

CECL – Using a Reasonable and Supportable Forecast

July 2019

Speakers



Chris Henkel

*Senior Director,
Enterprise Risk Solutions*

Moody's Analytics



Robby Holditch

*Director, Regulatory and
Accounting Solutions*

Moody's Analytics



Sohini Chowdhury

*Director, Regulatory and
Accounting Solutions*

Moody's Analytics

Today's Discussion Points

- » CECL Overview: What's Changing?
- » Recent Updates: Real-life Impact
- » Estimating Expected Credit Losses (“ECL”): A Refresher
- » Understanding and Defending Your Reasonable and Supportable Forecast
- » Concluding Remarks and Q&A

1

CECL Overview

What is CECL

FASB, ASU No. 2016-13, June 2016
Financial Instruments—Credit Losses (Topic 326)



CECL means CURRENT EXPECTED CREDIT LOSS Lifetime loss estimate from origination which replaces “incurred loss” model, where:

“The measurement of expected credit losses is based on relevant information about ***past events, including historical experience, current conditions, and reasonable and supportable forecasts*** that affect the collectability of the reported amount. An entity must use judgment in determining the relevant information and estimation methods that are appropriate in its circumstances.”

Changes under CECL

Applies to all banks, savings associations, credit unions

- » **Scope: financial instruments measured at amortized cost basis**
 - Loans held for investment
 - Debt securities held to maturity
 - Debt securities available for sale*
 - Off balance sheet exposures (Loan commitments, Letters of Credit)
- » **Measure expected credit losses over the life of financial asset based on:**
 - Past events, including historical experience
 - Current conditions
 - Reasonable and supportable forecasts
- » **New and changing GAAP Disclosure requirements: amortized cost by credit quality indicators and vintage, collateral dependent loans and PCD disclosure**

* Credit losses are recorded through the allowance and can be reversed. Allowance is subject to FV floor. Holding gain/loss – OCI. AFS security's Am Cost is written down to FV only if Am Cost < FV and the institution intends to sell or more than likely will be required to sell.

Summary

Your CECL Formula =



*326-20-30-9 - An entity is not required to develop forecasts over the contractual term of the financial asset or group of financial assets. Rather, for periods beyond which the entity is able to make or obtain reasonable and supportable forecasts of expected credit losses, an entity shall revert to historical loss information.

Defining What is Acceptable...

There are a few elements that are required to be incorporated when using any methods...

- » Historical Information
- » Current conditions
- » Reasonable & Supportable Forecast
- » Reversion to long term averages
- » Expert Judgement

326-20-30-9 An entity shall not rely solely on past events to estimate expected credit losses.... When an entity uses historical loss information, **it shall consider the need to adjust historical information to reflect the extent to which management expects reasonable and supportable forecast**.....The adjustments to historical loss information may be qualitative in nature and should reflect changes related to relevant data

326-20-30-9 Con't..... Some entities may be able to develop reasonable and supportable forecasts over the contractual term of the financial asset or a group of financial assets. However, an entity is not required to develop forecasts over the contractual term of the financial asset or group of financial assets. Rather, for periods beyond which the entity is able to make or obtain reasonable and supportable forecasts of expected credit losses, an entity shall revert to historical loss information

New disclosure requirements!



326-20-50-11 An entity shall disclose all of the following by portfolio segment and major security type:

- a) A description of how expected loss estimates are developed
- b) A description of the entity's accounting policies and methodology to estimate the allowance for credit losses, as well as a discussion of the factors that influenced management's current estimate of expected losses, including:
 - 1) Past Events
 - 2) Current Conditions
 - 3) **REASONABLE AND SUPPORTABLE FORECAST**

...as CECL nears, look for new and changed disclosures from FASB, SEC, and regulatory bodies...

From AICPA Banking Conference 2018

“ CECL is sensibly designed...” ”

Prepares need to present economic assumption,
perhaps in a tabular format....

SEC Remarks at the 2018 AICPA Banking Conference

Economic Assumption Tabular Example

U.S. MACRO BASELINE FORECAST SUMMARY										
	Units	18Q3	18Q4	19Q1	19Q2	2018	2019	2020	2021	2022
Gross Domestic Product	bcw\$	18,676.2	18,834.8	18,956.5	19,060.6	18,585.5	19,087.8	19,256.7	19,697.1	20,198.2
Change	%AR	3.7	3.4	2.6	2.2	3.0	2.7	0.9	2.3	2.5
Federal Budget	\$ bil	-198.5	-302.7	-346.9	-34.5	-883.4	-1,125.9	-1,460.5	-1,540.6	-1,647.4
Total Employment	mil	149.3	149.9	150.5	150.9	149.0	151.1	151.6	151.6	152.9
Change	%AR	1.5	1.8	1.5	1.1	1.6	1.4	0.3	-0.0	0.9
Unemployment Rate	%	3.8	3.7	3.5	3.4	3.9	3.4	3.9	4.7	4.9
Light Vehicle Sales	mil, SAAR	17.0	17.0	17.1	17.0	17.1	16.8	16.0	16.8	18.0
Residential Housing Starts	mil, SAAR	1.33	1.43	1.50	1.57	1.34	1.57	1.58	1.77	1.93
Median Existing-Home Price	\$ ths	261.9	264.1	265.7	267.3	260.5	268.1	276.0	286.3	298.0
Change	%YA	5.4	4.6	3.3	3.3	5.1	2.9	2.9	3.7	4.1
Consumer Price Index	%AR	2.8	2.4	2.6	2.6	2.6	2.5	2.3	2.3	2.2
Federal Funds Rate	%	2.0	2.3	2.7	3.0	1.9	3.1	3.5	3.3	2.8
Treasury Yield: 10-Yr Bond	%	3.08	3.21	3.37	3.48	2.99	3.50	3.60	3.93	4.29
Baa Corp. - 10-Yr Treasury	DIFF	2.1	2.5	2.5	2.5	2.0	2.5	2.6	2.4	2.3
Corporate Profits With IVA & CCA	\$ bil	2,189.8	2,217.5	2,235.0	2,248.5	2,191.5	2,261.8	2,346.5	2,563.0	2,697.0
Change	%YA	4.2	3.1	2.6	3.1	4.4	3.2	3.7	9.2	5.2
S&P 500	1941=10	2,756.2	2,754.7	2,705.3	2,633.2	2,736.7	2,579.9	2,502.5	2,737.2	2,932.2
Change	%YA	11.7	5.7	-1.0	-2.6	11.8	-5.7	-3.0	9.4	7.1

