

# CECL for Consumer Lending Portfolios: A Checklist

Deniz Tudor, PhD, Director, Consumer Credit Analytics  
David Fieldhouse, PhD, Director, Consumer Credit Analytics

**November 13, 2018**

# Agenda

1. Overview
2. Questions to ask to model owners
3. The case for calibration
4. Impact ratio
5. What's next?

1

Overview

# Thought Process for CECL Modeling

## Production

How quick does it need to be turnaround?  
What governance procedures should be in place?  
Do I have enough IT capacity for processing and frequent runs?

## Qualitative Adj.

How do I determine and defend reasonable and supportable horizon?  
Is management overlay allowed?

## Outcome

How do I assess model performance? How often should I?  
What kind of validation is needed for CECL?  
Are my forecasts stable?  
How to perform attribution analysis?  
Are all the stakeholders on same page on outcomes?



## Scope

Who and what is subject to CECL?  
How much should accounting to be involved in decisions?

## Inputs

Do I need my own data?  
Macroeconomic forecasts?  
What should be the granularity of my data?  
What should be the sample period?

## Methodology

Segmentations?  
What methodology is appropriate?  
Will the models have dual use?  
What drivers are needed?  
Are prepayments / delinquencies necessary?  
How to define / calculate lifetime?

# 2

## Questions to Ask To Model Owners

# Key Data Fields

## Borrower & Loan Data

(for all retail asset classes)

- » Borrower characteristics: credit history, location (state and zip code), employment status, primary/secondary income, credit quality, borrower age, debt-to-income ratio
- » Loan characteristics: origination information (date, term, balance, interest rate, scheduled payment, etc.),
- » Performance data: status, current balance, actual payment, modifications, etc.

## Securitized Loans

(for mortgage and auto)

- » Asset characteristics: product type, purchase price, occupancy/property/purpose type, current value, etc..

# LGD and EAD Data

## Loss Given Default

- » Collateral data is needed for secured products
- » Timing of recoveries is required if applying DCF method
- » Should institutions include recoveries for existing and future defaults?

## Exposure at Default

- » Future new accounts are excluded
- » Future draws on unfunded commitment are excluded if it's unconditionally cancellable (HELOCs might not be)
- » Pay-down curves of revolving products are essential

# Troubled Debt Restructurings (TDR)

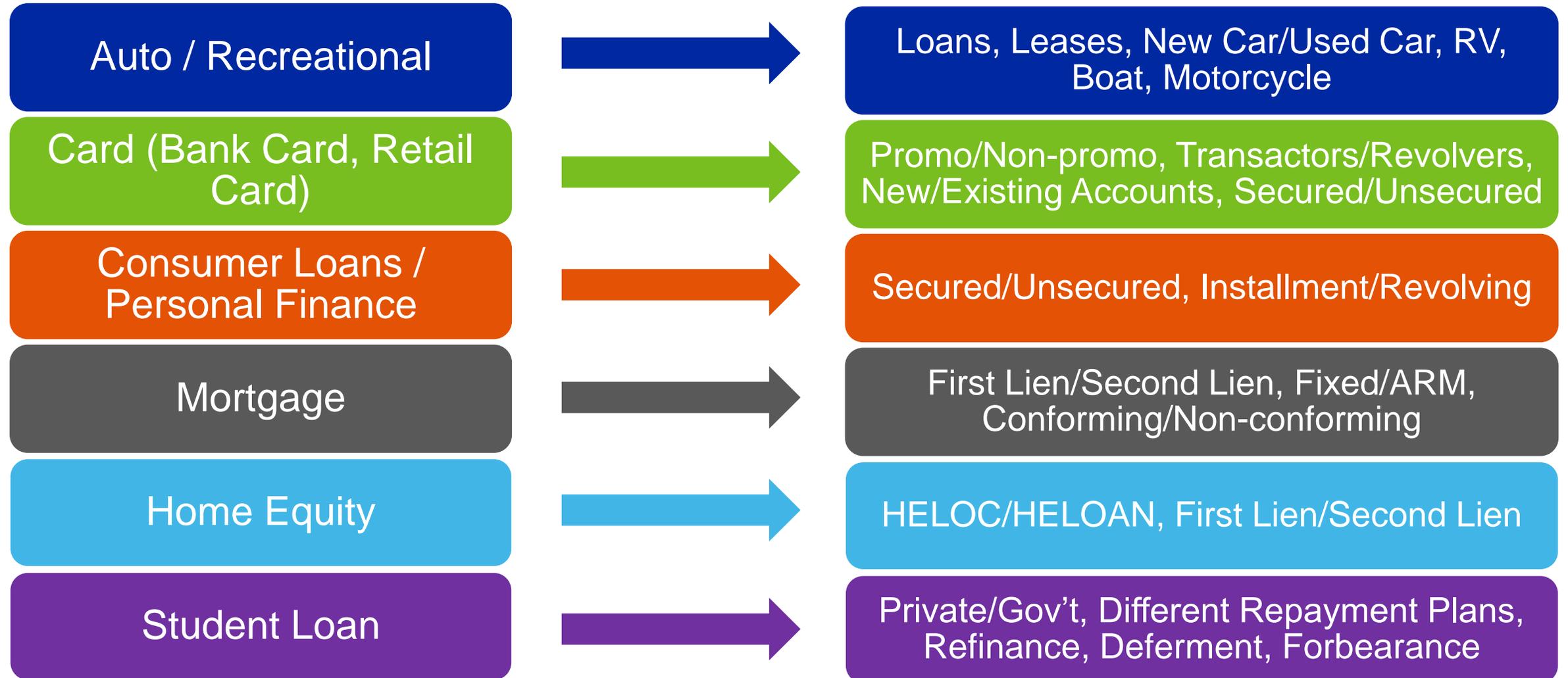
## CECL guidelines retain the concept of a TDR:

- » Do not change the criteria used to determine whether a modification of a loan constitutes a TDR.
- » Continue to require a TDR to be accounted for as a continuation of the original financial asset when identified.

## Challenges and Changes:

- » TDR impact on expected losses. Reasonably expected TDRs need to be accounted for using DCF method.
- » TDR definition is important. General institution specific policy matters.
- » Term extensions and interest rate concessions can complicate things, e.g. delaying prepayments and increasing behavioral lifetimes.
- » The EIR on a TDR can be based on the original contract.

