MOODY'S ANALYTICS

CECL Treatment for the Investment Portfolio

April 2017

Today's Speakers

David Kurnov

Senior Director | Financial Engineering

David manages global operations for the Structured Finance Valuations & Advisory group at Moody's Analytics. His team develops and implements analytical models for valuing and stress testing securities across structured asset classes and provides advisory support for risk analysis and regulatory submission.

Prior to his current role, David supported Moody's Investors Service rating analysts in using in-house software to rate and monitor CDO transactions. David holds a B.S. in Economics from The Wharton School and a B.S.E. in Computer Science from the School of Engineering at the University of Pennsylvania.

Nihil Patel

Senior Director | Product Management

Nihil has broad experience in research, modeling, service delivery, and customer engagement. Prior to his current role, Nihil led the Portfolio and Balance Sheet Modeling Services team within the Research organization. Before that role, he led the correlation research team for over seven years.

Nihil holds a MSE in Operations Research and Financial Engineering from Princeton University and a BS in Industrial Engineering and Operations Research from UC Berkeley. Prior to joining Moody's, Nihil worked at Cornerstone Research, a firm which specializes in litigation consulting. Nihil is a CFA charter holder.

Welcome!

Moody's Analytics CECL Webinar Series: Expected Credit Loss Quantification

Introduction to CECL Quantification
Tuesday, February 14, 2017 | 1:00PM EST

CRE CECL Methodologies
Tuesday, February 28, 2017 | 1:00PM EST

C&I CECL Methodologies
Tuesday, March 14, 2017 | 1:00PM EDT

Retail CECL Methodologies
Tuesday, March 28, 2017 | 1:00PM EDT

Investment Portfolio CECL Methodologies
Thursday, April 20, 2017 | 1:00PM EDT

To find out more about Moody's Analytics perspectives on CECL and to view the recordings from previous sessions of our webinar series, please visit:

www.moodysanalytics.com/cecl

Agenda

1. Introduction
2. Accounting Implications
3. Cashflow and Credit Modeling
   I. Direct Obligation Bonds
   II. Structured Securities
4. Questions

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ACCOUNTING IMPLICATIONS

Key Requirements on Debt Securities under CECL

HTM Debt Securities

» Measured at amortized cost

» Firms are required to set aside an amount of allowance of lifetime expected credit losses

» Unlike OTTI, CECL does not specify a threshold for the recognition of an impairment allowance

AFS Debt Securities

» Measured at fair value through other comprehensive income (FVOCI)

