Expected Loss Quantification: 
*Factors That Move the Needle*
Agenda

1. Foundational Elements
2. Economic Scenarios and Loss Forecasting
3. Conclusion
1 Foundational Elements
From the Interagency Guidance…

“…better alignment of allowance estimation practices with existing credit risk assessment and risk management practices is likely, as the new accounting standard allows a financial institution to leverage its current internal credit risk systems as a framework for estimating expected credit losses.”

*Interagency Frequently Asked Questions on the New Accounting Standard on Financial Instruments – Credit Losses*
Starting Points for CECL Implementation
Do you anticipate leveraging existing models in your CECL process?

- No, I don’t expect to leverage any existing models for CECL: 14%
- Yes, credit risk management loss forecasting models: 14%
- Yes, credit risk management scorecards/models (e.g., Dual Risk Rating models): 7%
- Yes, incurred loss ALLL methodology: 29%
- Yes, stress testing (DFAST) methodology: 36%

Moody’s Analytics, February 2017
Common Pitfalls: Segmentation Matters
Example: Call Report Level NCOs

Net Charge Off Rate for C&I and CRE Loans 1991 - 2016

Were loans to all firms in the C&I sector adversely affected by the "Dotcom Crash" in 2001?

Was the performance of all CRE property types and markets affected the same during the Great Recession?

What about today’s credit conditions?

...or the near-term future?

... or your individual portfolio concentrations?
CECL Requirement: “Pool” Evaluation of ECL When Similar Risk Characteristics Exist

**Collective (“Pool”) Evaluation**
- Required for financial assets when similar risk characteristic(s) exists

**Individual Evaluation**
- Required when a financial asset does not share risk characteristics with its other financial assets

**Examples of Shared Risk Characteristics**
- Internal or external credit score
- Risk ratings or classification
- Financial asset type
- Collateral type
- Size
- Effective interest rate
- Term
- Geographical location
- Industry of the borrower
- Vintage
A Word on Risk Ratings Processes

COMMON STORY

% of Commercial Loans

<table>
<thead>
<tr>
<th>Risk Rating Categories</th>
<th>Performing Loans</th>
<th>Non-Performing Loans</th>
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<td>RR 8</td>
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» Pool-based reserve
» Loss rate by rating category or based on peer group
» PD/LGD based approach

BETTER WAY

% of Commercial Loans

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<tr>
<th>Risk Rating Categories</th>
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<td>BRR 15</td>
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» Dual risk ratings: borrower (BRR) distinct from facility
» Often associated with Advanced Basel II/III approaches for capital calculation
» Risk drivers include qualitative and quantitative components

» Expert judgment driven assessment of risk
» Risk rating represents rank ordering of expected loss
» No separation between borrower risk and facility risk
Why Are Accurate Risk Ratings are Critical?

COMMON STORY

- Could lead to clustering of credits in certain pass risk grades.
- Questions:
  - Meaning of ratings?
  - Master rating scale concentrations?
  - Portfolio segmentation?

BEETTER WAY

- Benefits of a more refined risk rating process:
  - Can isolate drivers of credit risk more effectively
  - Reduces the subjectivity within the risk-rating process
  - Enables a bank to develop more repeatable, reasonable, and supportable forecasts
Factors That Move the Needle

Increasing the loss allowance under CECL is driven by:

- Level of PDs and LGDs
- State of the business cycle
- Reasonable and supportable forecasts
- Maturity of exposures

Note that most risk ratings systems are designed to be through-the-cycle, i.e. not overly sensitive to current conditions.
What if CECL Was In Effect in 2007?

Question: Does granularity matter?

Case Study

» Sample of 200 C&I loans (non-financial institutions)
» 2007 Q1 originations, >3-year maturities
» Internally rated 1-5 (pass grades as of Q4 2007)
» Analysis periods from 2007 Q4 to 2009 Q4
» Moody’s economic forecast scenarios as of 2007Q4, 2008 Q4 and 2009 Q4

Assumptions

For the Rating-based Analysis:

» PD measures were derived from internal ratings (1-5) that were mapped to the Moody’s rating-based PD map

For the PD-based Analysis:

» PD measures were calculated based on the obligor’s financial statement and economic cycle adjustments, independently of the internal ratings
Does Granularity Matter? Yes!

Granular analysis using objective quantitative tools as part of the process provide for a more accurate view of credit risk.
Factors That Move the Needle

Differences Are More Pronounced At Instrument Level

Instruments that are internally rated 5 with the TTC (long term) rating-implied PD of 1.51%:

<table>
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<th>1</th>
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<th>4</th>
<th>5</th>
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<th>7</th>
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</thead>
<tbody>
<tr>
<td>PD to maturity based on internal rating</td>
<td>1.52%</td>
<td>1.52%</td>
<td>1.51%</td>
<td>1.50%</td>
<td>1.49%</td>
<td>1.48%</td>
<td>1.43%</td>
</tr>
<tr>
<td>PD to maturity based on PIT PD</td>
<td>2.54%</td>
<td>3.14%</td>
<td>2.87%</td>
<td>2.54%</td>
<td>3.88%</td>
<td>2.48%</td>
<td>3.13%</td>
</tr>
<tr>
<td>% ECL to maturity based on internal rating</td>
<td>2.43%</td>
<td>2.22%</td>
<td>1.68%</td>
<td>1.61%</td>
<td>1.15%</td>
<td>1.13%</td>
<td>0.61%</td>
</tr>
<tr>
<td>% ECL to maturity based on PIT PD</td>
<td>4.01%</td>
<td>2.36%</td>
<td>2.14%</td>
<td>2.79%</td>
<td>1.61%</td>
<td>3.70%</td>
<td>3.37%</td>
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</tbody>
</table>
CECL as Pricing and Capital Advantage

