



FAQ

NOVEMBER 2018

CECL Forecasts & Scenarios FAQs

The Financial Accounting Standards Board's new current expected credit loss impairment standards require timely, forward-looking measurement of lifetime risk using credible models. We answer the leading questions related to the forward-looking elements needed.

For more detailed information, download the white paper *Economic Scenarios: What's reasonable and supportable?*

Do banks have more discretion to generate their own (reasonable and supportable) forecasts? What if such forecasts provide a lower credit loss estimate than from the current credit loss methodology?

In principle, nothing in the Accounting Standards Update prohibits generating your own forecasts. Your auditor and examiner must agree that the forecast is reasonable and supportable and sign off on the manner in which the expected credit loss estimate is conditioned on the forecasts. However, we expect that enhanced scrutiny is applied wherever the CECL reserve estimate is lower than under the incurred loss method.

Do regulators take a "standardized" scenario approach (like Comprehensive Capital Analysis and Review), given the potential for widely ranging economic scenarios among institutions?

Currently, regulators have opted not to provide prescriptive guidance in the use of economic scenarios in CECL and have not indicated they intend to do so.

How many scenarios should be used to estimate losses?

Loss estimates may vary significantly depending on how the guidance is interpreted and implemented. While FASB does not specify the number of scenarios to be used, we find that multiple scenarios to yield more reasonable and defensible results. In working with many firms, and our own modeling work, we define the following approaches as best practices:

Large Institutions – Employ multiple custom economic scenarios to produce a range of estimates that may be weighted to derive the loss allowance calculation. Credit loss models should forecast losses over the contractual or behavioral life of loans in the portfolio, making estimates less sensitive to explicit decisions around the forecast period and mean reversion method.

Mid-size Institutions – Use standard loss forecasts along multiple scenarios and then weight them to provide the most quantitative, defensible approach while reducing the potential for volatility in quarter-to-quarter updates.

Smaller Institutions (or firms that cannot run multiple

forecasts efficiently) – A single scenario approach is reasonable. Our recommendation is to set the "reasonable and supportable" forecast horizon at either two or three years with gradual reversion to average historical losses over a period of six months.

The use of multiple scenarios can help mitigate or eliminate the sensitivity of loss estimates to the choices surrounding forecast horizon and mean reversion. In addition, the cost of developing, maintaining and defending multiple scenarios may also pay off in the form of less volatile reserves and earnings. Attention needs to be paid to the credit loss forecasting models that will utilize economic forecasts as inputs.

Using multiple scenarios, how would probability weights for different scenarios be applied?

They should cover the full range of outcomes (both upside and downside) with quantitatively derived weights. Qualitative adjustment to these weights is possible, but the adjustment needs to be justifiable, documented and transparent.

The Moody's Analytics scenario development process consists of simulating many possible economic paths through the use of a vector autoregressive model. We apply an algorithm to rank-order these simulations from best to worst to create a distribution of possible economic outcomes.

Next, we identify paths at specific points in this distribution corresponding to our alternative economic scenario definitions. For example, S1 is the 10th percentile, Baseline is the 50th percentile, and so on. We transform these probabilities into weights by assuming each scenario is representative of the distribution between scenarios. Additional details on this transformation process are available in the Moody's Analytics white paper *Economic Scenarios: What's reasonable and supportable?*

Are probability-weighted forecasts available in Moody's Analytics Data Buffet®?

Probabilities are assigned to each of the standard Moody's Analytics alternative scenarios available in Data Buffet®. This platform enables clients to view, manipulate and automate delivery of Moody's Analytics economic data and forecasts through flat files, dynamically via Microsoft Excel, or via FTP

and API methods. Data Buffet is provided to clients with a subscription to economic data or forecasts from Moody's Analytics.

What are your thoughts on integrating CCAR and CECL economic forecasts?

CCAR and CECL are two different processes with different purposes, although they have the common objective of forecasting losses under varying economic conditions. The Federal Reserve is explicit that its CCAR scenarios are "hypothetical sets of conditions designed to assess the strength of banking organizations" and that the "scenarios are not forecasts of the Federal Reserve."

The loss forecasts under CECL are intended to capture a realistic view of the future loan losses a bank incurs over the life of the loans in its portfolio. Although the input scenarios used for CCAR and CECL differ, most CCAR institutions plan to leverage a single set of credit loss forecasting models for both applications in order to enhance operational efficiency and consistency.

What is the reversion time frame relative to the forecast horizon?

