MOODY'S ANALYTICS

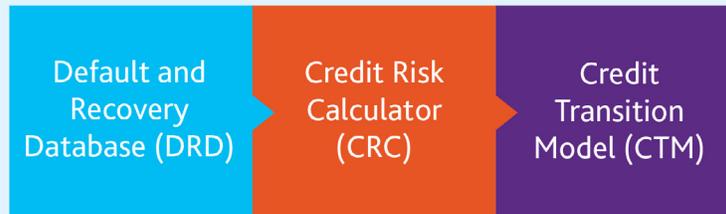# Credit Transition Model (CTM) – At-A-Glance

The Credit Transition Model is the Moody's Analytics proprietary, issuer-level model of rating transitions and default. It projects probabilities of rating transitions and default for over 7,000 bond and loan issuers.

CTM belongs to the family of discrete time, multiple destination, and proportional hazards models. It conditions on issuer-specific information, coupled with forward-looking macroeconomic views, to assign probabilities of default, withdrawal, upgrade, and downgrade to individual issuers, portfolios of issuers, or rating categories. CTM facilitates scenario analysis for credit transitions and defaults at both the issuer and portfolio levels. Such outputs are key for stress testing and regulatory credit loss calculations.

Cumulative probability of default (PD) forecasts provided by CTM are available for issuers rated by our sister company, Moody's Investors Service, for horizons of up to 20 quarters. Model-generated PDs can be conditioned on a wide selection of both standard and user-defined economic scenarios. The set of standard economic scenarios, updated monthly, includes the Moody's Analytics baseline, one upside scenario, and three downside scenarios, as well as three regulatory scenarios published by the Federal Reserve Bank (the Fed Baseline, Fed Adverse, and Fed Severely Adverse scenarios).

Default Suite Product

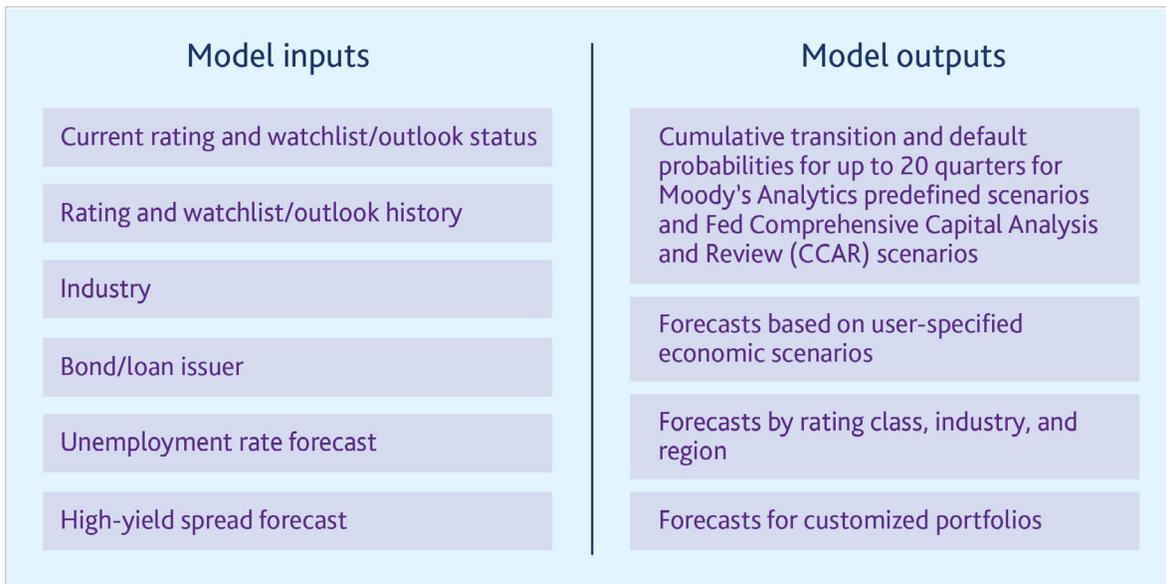| Default and Recovery Database (DRD) | Credit Risk Calculator (CRC) | Credit Transition Model (CTM) |

CTM is a part of the Default Suite product offered by Moody's Analytics and is available through a web-based platform.

What Differentiates CTM?