Moody's Example

2

Recent Updates

Potential Timeline Changes

- » There are currently 4 initiatives underway that could alter the timeline for the implementation of CECL. All 4 are being actively monitored but could yield changes to the implications of the new standard.
- » Those in House and Senate are in committee and require committee chairs to agree to put them on the agenda
- » Current feeling is that the House Finance committee chair (Rep. Waters D-CA) does not have an appetite to take this on.
- » Potential motivating factors are emerging:
 - » House bill has bi-partisan support and may be used to showcase this
 - » There are similar bills in both the House and Senate
- » FASB has introduced through their Private Company Council a possible compromise that would push back the effective date for 1/1/2021 filers to 1/1/2022 (coincides with credit unions, non-profits, and small banks).

Issuer	Legislation	Summary	Status
FASB	Private Company Council (PCC) proposal for effective date changes Introduced: June 2019	The PCC within the FASB is considering a change within it's standard issuance process that would make the effective date on new guidance a standard 2 years after public companies.	The implication is that this would push the non-SEC filing PBE's (many mid-sized banks) to a 1/1/2022 effective date for CECL from the current 1/1/2021. Possible change was well accepted by the FASB and is being discussed further.
US Senate	Continued Encouragement for Consumer Lending Act (S. 1564) Introduced: May 2019	AKA the 'Stop and Study' bill would require FASB to halt implementation of CECL and conduct a quantitative study to determine the standard's impact	Introduced in the Senate by Thom Tillis (R-NC). Referred to Committee on Banking, Housing and Urban Affairs.
US House of Representatives	CECL Consumer Impact and Study Bill of 2019 (H.R. 3182) Introduced: June 2019	Similar parameters to Senate bill requiring a halt to implementation of CECL until further study can be done.	Introduced by Rep. Gonzalez (D-TX). Moved to Committees (Financial Services and Agriculture).
US House of Representatives	Prohibit regulators from requiring CECL compliance (H.R. 7394) Introduced: Dec. 2018	Directly from bill: "To prohibit the Federal financial regulators from requiring compliance with the accounting standards update of the Financial Accounting Standards Board related to current expected credit loss ("CECL")..." Bill includes SEC from requiring compliance.	Introduced by Rep. Luetkemeyer (R-MO). Moved to Committees (Financial Services and Agriculture).

Regulatory Capital Changes

NR 2018-142
FOR IMMEDIATE RELEASE
December 21, 2018

Agencies Allow Three-Year Regulatory Capital Phase In for New Current Expected Credit Losses (CECL) Accounting Standard

The federal bank regulatory agencies approved a final rule modifying their regulatory capital rules and providing an option to phase in over a period of three years the day-one regulatory capital effects of the update to the accounting standard known as the “Current Expected Credit Losses” (CECL) methodology. The final rule also revises the agencies’ other rules to reflect the update to the accounting standards.



Proposed changes to Call Report FFIEC 031, 041 & 051

Draft Reporting Form Call Report Revisions Proposed

This draft reporting form reflects revisions addressing the revised accounting for credit losses under the Financial Accounting Standards Board's Accounting Standards Update No. 2016-13, "Financial Instruments – Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments"

- 1) April 2019 Proposed Call Report Revisions for the Community Bank Leverage Ratio to RC-R
- 2) September 2018 Proposed Call Report Revisions to RI-B & RI-C



3

Estimating Expected Credit Losses (“ECL”): A Refresher

Common Credit Loss Estimate Methodologies

» Loss Rate

- Pool/cohort approach
- Rating and loan type
- “WARM” method

» Probability of Default (“PD”) and Loss Given Default (“LGD”)

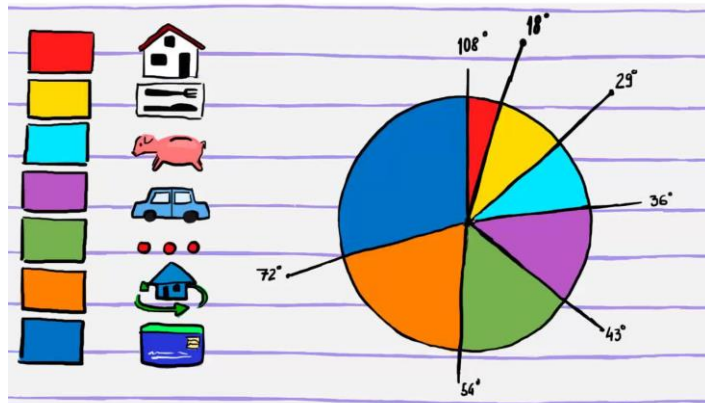
- Mapping internal ratings to agency ratings
- Use internal rating distribution and a central tendency of default
 - › Improve granularity with a PD (LGD) model
- Build or buy PD/LGD scorecards as part of a “dual risk ratings” framework

An institution may apply different estimation methods to different groups of financial assets. However, to properly apply an acceptable estimation method, an institution’s credit loss estimates must be well supported

Solving the Data Problem

A sensible way to think about it...

How should I segment my portfolio?



Which methodologies are appropriate?




Where can I find the data I need?



Regardless of the approach, you will need three types of data to derive CECL estimates

1. Data that captures the segment/pool's historical loss experience
2. Data for adjusting historical loss data to reflect the current credit environment on instruments in the segment/pool
3. Data for incorporating the impact of economic forecasts on instruments in the segment/pool



Data can be used to model ECL quantitatively or to support qualitative adjustments

You may also require data to support prepayments and other assumptions

Loss Rate Method Example

A group of loans have an amortized cost of \$5M at the end of 2015.