Note that the FASB guidance does not explicitly reference mean reversion in any context. It does state that entities are to "revert to historical loss information...for periods that are beyond the time frame for which the entity is able to develop reasonable and supportable forecasts." Users need to understand the forecast uncertainty and determine a reasonable and supportable forecast horizon for these models in conjunction with the choices around the economic forecast inputs. Guidance directs institutions to "revert to historical loss information" after a reasonable and supportable forecast period. What is this requirement really addressing? Forecast uncertainty. The standards set forth require lenders to forecast losses over the entire life of the loans on their book. Every model has forecast errors, as errors tend to grow over time because of uncertainty. It is imperative to understand limitations of all forecasting models.

- » Option 0: No need to revert externally if the loss-forecasting model already has reversion built into it.
- » Option 1: Revert to historical loss rates immediately after the determined forecast horizon.

- » Option 2: After the determined forecast horizon, gradually revert to historical loss rates.

»

The Moody's Analytics alternative economic scenarios revert to historic, long-run growth rates, which is deemed reasonable and supportable from the standpoint that the models do not attempt to forecast turning points in the economy—a notoriously difficult exercise. Rather, the scenarios are intended to provide a forecast over a single business cycle or recession of varying severity. In our forecasts, we project out 30 years, but return to long-term trend over a period of two to four years.

Our preferred approach is to incorporate reversion into the credit loss models rather than apply an on-the-top adjustment, but each institution will need to determine what is reasonable and supportable based on its own situation.

Was the "reversion to mean" ever interpreted as the mean reversion of the macro economic variables, or was it always assumed to be reversion to mean loss rate?

The FASB guidance does not explicitly reference mean reversion in any context. It does state that entities are to "revert to historical loss information...for periods that are beyond the time frame for which the entity can develop reasonable and supportable forecasts."

The Moody's Analytics alternative economic scenarios revert to historic, long-run growth rates, which is deemed reasonable and supportable from the standpoint that the models do not attempt to forecast turning points in the economy—a notoriously difficult exercise. Rather, the scenarios are intended to provide a forecast over a single business cycle or recession of varying severity. Our preferred approach is to incorporate reversion into the credit-loss models rather than applying a top adjustment, but each institution needs to determine what is reasonable and supportable based on its own situation. Additional details about the concept of, and options around, mean reversion of losses are available in the Moody's Analytics white paper Economic Scenarios: What's reasonable and supportable?

Would a reversion to economic factors underestimate loss forecasts?

Possibly. Given the nonlinear nature of credit losses, the

expected loss computed over multiple economic paths will be higher than the expected loss computed over a single, long-run average economic path. (This is a variation of Jensen's inequality.) For this reason, firms are likely to opt to calculate their losses over multiple paths and probability-weight the results provided they have the operational capacity to do so. This will provide a more accurate estimate of future losses and reduce the quarter-to-quarter volatility that may be introduced by relying on a single forecast or scenario.

Given that the Moody's Analytics alternative economic scenarios revert to historical long-term trend growth rates in the long run, there may be a concern that loss estimates 10 or 15 years in the future may be understated. Although a legitimate concern, we believe this is beyond the scope of the CECL guidance for the following reasons:

- » For most lending products, the bulk of the impact on the loss allowance will be driven by loan performance over the first two to three years of the forecast, especially once discounting is applied.
- » CECL estimates are not set in stone but subject to adjustment each quarter. If the economy starts to deteriorate, loss estimates will rise, leading to higher reserve requirements well in advance of the loss event. Regulators are not demanding that entities have perfect foresight.
- » Estimating the full range of possible economic outcomes, including multiple turning points far out into the future, would require a simulation exercise involving thousands if not tens of thousands of paths. This is well beyond the operational scope of financial institutions today.

Though the consideration of long-term economic forecasts may be out of scope for most institutions, if an entity is modeling the performance of assets with extremely long lives and/or large loss severities, a more customized set of future economic scenarios may be more appropriate. Moody's Analytics offers customized economic modeling engagements to address these situations.

If the CECL standard is not prescriptive about the level at which mean reversion can happen, at what level can reversion occur?

The FASB guidance does not explicitly reference or define mean reversion. It does state that entities are to "revert to historical loss information...for periods that are beyond the time frame for which the entity can develop reasonable and supportable forecasts." The Moody's Analytics alternative economic scenarios revert to historic, long-run growth rates, which is deemed reasonable and supportable from the standpoint that the models do not attempt to forecast turning points in the economy—a notoriously difficult exercise. Rather, the scenarios are intended to provide a forecast over a single business cycle or recession of varying severity. Our preferred approach is to incorporate reversion of the loss rates into the credit-loss models rather than apply them ex post, but each institution needs to determine what is reasonable and supportable based on its own situation.

What is the difference between a "scenario" and a "forecast"? The FASB standard seems to require forecasts as opposed to scenarios.