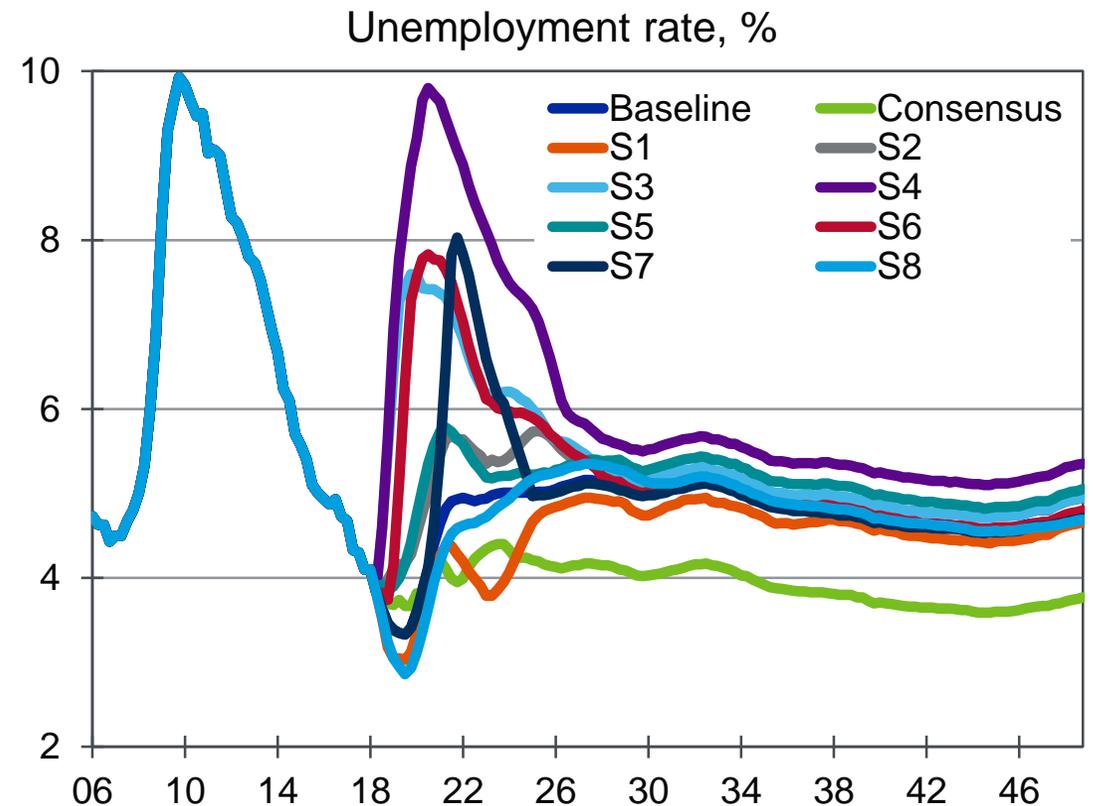
# Common Product Segmentations



# CECL Models Should Consider Current and Future Economic Conditions

Models should include national and/or regional economic variables

- » **Economic/Household Performance**  
GDP Growth, Disposable Income Growth
- » **Labor Markets**  
Unemployment, Job/Wage/Salary Growth
- » **Demographics**  
Population, Number of Households, Migrations etc.
- » **Real Estate Markets**  
Home Prices, Home Sales, Housing Starts/  
Permits
- » **Financial Markets**  
Federal Reserve Interest Rates, Equity Market  
Indexes



# Common Drivers of Credit Loss Models

for Consumer Portfolios

- » Segment
- » Life Cycle / Maturation Component
- » Vintage Quality Variables
- » Updated Credit Quality Variables\*
- » Time-Varying Macro Conditions
- » Segment × Macro Factor Interactions
- » Seasonality Dummies + Other Dummies
- » Delinquencies\*\*

\* These will be highly correlated with macro variables and can be used in lieu of them, e.g. Current LTV

\*\* Could be drivers of losses, will need data support and use can be decided based on complexity of inclusion

Bankcard Default Rate, % of Outstanding Balance



# CECL Acceptable Methodologies

FASB guidelines are not prescriptive

## Primary Methodologies

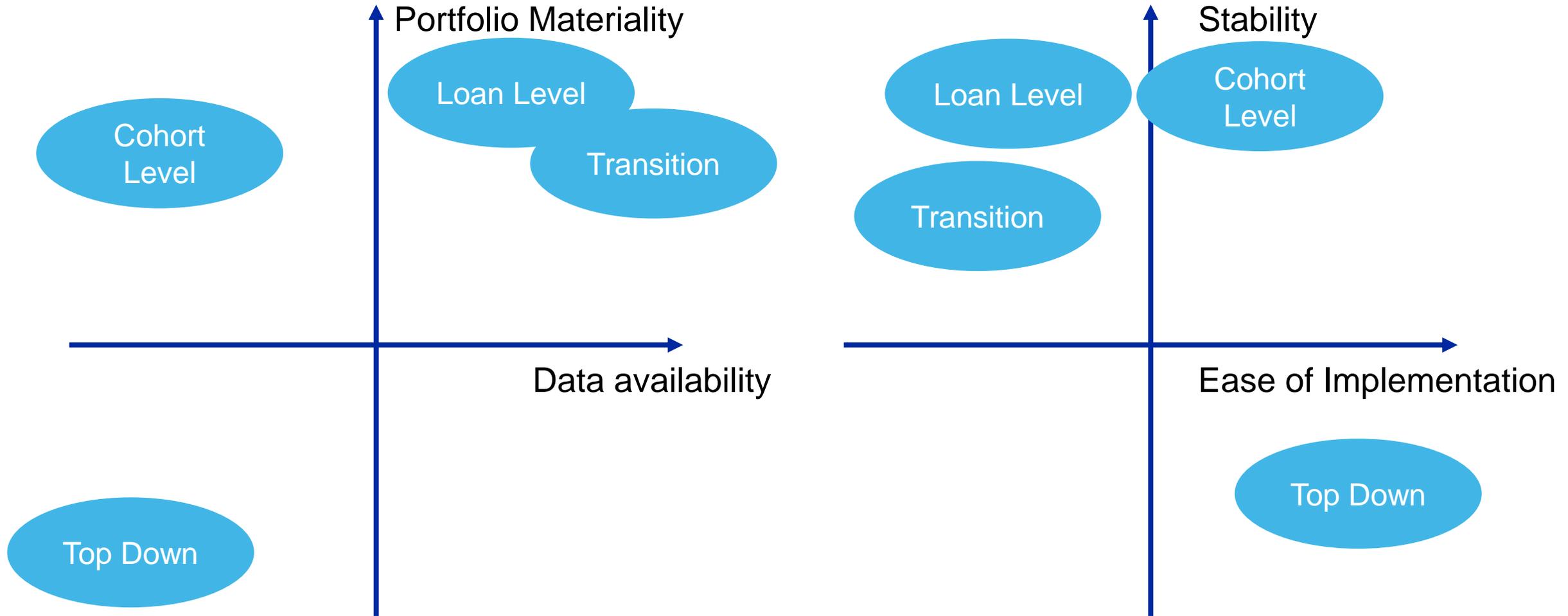
- » Loss rate method (Pool/cohort/vintage)
- » Probability of default method (Pool/cohort/vintage, loan level analysis)
- » Roll rate method (Migration analysis/Transition Matrices) (Pool or loan level analysis)
- » Discounted cash flow analysis (loan level analysis)