Year	Amortized Cost	Average Balance	Observed NCOs
2015	\$ 5,000		
2016	\$ 5,500	\$ 5,250	\$ 20
2017	\$ 6,000	\$ 5,750	\$ 50
2018	\$ 6,500	\$ 6,250	\$ 40
2019	\$ 7,000	\$ 6,750	\$ 30
2020	\$ 7,500	\$ 7,250	\$ 50

2015 Pool's Cumulative NCOs	\$	190
Lifetime Historical NCO (unadjusted)		3.80%

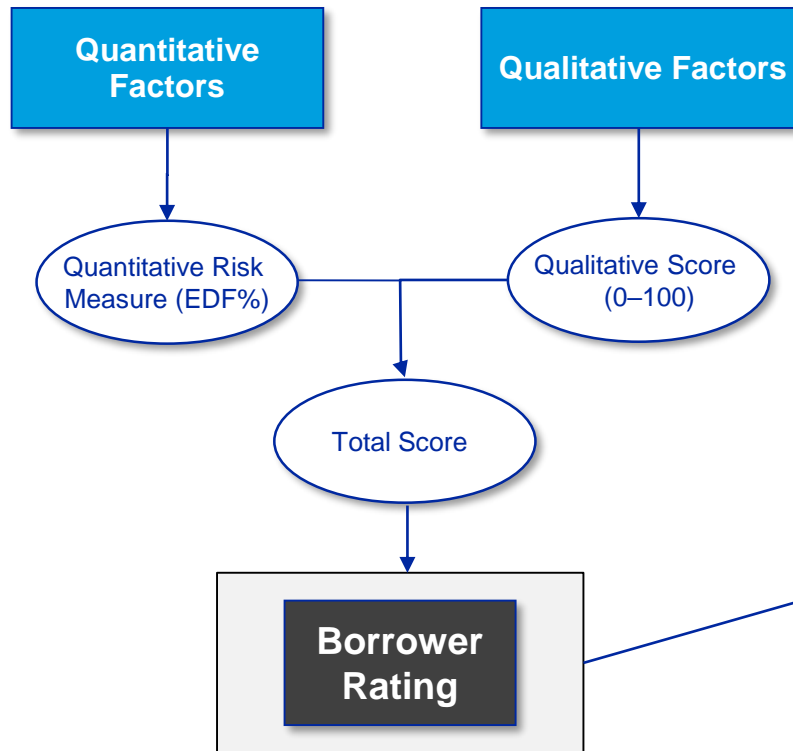
During 2016-2020, \$190K of the \$5M are charged off (includes recoveries), resulting in a cumulative loss rate of 3.80%.

Qualitative Adjustment	0.25%
Total ACL (%) as of 2020	4.05%
Total ACL (\$) as of 2020	\$ 304

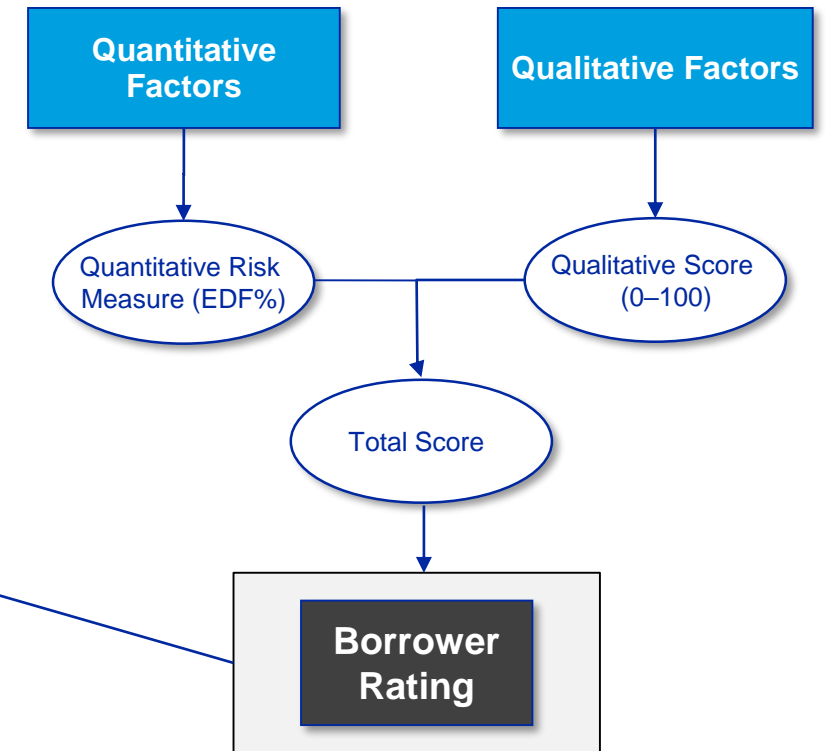
After qualitatively adjusting for the effects of current conditions and economic forecasts, we arrive at a cumulative loss rate of 4.05% to be applied to the amortized cost of the pool at the end of 2020 – resulting in an allowance of \$304k. .

PD and LGD Method

Commercial Real Estate Loan



Commercial & Industrial Loan



Master Rating Scale

Rating Grade	PD (1 Year)	Rating Grade
1	0.08%	1
2	0.14%	2
3	0.25%	3
4	0.43%	4
5	0.75%	5
6	1.31%	6
7	2.30%	7
8	4.02%	8
9	7.04%	9
10	12.31%	10
...

What information would be required?

