either market, location or building/site problems: • Below-market rent/occupancy. • Weaker tenants, lease structures. • In poor or declining market. • Has poor construction, or average construction with significant deferred maintenance. • Vulnerable to new competition from development; it is inferior to its competition in the market. • Has poor visibility or access. • Lacks amenities. • Building systems are out of date; considerable investment required to bring the property up to minimum current environmental and sustainability standards.
Model Treatment	The class A– or better grade is used only on buildings clearly above its competitive set and/or considered trophy quality. The model assigns relatively lower LGD, all else equal.	The class B+, B or B– grade is neutral.	The class C+ or worse grade is negative; the model assigns relatively higher LGD, all else equal.

LGD – Loss given default
Source: Fitch Ratings

Appendix M: Special Considerations for Japan Transactions

The criteria described in this report also apply to the surveillance of Japanese CMBS of multiborrower, fully amortizing, multifamily loans, with the exceptions described below.

Fitch expects to receive pool-specific loan-by-loan data to perform its model run for the ongoing surveillance of Japanese CMBS backed by fully amortizing loans. The agency applies the following Japan-specific assumptions to the model under this criteria report.

Fitch Standard Cap Rates and Constants for Japan

Property Type (%)	Standard Constant	Standard Cap Rate[a]
Multifamily	6.50	6.25

[a]Cap rates are for major cities in Japan.
Source: Fitch Ratings

- Fitch cap rates are derived from market sources, such as the Japan Real Estate Institute, taking into consideration the cyclicality of Japan's real estate sector.
- Refinance constants are arrived at with reference to historical Japanese interest rates as well as nonrecourse loans in Fitch-rated Japanese CMBS transactions.

Geographic Concentration Assumption

All properties are assumed to be in one geographic region for calculating the effective geographic count; as such, the maximum penalty for geographic concentration will be applied.

Market Cap Rates

The Fitch market cap rate assumption is based on market cap rates from the Japan Real Estate Institute.

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