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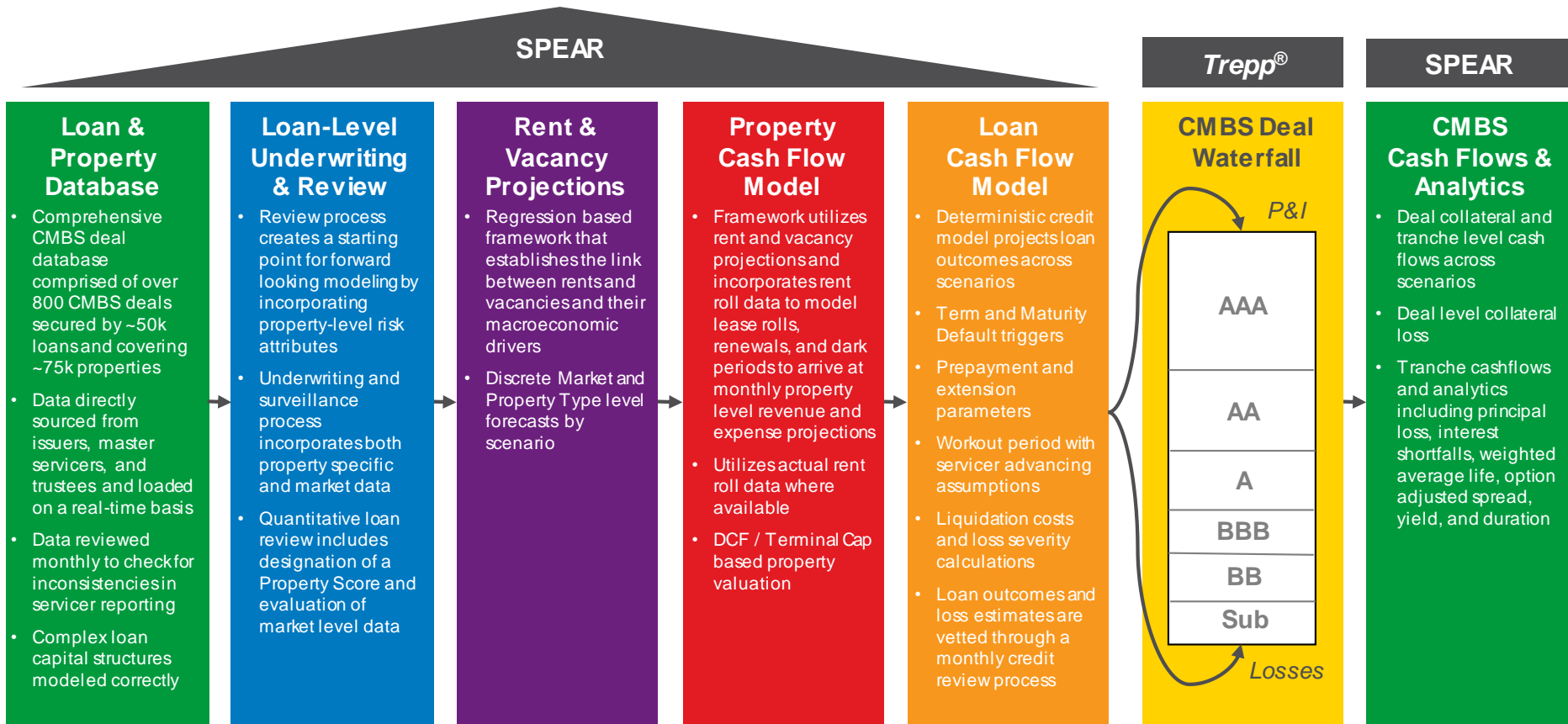
BlackRock Solutions CMBS Methodology

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BlackRock Solutions CMBS Modeling Framework

BlackRock Solutions uses a bottom-up approach to analyzing CMBS, built on loan-level data and a forward-looking deterministic modeling framework

- ▶ BlackRock Solutions sources data directly from CMBS servicers and trustees, reviewing monthly loan information for data errors and qualitatively reviewing property financials quarterly to assess whether reported data reflects property risk profiles
- ▶ Forward-looking real estate assumptions, combined with a deterministic credit loss model project outcomes for each loan backing a CMBS trust under multiple scenarios
- ▶ Loan-level loss outcomes are passed through Trepp's waterfall engine to generate bond-level cashflows, which BlackRock Solutions uses to estimate CMBS intrinsic valuations, loss projections and related security-level analytics



CMBS Modeling Framework: Loan and Property Database

BlackRock Solutions maintains its own database of commercial mortgage and property information backing US CMBS transactions

- ▶ All loan- and bond-level analysis and projections are derived using this data
- ▶ The initial dataset is aggregated from the original offering documents
- ▶ Updates are sourced directly from CMBS servicers and trustees on a monthly basis
- ▶ The dataset includes > 800 CMBS transactions, comprised of ~50k loans and ~75k properties