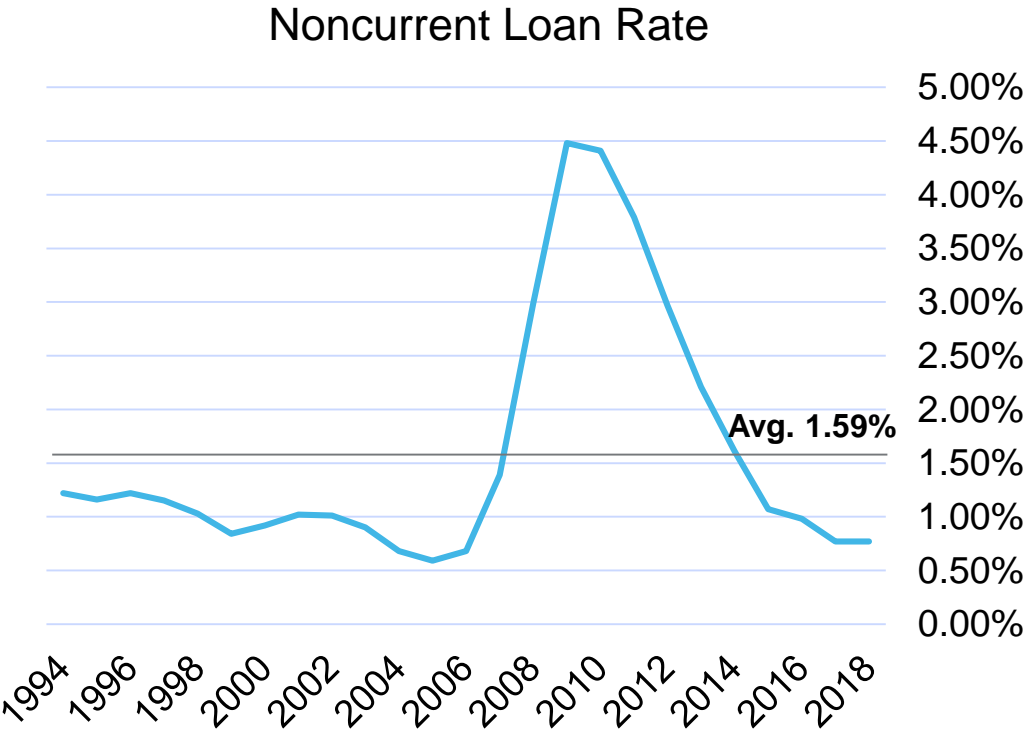
Consistent grades across the entire loan portfolio

Example of a PD and LGD Rating Scale

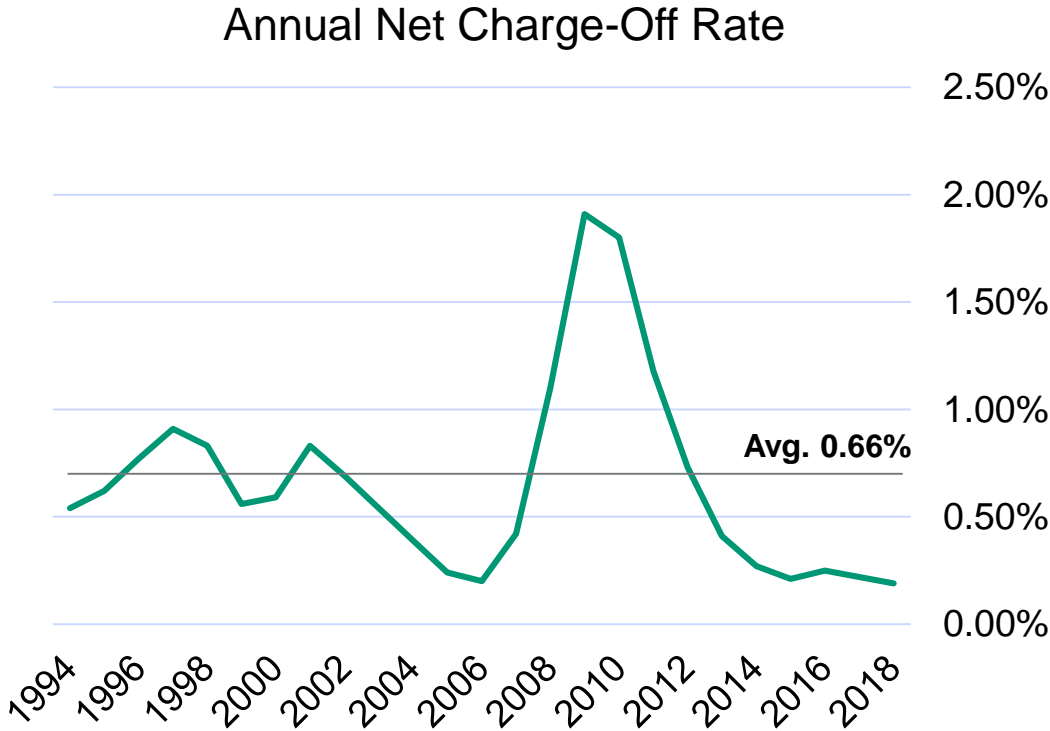
		A	B	C	D	E	F	G
		5%	15%	20%	25%	35%	45%	55%
1 Pass	0.08%	0.00%	0.01%	0.02%	0.02%	0.03%	0.04%	0.04%
2 Pass	0.14%	0.01%	0.02%	0.03%	0.04%	0.05%	0.06%	0.08%
3 Pass	0.25%	0.01%	0.04%	0.05%	0.06%	0.09%	0.11%	0.13%
4 Pass	0.43%	0.02%	0.06%	0.09%	0.11%	0.15%	0.19%	0.24%
5 Pass	0.75%	0.04%	0.11%	0.15%	0.19%	0.26%	0.34%	0.41%
6 Pass	1.31%	0.07%	0.20%	0.26%	0.33%	0.46%	0.59%	0.72%
7 Pass	2.30%	0.11%	0.34%	0.46%	0.57%	0.80%	1.03%	1.26%
8 Pass	4.02%	0.20%	0.60%	0.80%	1.01%	1.41%	1.81%	2.21%
9 Pass	7.04%	0.35%	1.06%	1.41%	1.76%	2.46%	3.17%	3.87%
10 OAEM	12.31%	0.62%	1.85%	2.46%	3.08%	4.31%	5.54%	6.77%
11 Substandard - A	20.00%	1.00%	3.00%	4.00%	5.00%	7.00%	9.00%	11.00%
12 Substandard - NA	35.00%	1.75%	5.25%	7.00%	8.75%	12.25%	15.75%	19.25%
13 Doubtful	50.00%	2.50%	7.50%	10.00%	12.50%	17.50%	22.50%	27.50%
14 Loss	100.00%	5.00%	15.00%	20.00%	25.00%	35.00%	45.00%	55.00%

Asset Quality Statistics

Noncurrent loans are well below the long-run average...