There are a number of benefits that financial institutions, corporations, and asset managers can gain by applying CTM in their credit risk management processes. CTM provides:

» Consistent ratings transition and default probability forecasts conditional on issuer characteristics, rating history, and different economic scenarios

» Consistent issuer-level forecasts over different time horizons

» PD projections with a low level of volatility, compared to other point-in-time PD measures

» A practical tool to calculate the probability that an issuer first encounters a rating threshold

» Broad geographic coverage of over 7,000 Moody's Investors Service-rated entities

» A fully transparent modeling approach with validation results

» Daily updates of the Moody's Investors Service issuer rating database and monthly updates for "off-the-shelf" economic scenarios defined by Moody's Analytics

» The ability to project PDs based on user-defined economic scenarios

» A framework that leverages Moody's Investors Service comprehensive default and rating database for calibration and validation purposes

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Model inputs	Model outputs
Current rating and watchlist/outlook status	Cumulative transition and default probabilities for up to 20 quarters for Moody's Analytics predefined scenarios and Fed Comprehensive Capital Analysis and Review (CCAR) scenarios
Rating and watchlist/outlook history	
Industry	Forecasts based on user-specified economic scenarios
Bond/loan issuer	
Unemployment rate forecast	Forecasts by rating class, industry, and region
High-yield spread forecast	Forecasts for customized portfolios

How Does CTM Work?

CTM methodology is grounded in the observation that credit transitions are cyclical and generally non-Markovian. In particular, there is abundant evidence showing that credit transitions correlate with credit and economic cycles, as well as evidence that rating migrations depend both on issuers' current ratings and on their rating migrations in the past. CTM incorporates not only issuer characteristics and rating histories, but also economic conditions as drivers of state transitions. In the estimation, the model first projects the transition probabilities from the current rating to each of five exiting states: upgrade, downgrade above C, downgrade to C, withdrawal, and default. After this step is completed, CTM uses historical conditional transition matrixes to connect the exiting states with the destination rating probabilities. We construct a US model and a European model with very similar structures, which are estimated separately on US and European issuer data, respectively.

How Is CTM Validated?

We have validated CTM along three primary dimensions:

» Cardinal accuracy   » Ordinal accuracy   » Rating forecast stability

The validation exercises show that CTM effectively forecasts PDs and rating transitions and differentiates between defaulters and non-defaulters. Compared to other point-in-time PD measures, the CTM projection displays a high degree of smoothness. Detailed validation results have been published in a separate methodology whitepaper.

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Major Differences Between the Current Version of CTM and Previous Versions

» The current version of CTM has been estimated with the new senior ratings algorithm (SRA). In 2015, Moody's Investors Service redesigned the SRA to make the notching rules determined dynamically and consistent with current rating practices. Additionally, the issuer universe under the new SRA has been expanded to include banks that only have deposit ratings.

» The recalibration sample includes data through the end of 2015 to help capture better post-crisis credit risk dynamics.

» An adjustment step was added in estimating the European model parameters to enhance the model's cardinal accuracy.

» Macro inputs have been adjusted with Moody's Analytics economic forecasts, as well as Fed CCAR macro assumptions.

» A modified version of Multi-Country Macroeconomic Scenario Accelerator (MCMESA) has been incorporated to let clients express their view on GDP growth.

» The new interface allows clients to run the CTM as of a past date, to facilitate internal back testing and other analysis.

How Can CTM Be Used by Clients?

Portfolio Credit Risk Monitoring and Management
CTM allows portfolio managers to monitor changes in obligor credit quality based on projected transition and default probabilities. Risk practitioners can run CTM to quantify the impact of different economic scenarios on their portfolios. CTM is also a practical tool that calculates the probability that an issuer first passes a certain rating threshold, which is important for asset managers facing certain investment requirements. CTM forecasts can be also be used as quantitative inputs to clients' internal risk rating systems.

Capital Adequacy and Stress Testing
PD is a key input for calculating expected loss. Clients can use CTM to estimate loan loss provisions under user-specified stress scenarios, and loan loss provisions are a major component of capital ratios.

Input for Economic Capital Calculation
The PD forecast by CTM can be used to calculate expected loss, unexpected loss, and subsequently calculate economic capital.

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