The BlackRock Solutions CMBS database is organized to relate multi-note loan structures with underlying properties and reported financials

Property and loan data are reviewed period-over-period and versus issuance to assess any potential servicer reporting errors or data ambiguities

Examples of BlackRock Solutions CMBS Loan Database Structure & Process

Data	BlackRock Solutions Structure
Loan Capital Structure	<ul style="list-style-type: none">▶ BlackRock Solutions manually maps the capital stacks for all multi-note loans included in CMBS trusts from original Offering Documents▶ Tie-out of note/loan information to capture and attribute property cash-flows on complete loan capital structures▶ Identify cross-default provisions with associated loans / 'notes'
Financial Reporting	<ul style="list-style-type: none">▶ Partial-year financials reported by servicers are compared to prior reported periods to determine whether the amounts reported are annualized, partial or errant▶ BlackRock Solutions identifies the controlling servicer for multi-note loans (dubbed the "Paymaster") and uses its financial reporting for all notes associated with the unique underlying property(s)

CMBS Modeling Framework: Loan-Level Review

BlackRock Solutions performs a qualitative review of large loans along with any other loans meeting certain review criteria (e.g. delinquent or specially serviced loans)

- ▶ All other loans undergo a quantitative vetting process

Loan review process assesses the reasonableness of servicer reported information to account for the following:

- ▶ Stale or dated income information (e.g. income reporting 9– 12 months old) or partial year reporting
- ▶ Recent credit events that may materially alter property values (e.g. tenant/sponsor bankruptcy)
- ▶ Idiosyncratic credit characteristics (e.g. credit tenant or ground leases, environmental issues)

Loan reviews create a starting point for forward-looking modeling by incorporating property-level risk attributes, which are not captured by static income reporting

As a final step, loan outcomes are reviewed for consistency with underwriting inputs



CMBS Modeling Framework: Assumption Setting

Property-level Cap Rate and NCF projections vary by scenario and are used to estimate loan outcomes

NCF Generation Process

Property-Level Data

- Recently reported income and operating history

CRE Projections

- BlackRock Solutions leverages third party data on historical rent and vacancy rates as well as market discount and cap rates
- BlackRock Solutions econometrically forecasts rent and vacancy at the market and property type level

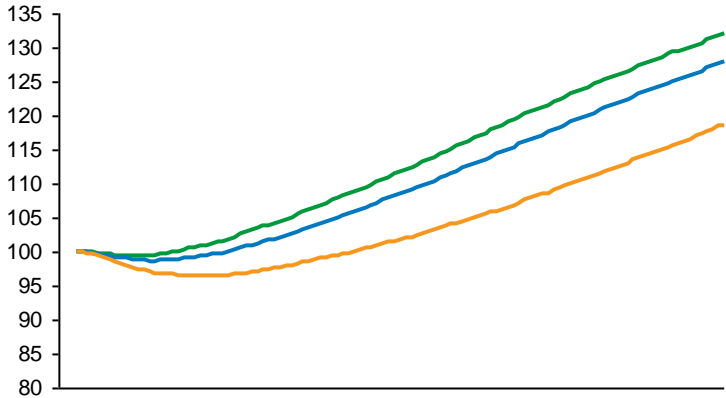
BlackRock Solutions Commercial Real Estate Professional Review

- Analysis and review of forecast information
- Review of property level data and outcomes

NCF Curves

- ▶ BlackRock Solutions underwritten cashflows are used as the starting point in forecasts
- ▶ NCF curves project property income and value across multiple scenarios
- ▶ Capitalization rates are applied to NCF projections to determine property valuations over time

Illustrative NCF Growth Curves



CMBS Modeling Framework: Assumption Setting

BlackRock Solutions employs a forward-looking deterministic credit model to estimate loan-level outcomes. Major assumptions and credit model parameters include the following:

Primary Deterministic Model Parameters

Income and Property Value Drivers

Assumption	Description
Rent and Vacancy	<ul style="list-style-type: none"> ▶ MSA and property-type based projections of property-level performance through time
Discount rates and cap rates	<ul style="list-style-type: none"> ▶ Cap rate curves (term structure) by MSA and property type ▶ Adjusted by property grades to account for individual property location and quality ▶ Combined with income projections to determine property value
Property grades	<ul style="list-style-type: none"> ▶ Individually assigned grades based on location, condition and size ▶ Used to adjust cap rates to account for individual property quality
DSCR default trigger	<ul style="list-style-type: none"> ▶ Monthly test that results in a term default if DSCR and LTV cross threshold levels ▶ Triggers are property type based
Loan extensions	<ul style="list-style-type: none"> ▶ Loans are extended at maturity if LTV falls within a defined band
Loan prepayment	<ul style="list-style-type: none"> ▶ Loans are prepaid during their open period if LTV and Debt Yield falls within specified levels
Workout period	<ul style="list-style-type: none"> ▶ Time to resolution after a term or maturity default ▶ Period length based on loan size and jurisdiction (by State)
Liquidation costs	<ul style="list-style-type: none"> ▶ Percentage of property value at liquidation
Servicer reserves	<ul style="list-style-type: none"> ▶ Reserves held by the servicer are used to fund debt service payment shortfalls if income drops below the DSCR threshold