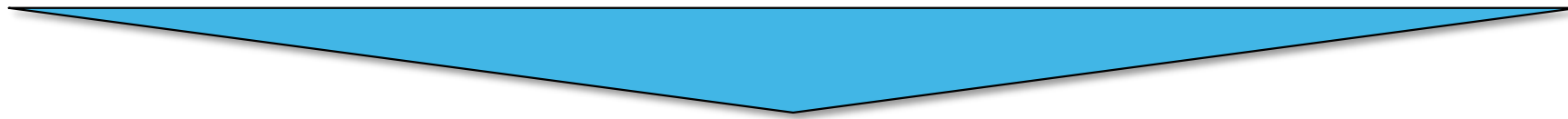
...therefore so are the amount of loans being charged



Source: FDIC (all insured institutions \$1B to \$10B in total assets)

Food for thought...

It is acceptable to adjust historical loss information for current conditions and the reasonable and supportable forecasts through a qualitative approach rather than a quantitative approach...but is it really easier?



Small changes to “Q Factor” assumptions may result in large changes to credit loss provisions, potentially inviting greater scrutiny from auditors, examiners, and bank board members.

4

Understanding and Defending “Reasonable and Supportable” (R&S) Forecasts

CECL Forecasting Requirements

*“The measurement of expected credit losses is based on relevant information about past events, including **historical experience**, **current conditions**, and **reasonable and supportable forecasts** that affect the collectability of the reported amount. An entity must use judgment in determining the relevant information and estimation methods that are appropriate in its circumstances.”*

Source: Page 3, Financial Instruments—Credit Losses (Topic 326), FASB, No. 2016-13, June 2016


3 Ways of Satisfying the R&S Requirement

1. Reversion in inputs

Revert to unadjusted historical average economic values

2. Reversion in outputs

Revert to unadjusted historical average losses



R&S period < life of the loan

3. Lifetime R&S

R&S period = life of the loan

How to Incorporate Economic Forecasts in CECL?

CECL does NOT require a specific approach

- ✓ Qualitatively leveraging the forecasts acceptable for smaller institutions
- ✓ No strict rules on number of scenarios, weights etc. But,
 - Using multiple scenarios mitigates the uncertainty from a single forecast
 - Controls for the non-linearity in credit losses
 - Provides guidance regarding sensitivity of losses to economic slowdown/downturn

R&S Shorter than Life of the Loan

Elect an R&S period, a reversion period and a reversion technique.
Reversion to unadjusted historical averages can be –

1. IN INPUTS

Over R&S period = Economic forecasts using the model

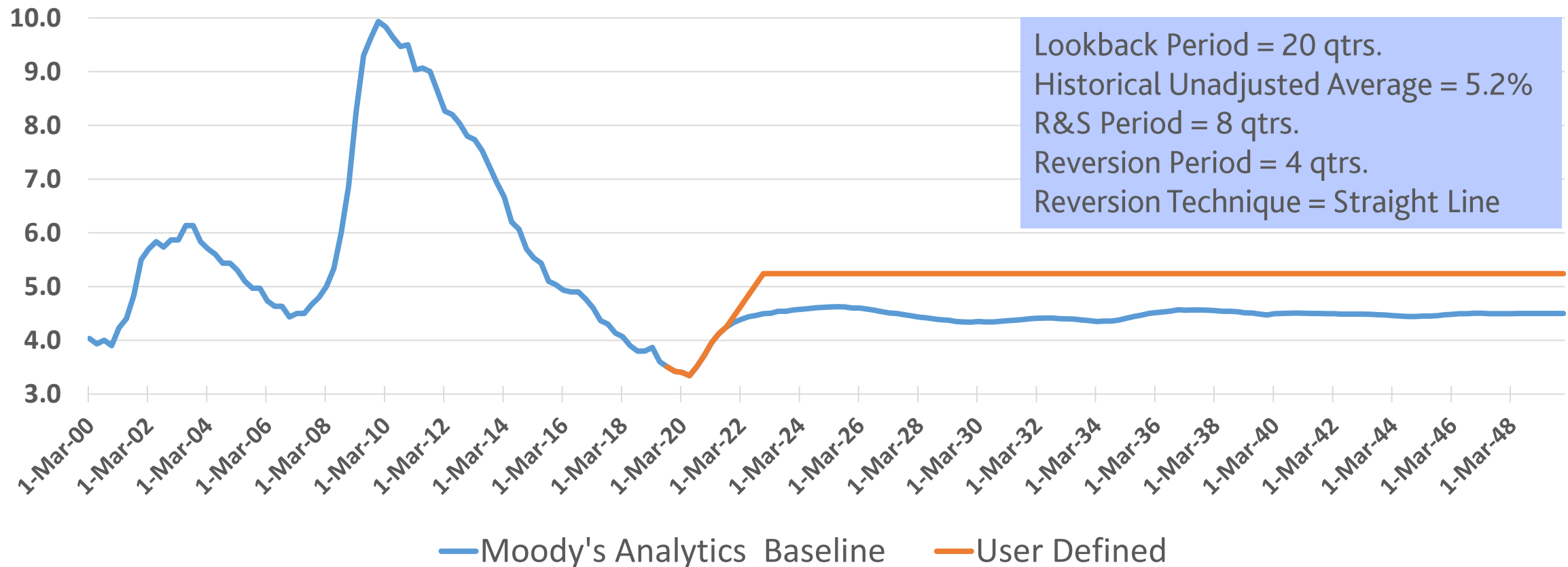
Over reversion period = Economic forecasts artificially revert to **unadjusted** historical averages

After reversion period until the end of life = Economic forecasts set equal to **unadjusted** historical averages

Estimate lifetime loss using this economic forecast as input into credit loss model