We use the terms "scenario" and "forecast" interchangeably, as does the FASB guidance ("hypothetical economic scenarios", "supportable forecasts"). Generally speaking, a forecast is any forward-looking view conditional on information known at the start of the forecast. We commonly refer to our Baseline (50th percentile) view as our forecast and S1 through S8 as alternative scenarios around this Baseline.

What is a defensible forecast methodology?

Firms will want to ensure that the underlying credit models employed are based on sufficient performance history to generate robust, meaningful loss estimates that are sensitive to changing economic conditions. Firms should:

- » Confirm that the observed history used to develop models is relevant for the time horizon projected.
- » Base models on sound economic and statistical theory, incorporating inter-relationships and feedback effects among economic variables. For example, a shock to one factor such as interest rates impacts all other factors such as employment over time.
- » Develop models that provide information at varying levels of geographic aggregation to capture local economic effects.

»

Do Moody's Analytics forecasts and scenarios meet CECL compliance standards?

Moody's Analytics forecasts are based on decades of sound economic theory and supported by robust quality-control processes to ensure all input data are up to date and accurate. This is what makes them "reasonable and supportable." The quality of the Moody's Analytics forecasts benefit from the long history of an experienced team of economists, database managers and operational engineer running a monthly forecasting process. Annual forecast quality reviews along with tracking and model validation reports are provided to users to gauge the quality of the forecast outputs relative to the volatility of historical economic indicators. Extensive model documentation discloses the specification and parameter estimates of all of the variables in our economic model, providing users with full transparency and insight into the forecasting process.

Based on our experience with IFRS 9 internationally, regulators have viewed the use of proprietary economic models favorably, provided that they are well-grounded in economic theory, are well-documented and transparent, and they capture the inter-relationships between economic indicators such that a shock to a given factor is propagated throughout the system. The Moody's Analytics economic forecasting models meet all of these criteria.

What information on back-testing and model validation does Moody's Analytics provide?

Moody's Analytics produces a model documentation and model validation report once a year. This report is extensive: It covers topics ranging from the theory behind the model to justification of the model structure to the process used to develop equations as well as a thorough validation with back-testing, benchmarking and sensitivity analysis. These reports are included with subscriptions to the regulatory scenario package and are available for purchase by other clients.

How would a firm work with Moody's Analytics to develop and update the economic scenarios?

For users who contract with Moody's Analytics on the development of custom economic scenarios, we start the process by meeting with you and identifying your

unique exposures and risk. We then meaningfully expand scenario parameters to create an idiosyncratic scenario that is as severe as the last CCAR severely adverse scenario. Our economists review and fine-tune the output for consistency and reasonableness and meet with you to reviews the national-level scenario and make any comments or suggestions. We then run the regional or global idiosyncratic forecast and deliver the results. We furnish a description of the scenario and provide model validation (back-testing, out of sample, shock results of key variables). Periodic updates to capture new data releases, revisions, or any changes to equations are maintained, and additional validation is performed if required. Users can work with our team or their account representatives to receive training on the use of these series. Please contact your account representative for additional information.

Are your scenarios part of the Impairment Studio and are they already weighted?

Yes, our scenarios are available through the Impairment Studio platform. The full suite of the standard Moody's Analytics alternative economic scenarios are also available as a stand-alone offering. We offer a baseline forecast and up to eight alternative scenarios. Probabilities are assigned to each of the standard Moody's Analytics alternative scenarios. In addition, a consensus scenarios is also available.

© 2018 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates (collectively, "MOODY'S"). All rights reserved.

CREDIT RATINGS ISSUED BY MOODY'S INVESTORS SERVICE, INC. AND ITS RATINGS AFFILIATES ("MIS") ARE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MOODY'S PUBLICATIONS MAY INCLUDE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES. MOODY'S DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL, FINANCIAL OBLIGATIONS AS THEY COME DUE AND ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS AND MOODY'S OPINIONS INCLUDED IN MOODY'S PUBLICATIONS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. MOODY'S PUBLICATIONS MAY ALSO INCLUDE QUANTITATIVE MODEL-BASED ESTIMATES OF CREDIT RISK AND RELATED OPINIONS OR COMMENTARY PUBLISHED BY MOODY'S ANALYTICS, INC. CREDIT RATINGS AND MOODY'S PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. NEITHER CREDIT RATINGS NOR MOODY'S PUBLICATIONS COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. MOODY'S ISSUES ITS CREDIT RATINGS AND PUBLISHES MOODY'S PUBLICATIONS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, MAKE ITS OWN STUDY AND EVALUATION OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

MOODY'S CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE MOODY'S CREDIT RATINGS OR MOODY'S PUBLICATIONS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER.