## Estimation Techniques

- » Model specification is defined based on features of performance metrics (binary, continuous, bounded, etc.)
- » Standard candidates include OLS, Log OLS, (multinomial) Logit, Probit, Tobit and Fractional Logit
- » Discrete time hazard models with or without competing risks
- » Markov chain credit migration
- » Machine learning

# Pros and Cons

By key factors

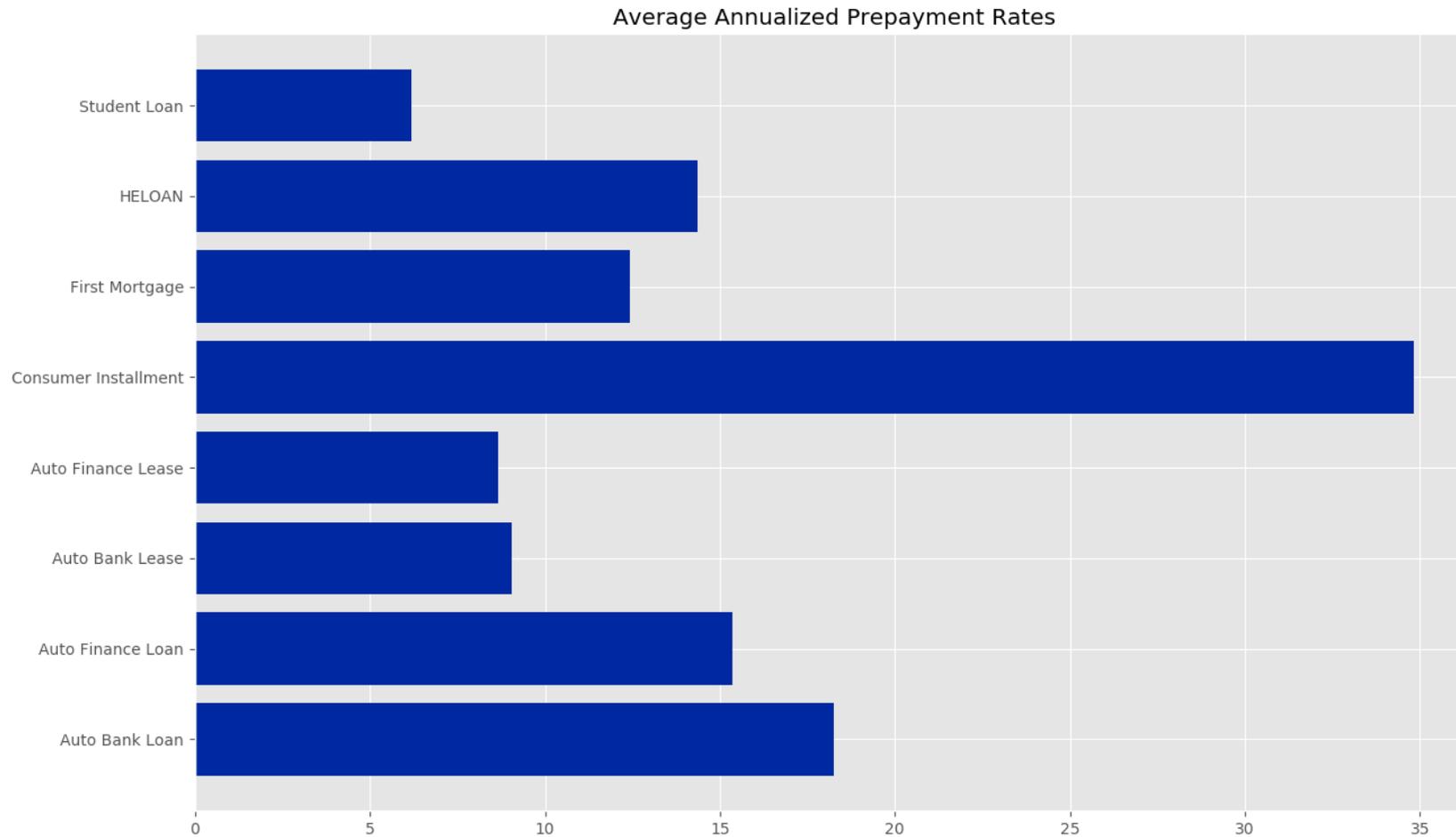


# Pros and Cons of Different Approaches

	Top-down Loss Rate	Cohort Vintage	Transition	Loan Level
Portfolio	<ul style="list-style-type: none"> <li>Only suitable for homogeneous portfolio</li> <li>Be cautious about applying to material portfolios</li> </ul>	<ul style="list-style-type: none"> <li>Can be applied to portfolio of different sizes and segments</li> </ul>		
Data requirement	<ul style="list-style-type: none"> <li>Low: historical loss rates at aggregated level + latest snapshot(s) at cohort level</li> <li>Quarterly or monthly</li> </ul>	<ul style="list-style-type: none"> <li>Medium: historical performance data at cohort level + latest snapshot at cohort level</li> <li>Quarterly or monthly</li> </ul>	<ul style="list-style-type: none"> <li>High: historical performance data at loan level + latest snapshot at loan level</li> <li>Monthly for stage transition; quarterly or monthly for score transition</li> <li>Score transition requires scores being refreshed at a frequency not lower than data frequency</li> <li>Data should be reasonably populated with minimal or no skipping or truncation issues</li> </ul>	<ul style="list-style-type: none"> <li>High: historical performance data at loan level + latest snapshot at loan level</li> <li>Quarterly or monthly</li> <li>Data should be reasonably populated with minimal or no skipping or truncation issues</li> </ul>
Estimation	<ul style="list-style-type: none"> <li>Easy to estimate</li> <li>High maintenance due to relatively low stability</li> <li>Re-estimation required if there are substantial changes in lending policy or portfolio mix</li> </ul>	<ul style="list-style-type: none"> <li>Moderate</li> <li>High stability</li> <li>RE-estimation required if pooling strategy changes</li> </ul>	<ul style="list-style-type: none"> <li>Complex</li> <li>Captures all intermediate and final stages within one framework</li> <li>Trade-off between consistency and granularity</li> </ul>	<ul style="list-style-type: none"> <li>Complex</li> <li>High stability</li> <li>Results can be assessed at account level, segment level, or portfolio level</li> </ul>
Other use cases	<ul style="list-style-type: none"> <li>Stress testing</li> </ul>	<ul style="list-style-type: none"> <li>Stress Testing, Planning</li> </ul>	<ul style="list-style-type: none"> <li>Stress testing, pricing and planning</li> </ul>	
Implementation / Production	<ul style="list-style-type: none"> <li>Easy to Moderate</li> </ul>	<ul style="list-style-type: none"> <li>Moderate</li> </ul>	<ul style="list-style-type: none"> <li>Complex</li> </ul>	
Attribution & Disclosure	<ul style="list-style-type: none"> <li>Moderate</li> <li>Attributions analysis are limited</li> <li>Disclosure pools</li> </ul>	<ul style="list-style-type: none"> <li>Complex</li> <li>Multiple runs required to track model / segment changes</li> <li>Light calibration required when modeling segmentation differs from disclosure pooling</li> </ul>	<ul style="list-style-type: none"> <li>Easy; results can be aggregated and compared at any level</li> </ul>	