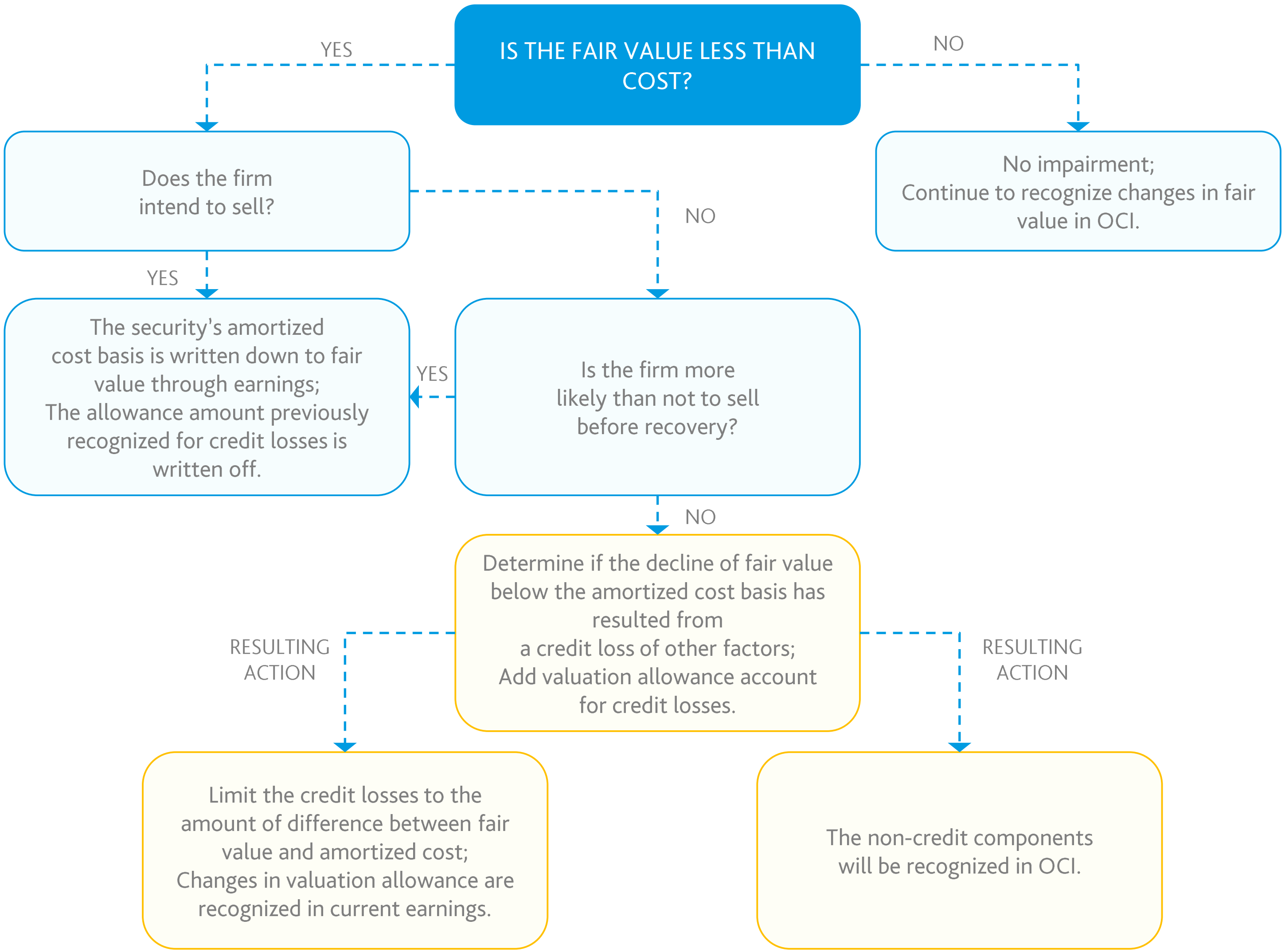
» If a firm intends to sell or is more likely than not to sell the security before recovery of its amortized costs basis

- Write down the debt security's amortized cost to the debt security's fair value

» For the rest of AFS debt securities

- Eliminate the concept of "other than temporary"
- Use an allowance approach (vs. permanently writing down the security's cost basis)
- Limit the allowance to the amount by which the security's fair value is less than its amortized cost basis

Revised Rules for AFS Debt Securities



Estimation Methods for Expected Credit Losses

For HTM debt securities, the accounting guideline does not prescribe specific estimation methods for estimating allowance for credit losses. One may apply different methods to different groups of financial assets, including:

- Discounted cash flow, vintage analysis, loss-rate, roll-rate methods, probability-of-default
- Individually or collectively measurement

For AFS debt securities, the new accounting standard maintains the current requirement:

- Assess credit losses at the individual security based on discounted cash flow model

Institutions can also continue using existing methods for estimating allowances under CECL. However, they must change inputs and assumptions to achieve forward-looking lifetime loss estimates.

A debt security on which OTTI had been recognized prior to the effective date of the new standard will transition to the new guidance prospectively (i.e., with no change in the amortized cost basis of the security).

Illustrative Example: OTTI Rule vs. CECL

We use a stylized example to illustrate how the revised rule would impact impairment losses, earnings, and OCI calculation for AFS and HTM securities at:

- Origination/acquisition date
- Two reporting dates after that, to illustrate the P/L and OCI calculation
- Reporting date 1: security is other-than-temporary (OTT) impaired under the current rule
- Reporting date 2: three possible outcomes, under CECL
  - Outcome 1: Fair Value (FV) < Present Value of Cash Flows (PVCF) < Amortized Cost (AC)
  - Outcome 2: Present Value of Cash Flows (PVCF) < Fair Value (FV) < Amortized Cost (AC)
  - Outcome 3: Fair Value (FV) > Amortized Cost (AC)

The next two slides show the calculation of impairment losses and OCI under the OTTI and CECL rules for HTM and AFS debt securities