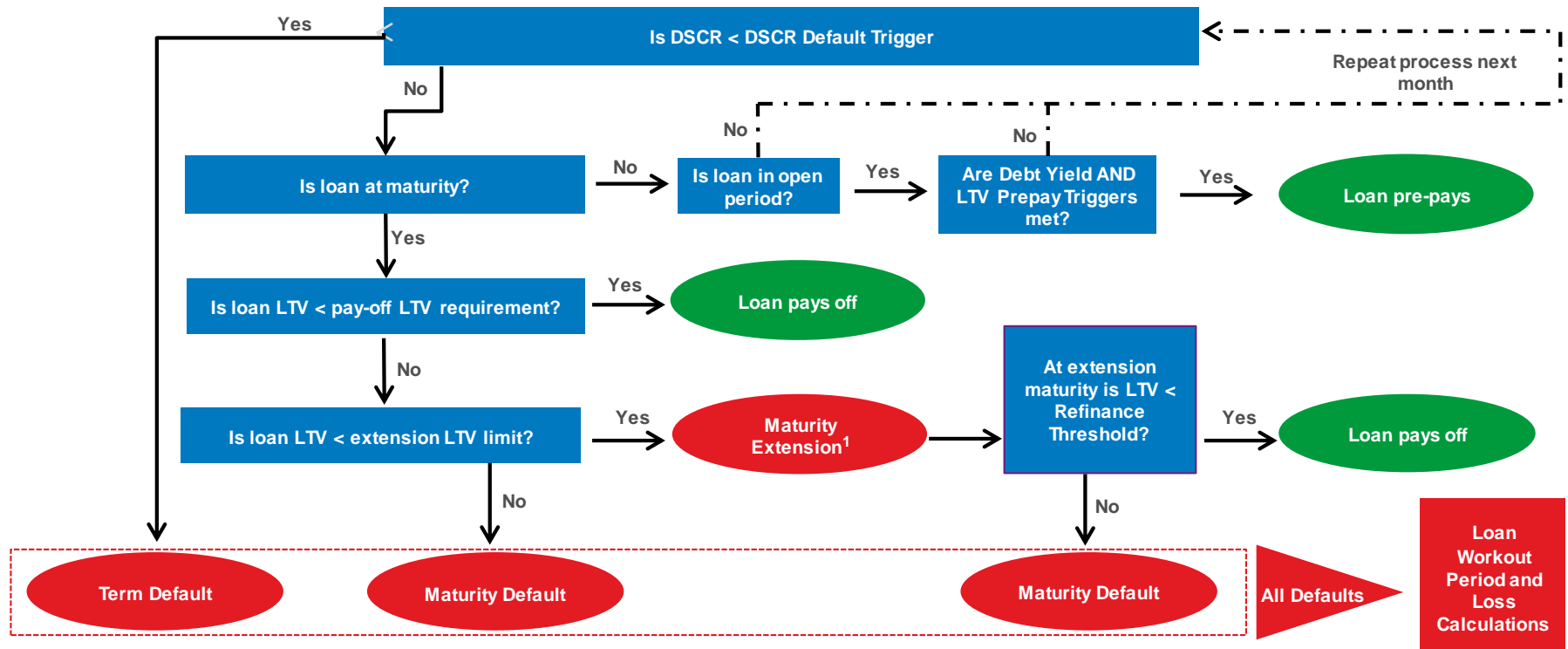
Income growth curves and cap rates are stressed across scenarios

Loan Outcome and Loss Parameters

CMBS Modeling Framework: Loan Outcome Projections

Loan outcomes are determined by a series of DSCR and LTV tests over time

Loan Outcome Logic Tree



- ▶ Term default: DSCR < Default Triggers at any point during initial term of loan extension
- ▶ Pay off at original maturity LTV < Pay-off LTV requirement
- ▶ Default at original maturity LTV > Extension LTV limit at original maturity
- ▶ Extension at original maturity LTV between extension LTV bounds at original maturity
- ▶ Default at extension maturity LTV > Refinance Threshold at extension maturity

(1) DSCR tests are run throughout the extended lifetime of the loan. If a DSCR test fails, the loan will go into default

Important Notes

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