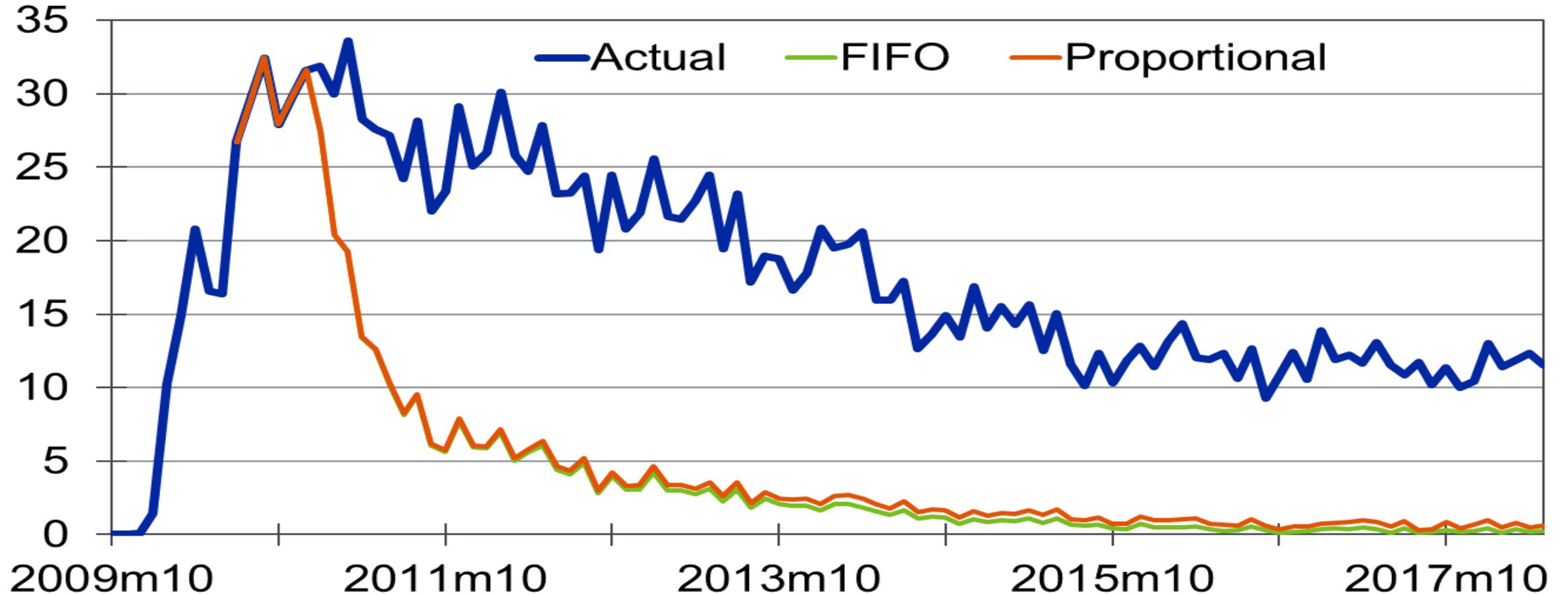
# Industry Prepayment Rates (%)

Varies by product



# CECL Credit Card Paydown Methodology

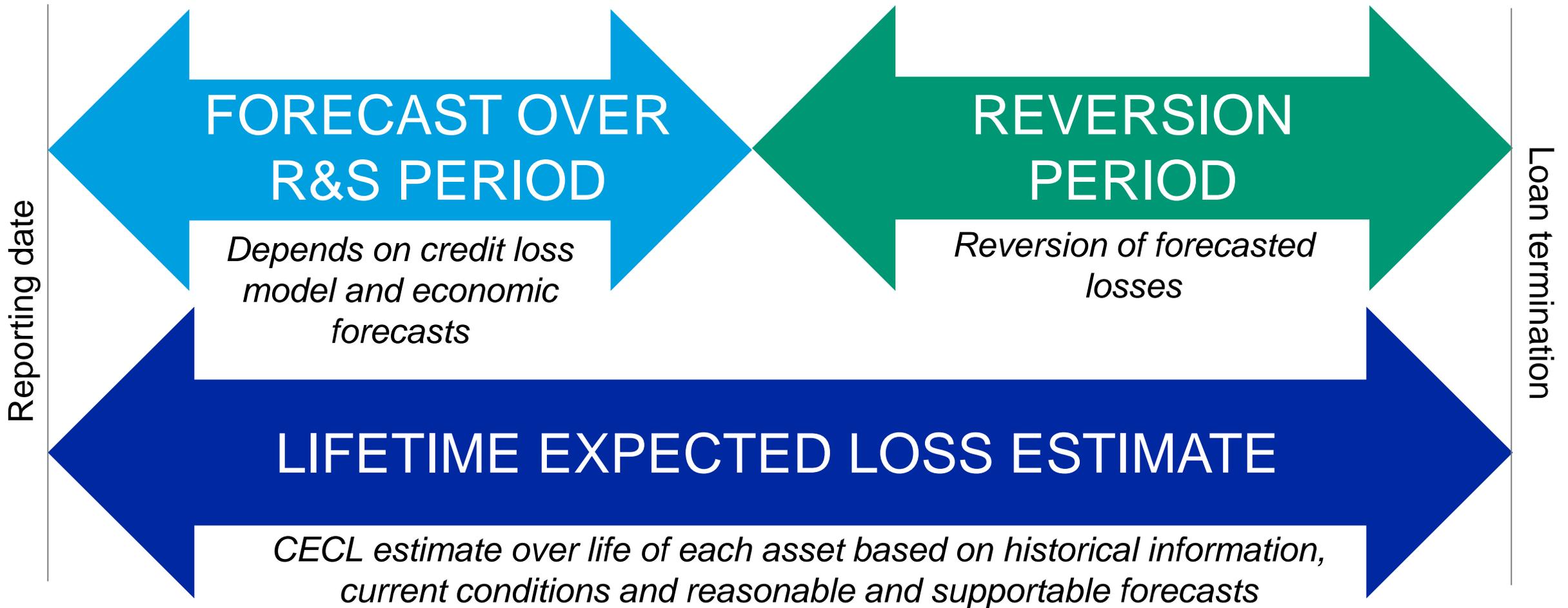
\$ mil, 09Q4 Booking and 10Q2 Balance Sheet