Input Reversion Example

Unemployment rate, %, US



R&S Shorter than Life of the Loan

2. IN OUTPUTS

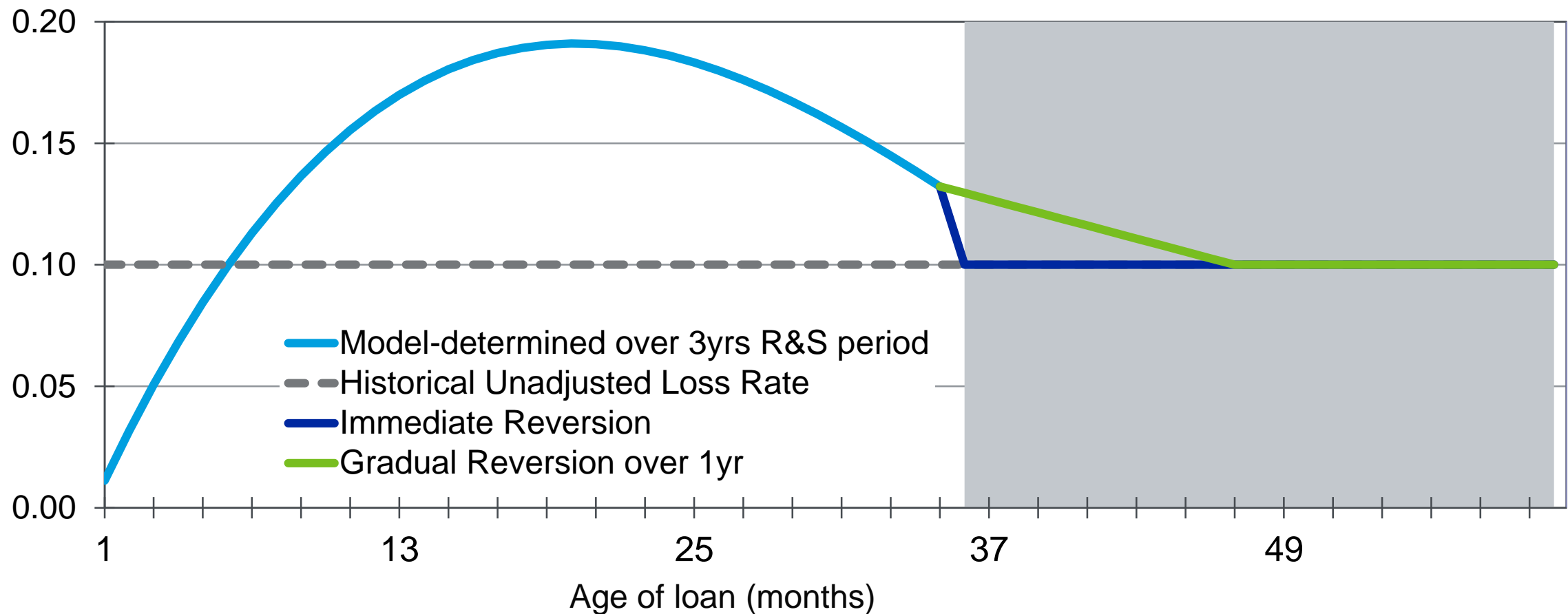
Over R&S period = Credit loss and economic forecasts using the model

Over reversion period = Credit losses artificially revert to some **unadjusted** historical average

After reversion period until the end of life = Credit losses set equal to **unadjusted** historical averages

Output Reversion Example

Monthly Loss Rate, %



For illustration purposes only

R&S = Life of the Loan

3. LIFETIME R&S

Possible only if BOTH a) and b) are satisfied

- a) Economic forecasts are R&S over the life of the loan ★
- b) Credit loss models produce reasonable estimates of losses over the life of the loan

What Makes an Economic Forecast R&S over Lifetime?

It is produced by a **model** which:

- ☑ is based on **sound, generally accepted economic theory**
- ☑ incorporates **inter-relationships and feedback effects**
 - a shock to one factor impacts all other factors over time
- ☑ considers a **range of possible outcomes**
- ☑ provides info at varying **levels of geography** & captures **local economic effects**
- ☑ utilizes a **rigorous, auditable process** for data and forecasting

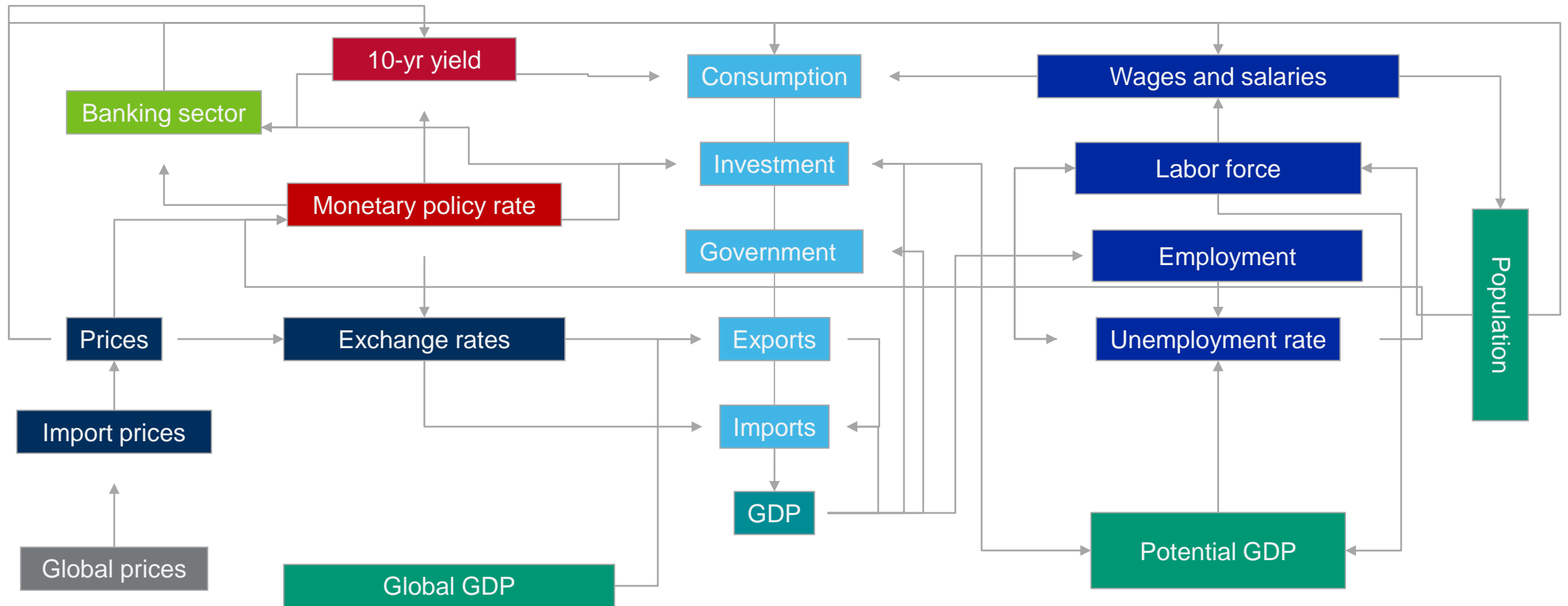
AND...