“[Bankers] will likely be expected to integrate the assumptions used in their CECL loss estimates (mainly those pertaining to forecasts of the future) with those used in asset/liability management, capital management, and overall budgeting. CECL’s requirement to record a life of loan loss estimate at origination (in other words, recognize the cost up front), for practical purposes, will force a bank to weigh the potential risks much more closely before expanding its business. This can change bank behavior.

FASB’s Current Expected Credit Loss Model for Credit Loss Accounting (CECL): Background and FAQ’s for Bankers
American Bankers Association, June 2016

"
Economic Scenarios and Loss Forecasting
The Trouble With Our Predictions

“...It’s hard enough to know where the economy is going. But it’s much, much harder if you don’t know where it is to begin with.”

Nate Silver
“The Signal and The Noise”
Realized Recession Was Worse but Recovered Fast

The Fed’s SCAP forecast from Early 2009
Finding Right Economic Variables for Risk Attributes is Critical

![Graph 1: Lifetime Loss Rates vs. Unemployment Rate](image1)

![Graph 2: Lifetime Loss Rate vs. Credit Spreads](image2)
What is Reasonable and Supportable?

Two Considerations to Determine Forecast Horizon:

**CECL Model**
- Is the length of observed historical performance sufficient to project losses?
- Is observed history of performance relevant for the future time horizon?
- Is the methodology used reasonable and supportable over the time horizon?

**Forecast**
- Are forecasts for forward-looking drivers econometrically determined?
- Is data with limited history being extrapolated?
- Are economic cycles being forecasted in a reasonable fashion?
Range of Moody’s Analytics Macroeconomic Scenarios

Economic scenarios (2007)
- BL: Baseline Scenario
- S2: Housing Market Recovery, Mild Recession
- S4: Housing Market Crash, Severe Recession

Economic scenarios (2017)
- S1: Stronger Near-Term Growth
- S2: Slower Near-Term Growth
- S3: Moderate Recession
- S4: Protracted Slump
- S5: Below-Trend Long-Term Growth
- S6: Stagflation
- S7: Next-Cycle Recession
- S8: Low Oil Price
- CF: Consensus Scenario
- BL: Baseline Scenario

Real GDP growth rate, % Yr/Yr

Factors That Move the Needle
Range of Scenarios in 2007 Compared to Actual

**Factors That Move the Needle**

![Graphs showing actual trend, baseline, and scenarios S2 and S4.](image)

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MOODY'S ANALYTICS

Factors That Move the Needle  21
What if CECL Was In Effect in 2007? (Continued)

Questions to Test

» What can we learn about impact of reasonable & supportable period length?
  - Revert to Moody's long term PDs
  - Compare 1 year, 2 year and no mean reversion

» Is there benefit to using more than one scenarios?
  - Compare outcomes based on different scenarios
  - Compare probability-weighted outcome of 3 scenarios to a single scenario

Assumptions

Economic variables for C&I portfolio

» US Unemployment Rate
» S&P Equity Index
» CBOE Volatility Index (VIX)
» Intermediate Term BBB Bond Spread
Testing Impact of Scenario Selection

Reversion to historical information beyond reasonable horizon addresses forecast uncertainty…. As does forecasting under multiple scenarios.
3 Conclusion
What If CECL Was in Place During Financial Crisis…

Bank Level View

<table>
<thead>
<tr>
<th>Standard Deviation</th>
<th>Incurred Loss</th>
<th>CECL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003Q3 – 2015Q4</td>
<td>0.55%</td>
<td>0.83%</td>
</tr>
<tr>
<td>Crisis Period (2007Q1 – 2010Q4)</td>
<td>0.66%</td>
<td>1.04%</td>
</tr>
</tbody>
</table>

From What Do Half a Million Loans Say About the Impact of CECL on Loan Loss Allowance? by Dr. Yanping Pan, Dr. Yashan Wang, July 2017
Looking ahead…
The opportunity to align risk management processes and forecasts

Benefits

» Build toward risk-based pricing
» Cost of model ownership and maintenance
» Common language of risk between use cases
» More nimble risk strategy and active quantitative portfolio management
About Moody’s Analytics
Moody’s Analytics Core Capabilities

Models
- Top-down and granular CECL compliant credit risk models
- Off-the-shelf or customizable models to reflect bank’s own experience

Economic Scenarios
- Comprehensive credit risk data across asset classes to support benchmarking, validation and modeling
- Bank peer benchmarking data

Advisory
- Quantitative Impact analysis
- Model gap assessment
- CECL framework design and implementation
- Custom credit risk modeling

Data
- Data ingestion and storage
- Integrated ECL modeling and qualitative overlays
- Management analysis and reporting

PROCESS AUTOMATION
- Standard and custom economic forecasts and supporting narratives
- Scenario probabilities to support multi-scenario analysis
With thanks to Jin Oh, Ed Young