Sources: CFPB, Equifax, CreditForecast.com, Moody's Analytics

# What about the Forecast Horizon?

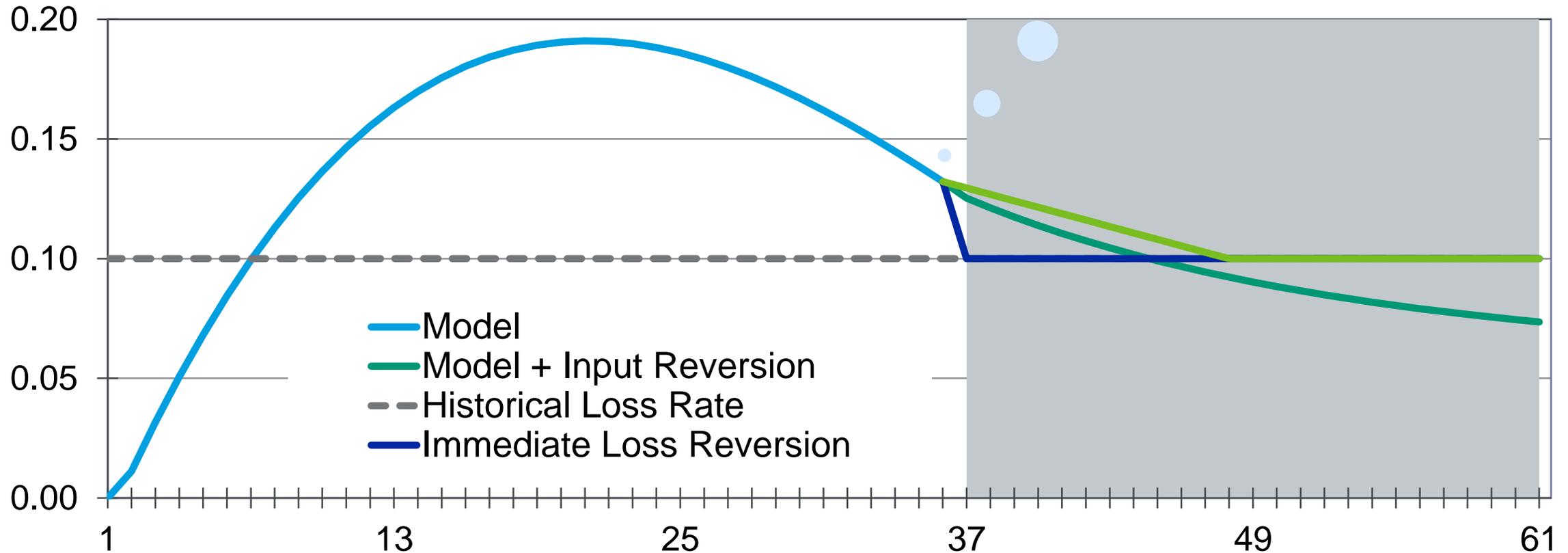
CECL requires a LIFETIME estimate composed of a forecast and reversion period



# Mean Reversion Example

Monthly Loss Rate, %

Assume credit model is reasonable and supportable for 36 months



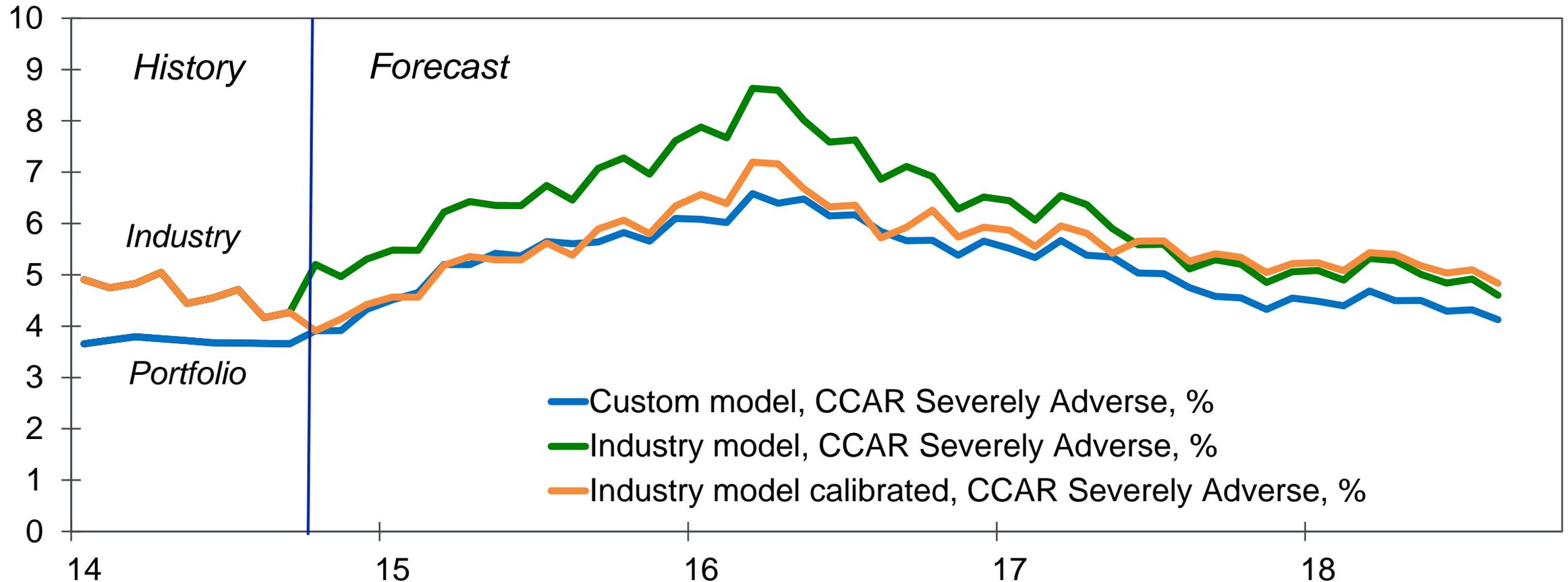
For illustration purposes only.