Converges to historical trends in the long run

Moody's Economic Forecasts are R&S over Lifetime!!

Structural Forecast Model: Set of Interlinked Equations

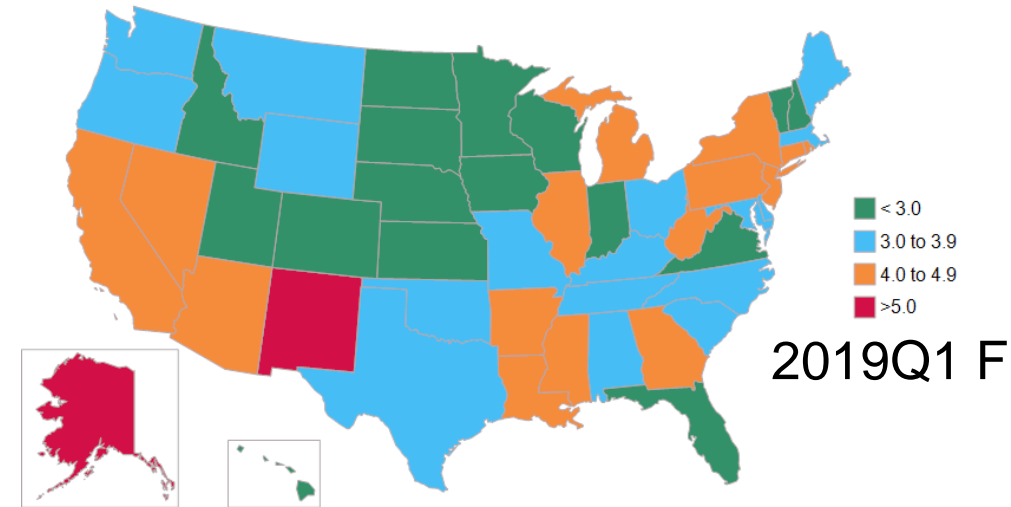
The approach used by Federal Reserve, IMF, Central Banks, and Moody's Analytics



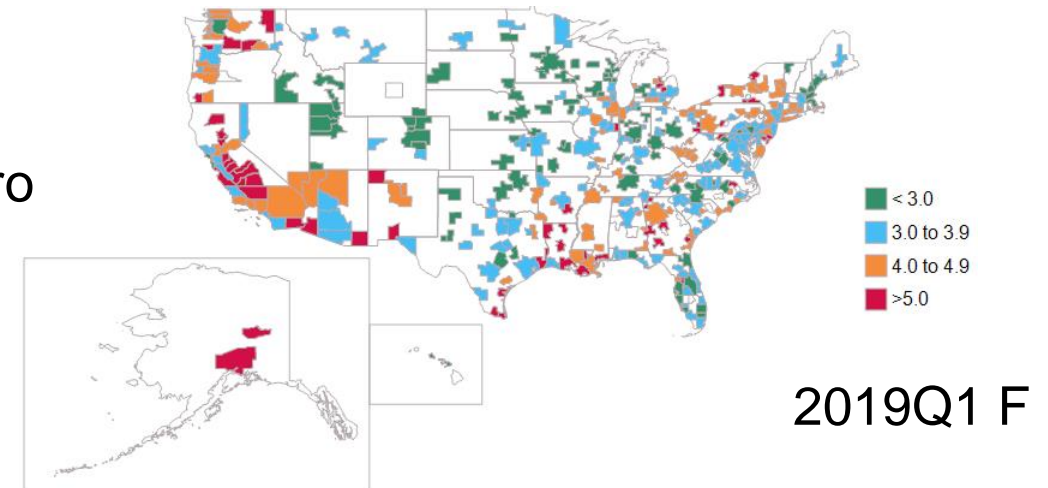
Integrated National, State, and Metro-level Forecasts