ALL INFORMATION CONTAINED HEREIN IS PROTECTED BY LAW, INCLUDING BUT NOT LIMITED TO, COPYRIGHT LAW, AND NONE OF SUCH INFORMATION MAY BE COPIED OR OTHERWISE REPRODUCED, REPACKAGED, FURTHER TRANSMITTED, TRANSFERRED, DISSEMINATED, REDISTRIBUTED OR RESOLD, OR STORED FOR SUBSEQUENT USE FOR ANY SUCH PURPOSE, IN WHOLE OR IN PART, IN ANY FORM OR MANNER OR BY ANY MEANS WHATSOEVER, BY ANY PERSON WITHOUT MOODY'S PRIOR WRITTEN CONSENT.

CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY ANY PERSON AS A BENCHMARK AS THAT TERM IS DEFINED FOR REGULATORY PURPOSES AND MUST NOT BE USED IN ANY WAY THAT COULD RESULT IN THEM BEING CONSIDERED A BENCHMARK.

All information contained herein is obtained by MOODY'S from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. MOODY'S adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources MOODY'S considers to be reliable including, when appropriate, independent third-party sources. However, MOODY'S is not an auditor and cannot in every instance independently verify or validate information received in the rating process or in preparing the Moody's publications.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers is advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by MOODY'S.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, including but not limited to by any negligence (but excluding fraud, willful misconduct or any other type of liability that, for the avoidance of doubt, by law cannot be excluded) on the part of, or any contingency within or beyond the control of, MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY SUCH RATING OR OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY MOODY'S IN ANY FORM OR MANNER WHATSOEVER.

Moody's Investors Service, Inc., a wholly-owned credit rating agency subsidiary of Moody's Corporation ("MCO"), hereby discloses that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by Moody's Investors Service, Inc. have, prior to assignment of any rating, agreed to pay to Moody's Investors Service, Inc. for appraisal and rating services rendered by it fees ranging from \$1,500 to approximately \$2,500,000. MCO and MIS also maintain policies and procedures to address the independence of MIS's ratings and rating processes. Information regarding certain affiliations that may exist between directors of MCO and rated entities, and between entities who hold ratings from MIS and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted annually at www.moody.com under the heading "Investor Relations — Corporate Governance — Director and Shareholder Affiliation Policy."

Additional terms for Australia only: Any publication into Australia of this document is pursuant to the Australian Financial Services License of MOODY'S affiliate, Moody's Investors Service Pty Limited ABN 61 003 399 657 AFSL 336969 and/or Moody's Analytics Australia Pty Ltd ABN 94 105 136 972 AFSL 383569 (as applicable). This document is intended to be provided only to "wholesale clients" within the meaning of section 761G of the Corporations Act 2001. By continuing to access this document from within Australia, you represent to MOODY'S that you are, or are accessing the document as a representative of, a "wholesale client" and that neither you nor the entity you represent will directly or indirectly disseminate this document or its contents to "retail clients" within the meaning of section 761G of the Corporations Act 2001. MOODY'S credit rating is an opinion as to the creditworthiness of a debt obligation of the issuer, not on the equity securities of the issuer or any form of security that is available to retail investors. It would be reckless and inappropriate for retail investors to use MOODY'S credit ratings or publications when making an investment decision. If in doubt you should contact your financial or other professional adviser.

Additional terms for Japan only: Moody's Japan K.K. ("MJKK") is a wholly-owned credit rating agency subsidiary of Moody's Group Japan G.K., which is wholly-owned by Moody's Overseas Holdings Inc., a wholly-owned subsidiary of MCO. Moody's SF Japan K.K. ("MSFJ") is a wholly-owned credit rating agency subsidiary of MJKK. MSFJ is not a Nationally Recognized Statistical Rating Organization ("NRSRO"). Therefore, credit ratings assigned by MSFJ are Non-NRSRO Credit Ratings. Non-NRSRO Credit Ratings are assigned by an entity that is not a NRSRO and, consequently, the rated obligation will not qualify for certain types of treatment under U.S. laws. MJKK and MSFJ are credit rating agencies registered with the Japan Financial Services Agency and their registration numbers are FSA Commissioner (Ratings) No. 2 and 3 respectively.

MJKK or MSFJ (as applicable) hereby disclose that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by MJKK or MSFJ (as applicable) have, prior to assignment of any rating, agreed to pay to MJKK or MSFJ (as applicable) for appraisal and rating services rendered by it fees ranging from JPY200,000 to approximately JPY350,000,000.

MJKK and MSFJ also maintain policies and procedures to address Japanese regulatory requirements.