# 3

## The case for calibration

# Loss Forecasting Based on Industry Trends

Conditional loss rate, % of balance, annualized

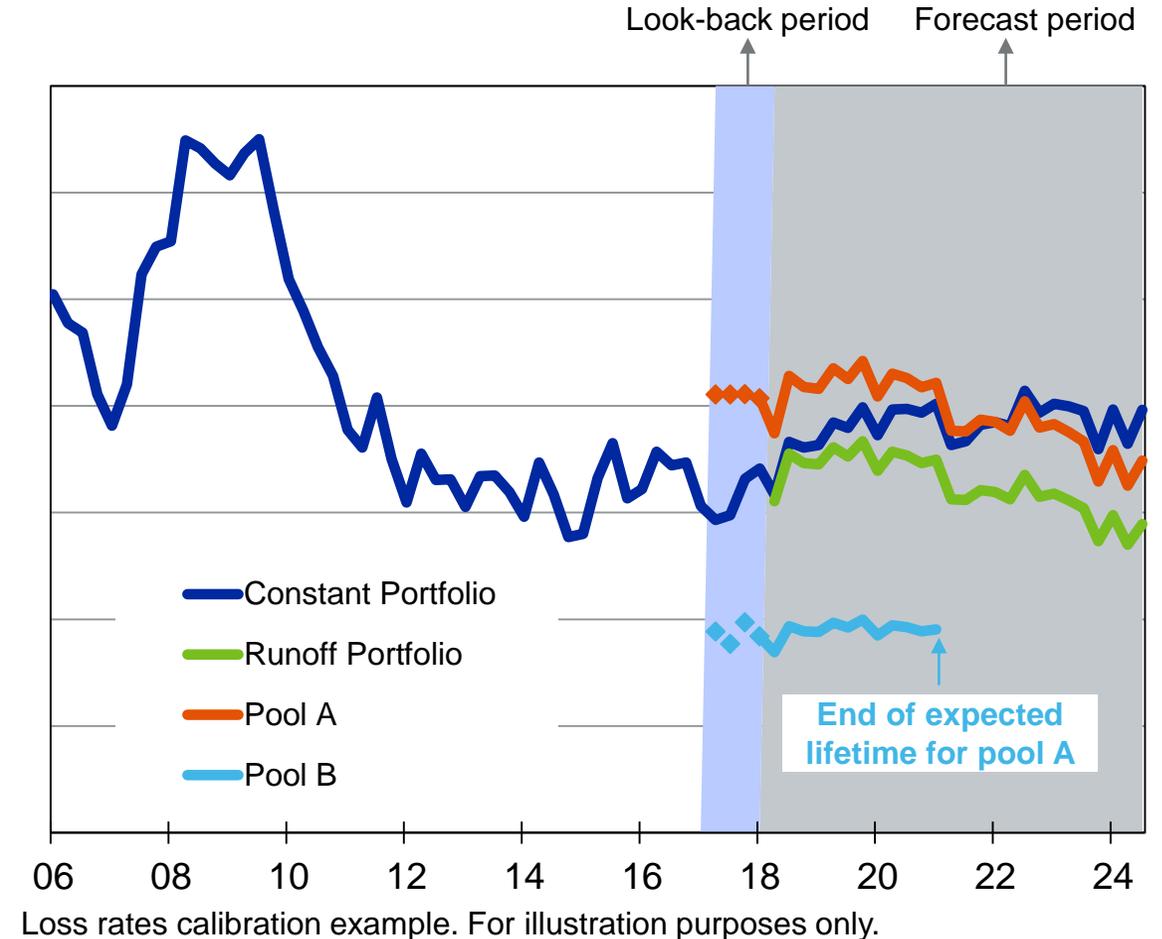


Sources: Moody's Analytics

# Top Down Approach

For small institutions, immaterial and/or young portfolios

- » The approach requires
  - Historical loss rates at aggregate level
    - › Banks' and credit unions' historical loss rates are available through Moody's call report forecasts and credit union forecasts
    - › Adjust loss rate forecasts to reflect the nature of run-off portfolios
  - Recent performance data at pool / account level: origination & maturity dates, balance, credit score, LTV, etc.
    - › Select a reasonable "look-back" period
- » Adjust top down loss forecasts for each pool by considering recent experience and future conditions



4

Impact Ratio

# How Will CECL Impact a Bank's Loss Allowance?

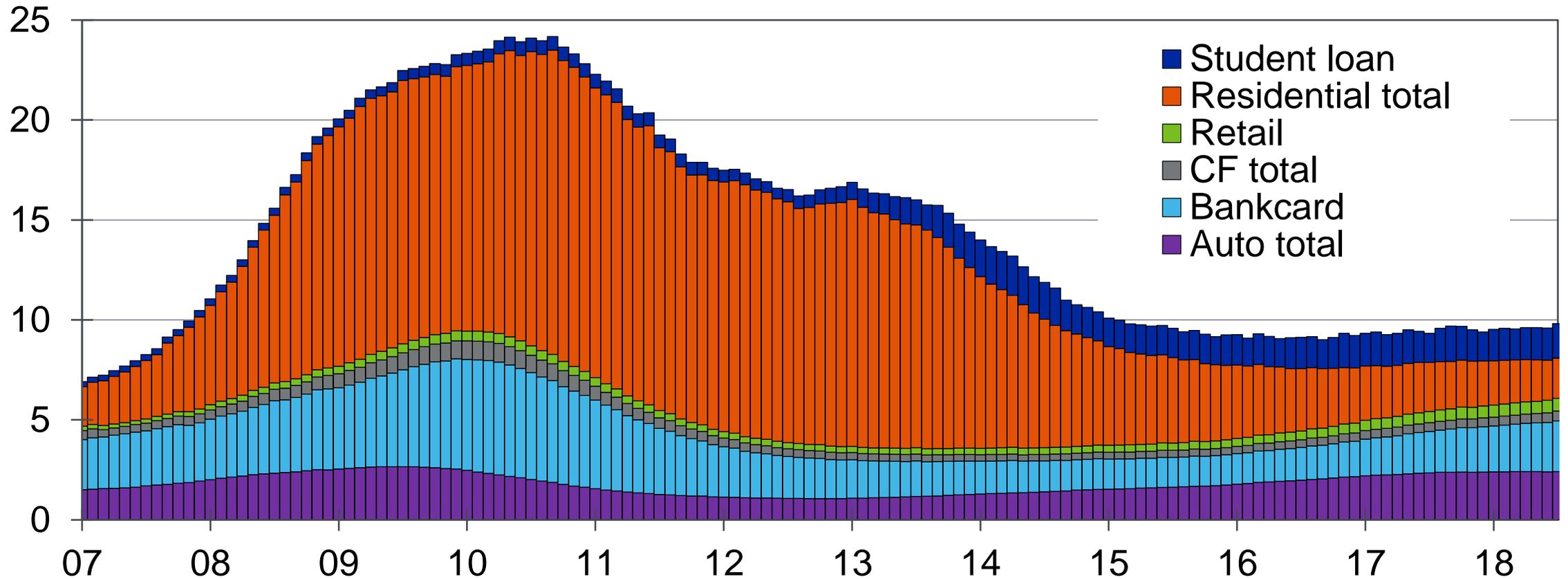
“Prediction is very difficult, especially if it is about the future.” Niels Bohr

## Depends on a number of factors including but not limited to:

- Contractual term of loans / Lifetime assumption / Methodology for paydown
- Reasonable and supportable period / Mean reversion technique
- Credit quality
- Geography
- Scenario assumptions
- LGD assumptions
- Stage of economic and product credit cycle
- Modeling methodology
- Size and concentration of institution
- Qualitative adjustments
- Current incurred loss method (forward, backward/look-back period)

# History of Consumer Default Volumes by Product

Default balances, \$ bil, 12-mo MA



Sources: Equifax, Moody's Analytics



# Key Assumptions that Would impact CECL

Comparison by model types

	Top-down Loss Rate	Cohort Vintage	Transition	Loan Level
Estimation Approach	Yes	Yes	Yes	Yes
Scenario Conditioned	Yes	Yes	Yes	Yes
Lifetime Assumption	Yes	Yes	Yes	Yes
Reasonably and Supportable Period	Yes	Yes	Yes	Yes
Qualitative Adjustment	Yes	Yes	Yes	Yes
Segmentation	Yes	Yes	Yes	Yes
Default Definition	Yes	Yes	Yes	Yes
Recovery Window	No	Yes	Yes	Yes
Look-back period	Yes	Yes if using off-the-shelf models	Yes if using off-the-shelf models	Yes if using off-the-shelf models

5

What's Next?