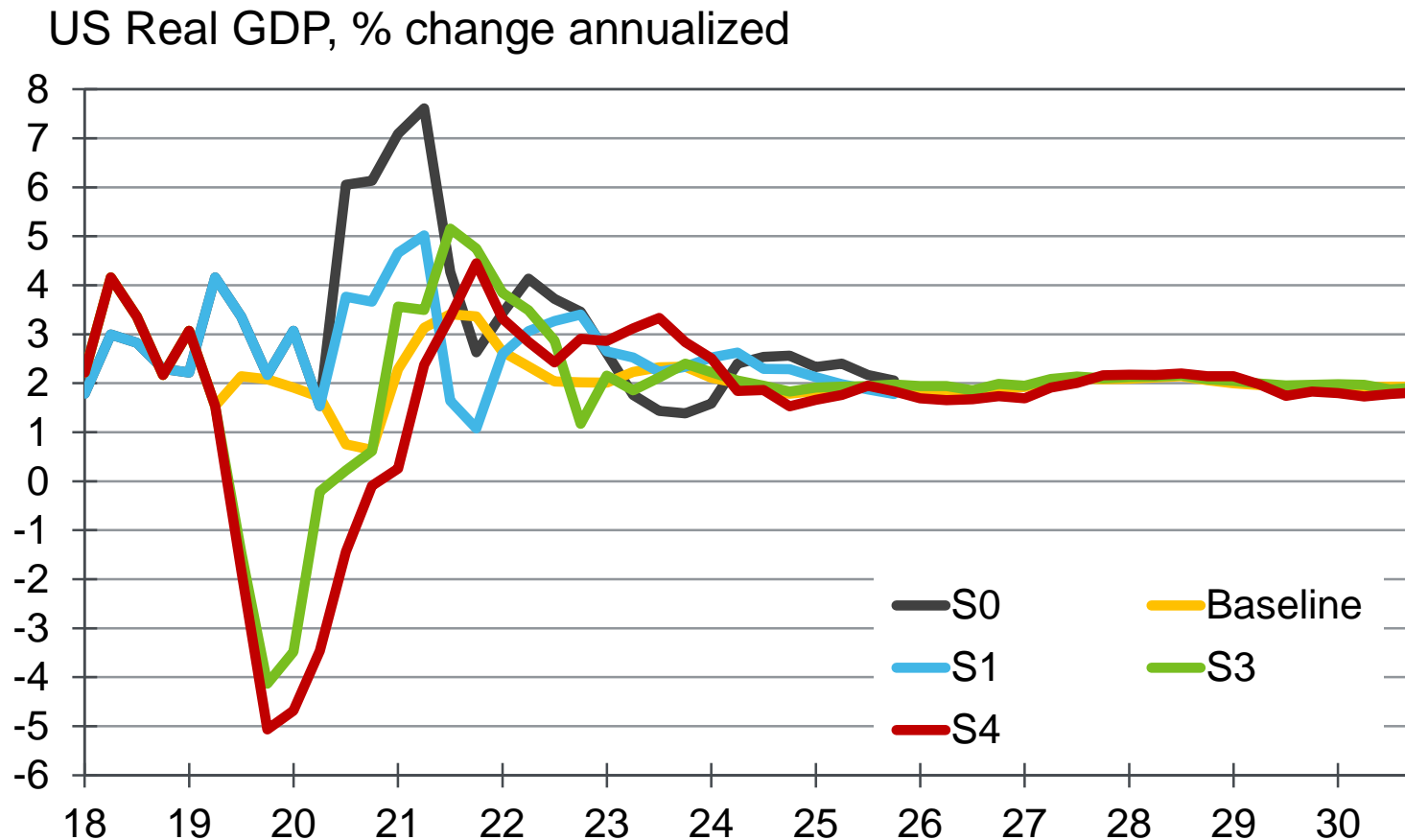
State



Metro



Moody's Forecasts Cover a Range of Possible Outcomes



Source: Moody's Analytics

Scenario Inventory

- BL Baseline Forecast (50th pctile)
- CB Consensus Baseline
- S0 Strong Upside (4th pctile)
- S1 Stronger Near-Term Growth (10th pctile)
- S2 Slower Near-Term Growth (75th pctile)
- S3 Moderate Recession (90th pctile)
- S4 Protracted Slump (96th pctile)
- S5 Below-Trend Long-Term Growth
- S6 Stagflation
- S7 Next-Cycle Recession
- S8 Low Oil Price
- CS Constant Severity
- CB Consensus Baseline

- FB Fed Baseline
- FA Fed Adverse
- FS Severely Adverse Scenario
- BC Bank-Specific Scenario

Which R&S Approach Should You Use?

Each has its pros and cons

R&S Approach	PROS	CONS
Reversion in Inputs or Outputs (R&S period < life of loan)	<ul style="list-style-type: none">– Need economic forecast only through R&S period– Need credit loss model to produce defensible forecasts only through R&S period	<ul style="list-style-type: none">– Have to defend choice of R&S period– Have to defend choice of lookback period used for calculating unadjusted historical averages– In output reversion, portfolio-specific lookback period will be harder to defend– Harder to validate and monitor– Input reversion might underestimate provisions
Lifetime R&S	<ul style="list-style-type: none">– Easier to interpret, monitor and validate a forecast coming out of a single model– Convergence is to a historical trend which is intuitive and model-determined	<ul style="list-style-type: none">– Might underestimate provisions in certain cases– Requires economic forecasts which are R&S through life of the loan– Requires credit loss models which produce valid results through life of the loan

5

Concluding Remarks and Q&A

ANY
QUESTIONS
?

Globally and locally acknowledged for award-winning tools to measure and manage risk.



CECL Technology
Category Leader



Balance Sheet
Management Technology
Category Leader



Compliance Risk Technology
Implementation of the Year
and Credit Risk Technology
Implementation of the Year



CLO Data Provider of
the Year



Innovation in Customer Service -
Financial Services Industries



Best ESG Solution
Best Solvency II Solution



Best Solvency II Tech
Solutions Category
Winner



Technology Vendor of
the Year



Stress Testing Product of the Year
Category Winner
Economic Scenario Generation
Product of the Year Category Winner
Solvency II Product of the Year
Category Winner
Regulatory Reporting Product of the
Year Category Winner



Best Buy-Side Market Surveillance
Tool Category Winner –
Structured Finance Portal



Ranked 5 out of 100
Credit Risk Category Winner
Enterprise Stress Testing
Solution Category Winner



#1 IFRS 9
#1 Asset and Liability Management
#1 Regulatory Capital Calculation
and Management



Ranked 19th in the Overall
Top 100 Rankings



Best Credit Risk Solution
Provider – RiskCalc™

Robby Holditch
Director
+1 (212) 553-2119
Robby.Holditch@moodys.com

Chris Henkel
Senior Director
+1 (212) 553
Chris.Henkel@moodys.com

For more info on Moody's Analytics solution, visit our CECL site:

<http://MoodyAnalytics.com/CECL-implementation>

© 2019 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.