# Conclusions

## How to select appropriate methodologies

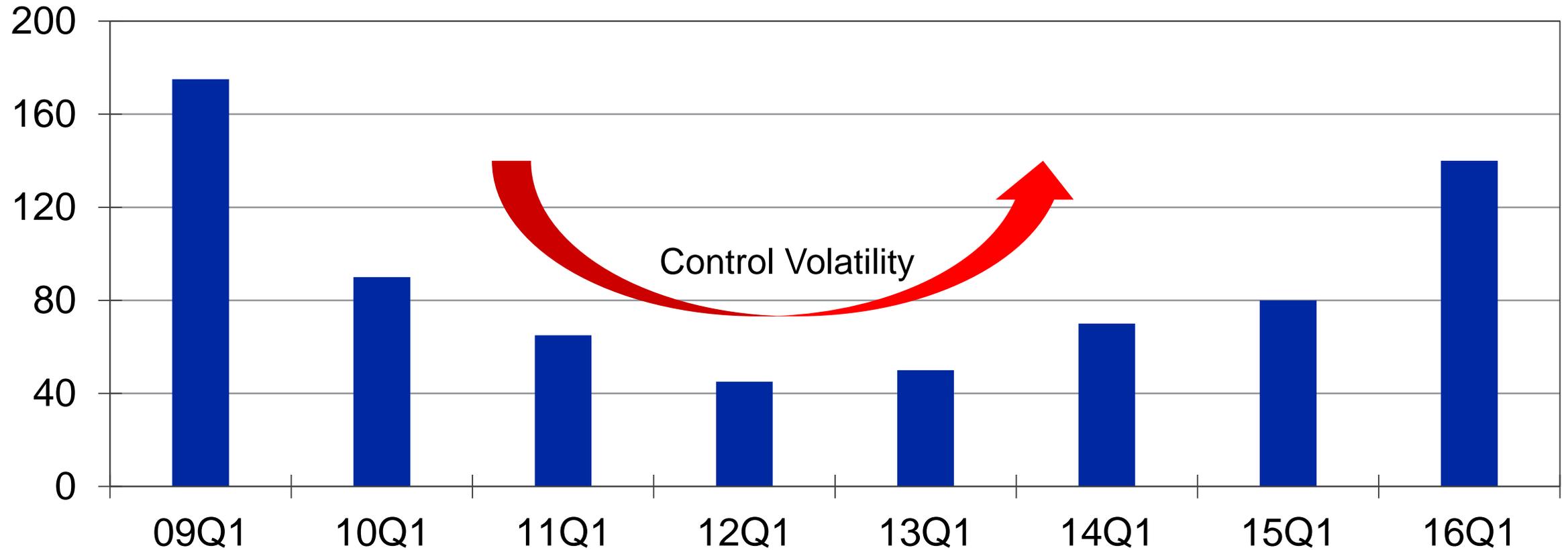
- » CECL standards are not prescriptive
- » Institutes should evaluate all components before making a decision
- » Choosing the best methodology depends on many parameters: data availability, size and complexity of a portfolio, business needs, development, implementation and production cost, etc.
- » Unified solutions across portfolios are not necessary but might be desired to help with auditors/validators (will need to justify reasons for differences)
- » Attribution of the loss variations and loss stability need be closely monitored

# What's Next?

- » Sensitivity analysis?
- » Validation?
- » Buy-in from other departments?
- » How will results impact underwriting standards? Pricing? A holistic view.
- » Linking loss forecasting with originations
- » Volatility of reserves quarter over quarter, monitoring results
- » Attribution analysis, other disclosures

# Major Concern: CECL Model Output Stability

CECL by Reporting Dates, for Illustration Purposes Only (\$ Mil.)



# For More Information...

[www.moodyanalytics.com/cecl](http://www.moodyanalytics.com/cecl)



**MOODY'S**  
ANALYTICS

## CECL's Forward-Looking Requirement: The Impact Could Be Substantial

**Cristian deRitis PhD, Sr Director, Economics**  
**Timothy Daly, Director, Sales Manager**



## WHITEPAPER

### How Much Will CECL Impact Reserves for First Mortgage Portfolios?

Prepared by

Deniz Tudor  
Deniz.Tudor@moodys.com  
Director

Timothy Daigle  
Timothy.Daigle@moodys.com  
Economist

Ever since the Financial Accounting Standards Board announced that accounting standards for loss reserves will move from an incurred-loss method to a forward-looking approach there has been much speculation on how lending institutions will be impacted. To the best of our knowledge, there has been no study that quantifies this impact in a rigorous manner for the industry as a whole, although a few individual lending institutions have conducted their own analysis.



## WHITEPAPER

### Economic Scenarios: What's Reasonable and Supportable?

Prepared by

Cristian deRitis  
Cristian.deRitis@moodys.com  
Senior Director

Contact Us

Introduction

The world is awash in forecasts. Politicians, pundits, analysts and even economists are constantly filling the airwaves with their views on economic issues and how the future is bound to unfold. Forecasts often come with an agenda or other motivation in order to nudge policymakers in a particular direction. But even more neutral analysts can differ in their

7

Appendix

# Moody's Analytics ECCL

A cohort level solution that couples user inputs with industry data and models

- » ECCL (Expected Consumer Credit Losses) is an extension of [CreditForecast.com](https://www.creditforecast.com), a Moody's Analytics and Equifax joint product
  - Extends the forecast to encompass the life of the loan
  - Computes lifetime ECL values for user inputted portfolio footprint (Risk Score X Origination Vintage X Geography)
  - Users have the flexibility to use industry standard settings or override with their own assumptions for necessary parameters (e.g. LGD and the expected life of the loan)

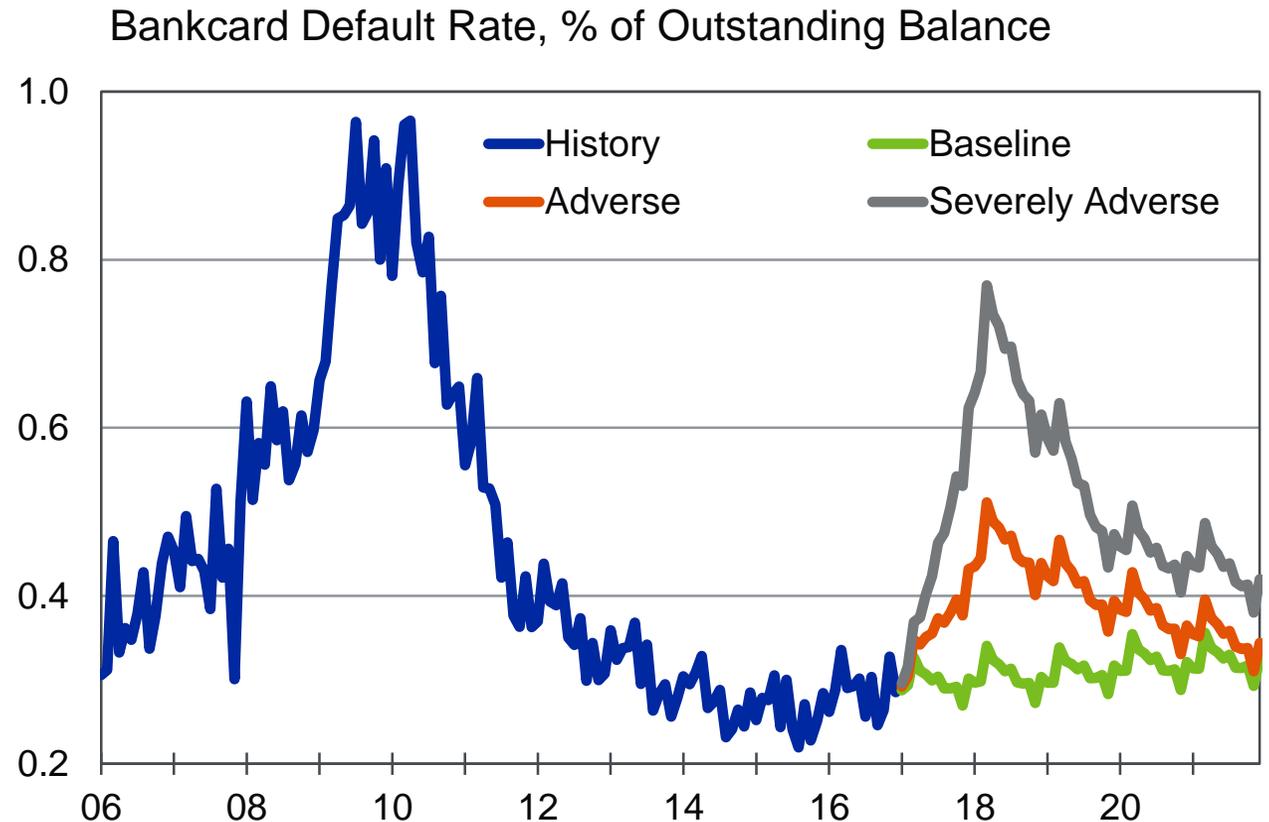
User inputs				Underlying industry model	Industry/User defined assumption		
State	Orig. Score	Orig. Quarter	Outstanding Balance	PD*	LGD	ECL Rate	ECL
CA	700-719	2009Q2	\$100	4%	40%	1.6%	\$1.6
CA	660-669	2011Q2	\$300	6%	40%	2.4%	\$7.2
CA	660-669	2013Q2	\$500	7%	40%	2.8%	\$14.0
CA	700-719	2015Q2	\$200	4%	40%	1.6%	\$3.2
CA	700-719	2017Q2	\$700	5%	40%	2.0%	\$14.0
CA	700-719	2017Q3	\$1000	6%	40%	2.4%	\$24.0
CA	700-719	2017Q4	\$800	4%	40%	1.6%	\$12.8
...	...	...	...	...	...	...	...

\*PD is the cumulative probability of default over the industry default/user supplied assumed remaining life of loan.  
For illustration purposes only.

# Moody's Credit Cycle Standard Model

Loss forecasting models based on CreditForecast.com

- » Cohort/Vintage Pooled time series
- » Fractional logit models of default rates
- » Primary Model Drivers
  - Life Cycle/Maturation Component
  - Vintage Quality Variables
  - Time-Varying Macro Conditions
  - Seasonality Dummies
  - Delinquency Roll Rates/Daisy Chain
  - Segment × Macro factor interactions



# Moody's Portfolio Analyzer™

A loan level solution that fits various data availabilities

- » Loan-level econometric models for default, prepayment, and severity for various types of mortgages including HELOCs and HELOANs, and Auto
- » Macro-economic factors at national, state, and MSA levels
- » Built-in vintage effects, lifecycle, and business cycles
- » Calculates contractual and credit-risky cash flows over the life of the loan
- » Provides discounted cash flows using the effective interest rate

Off-the-shelf	Calibrated	Custom
Used when no history available	Off-the-shelf models back-tested on historical performance data	Models built using client data only
Limited knowledge of underlying models	Models calibrated across different segments	Full transparency of underlying methodology

# Moody's Analytics LGD Solutions

Solution	Asset Class and Granularity	Key Model Inputs
Fannie Mae/Freddie Mac Mortgage	Loan level fixed-rate mortgage	Default balance, sales proceeds, expenses, MI and non-MI recoveries, age, credit score, LTV, geo, macroeconomic condition
MPA/APA	Loan level mortgage and home equity loans / lines Loan level auto loans	LTV, liquidation balance, time to liquidation, property and occupancy information, geo, lien position
AutoCycle	Auto data at 11-digit VIN level	Vehicle characteristics, style types, macroeconomic condition
CRF	Bank call report data at firm level, all asset classes	Charge-offs, macroeconomic condition
Credit Union Forecasts	Credit union call report data at firm level, all asset classes	Charge-offs, macroeconomic condition

# Consensus Scenario

This scenario is designed to incorporate the central tendency of a range of baseline forecasts produced by various institutions and professional economists.

- » The probability that the economy will perform better than this consensus is equal to the probability that it will perform worse.
- » The consensus scenario is based on a review of publicly available baseline forecasts of the U.S. economy. These sources include:
  - Congressional Budget Office
  - Social Security Administration
  - Federal Open Market Committee members' range of forecasts
  - Federal Reserve Comprehensive Capital Analysis and Review baseline
  - European Commission U.S. baseline
  - U.K. Prudential Regulation Authority U.S. baseline
  - Philadelphia Federal Reserve Survey of Professional Forecasters

Note: Assumptions for all other MA scenarios available

United States  
121 North Walnut Street  
Suite 500  
West Chester PA 19380  
+1.610.235.5299

United Kingdom  
One Canada Square  
Canary Wharf  
London E14 5FA  
+44.20.7772.5454

Australia  
Level 10  
1 O'Connell Street  
Sydney, NSW, 2000  
Australia  
+61.2.9270.8111

Czech Republic  
Washingtonova 17  
110 00 Prague 1  
Czech Republic  
+420.22.422.2929

Singapore  
6 Shenton Way  
#14-08 OUE Downtown 2  
Singapore 068809  
+65.6511.4400

© 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.

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's.com](http://www.moody's.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 657AFSL 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.