Treatment of AFS Debt Securities under OTTI vs. CECL

		Reporting Date 1		Reporting Date 2					
				Outcome 1 (FV < PVCF < AC)		Outcome 2 (PVCF < FV < AC)		Outcome 3 (FV > AC)	
	ACQN. DATE	OTTI	CECL	OTTI	CECL	OTTI	CECL	OTTI	CECL
Fair Value (FV)	100	90		92		95		101	
Present Value (PVCF)	-	96		95		94		98	
Amortized cost (AC)	100	100	100	96	100	96	100	96	100
Cum. Credit OTTI	-	4	NA	5	NA	6	NA	4	NA
Allowance	-	NA	4	NA	5	NA	5	NA	0
Cum OCI	-	-6	-6	-3	-3	1	0	5	1
Credit Losses *	-	4	4	1	1	2	1	0	-4

Key differences to note:

- Credit losses capped to total impairment under revised rule (Outcome 2)
- Negative credit loss under revised rule i.e., reversal of loss (Outcome 3)
- Amortized cost written down under the current rule after recognizing impairment (Outcomes 1 and 2)

**recognized in P&L*

3

CASHFLOW AND CREDIT MODELING

Key Aspects of CECL

Requires current estimates of all contractual cashflows not expected to be collected.

Based on relevant information regarding:

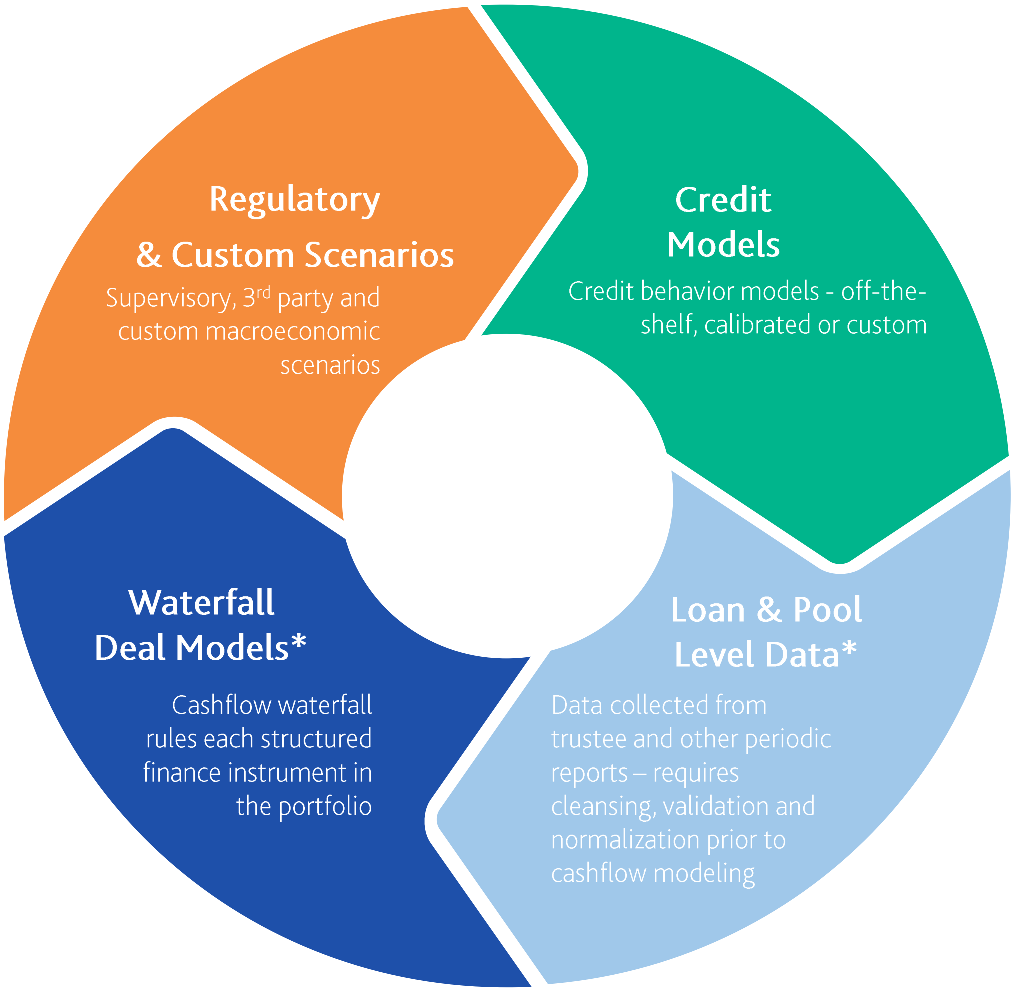
» Past events, including historical experience

» Current conditions

» Reasonable and supportable forecasts

Allows for a transition to a long run average beyond the timeframe that can be forecasted

Modeling Components

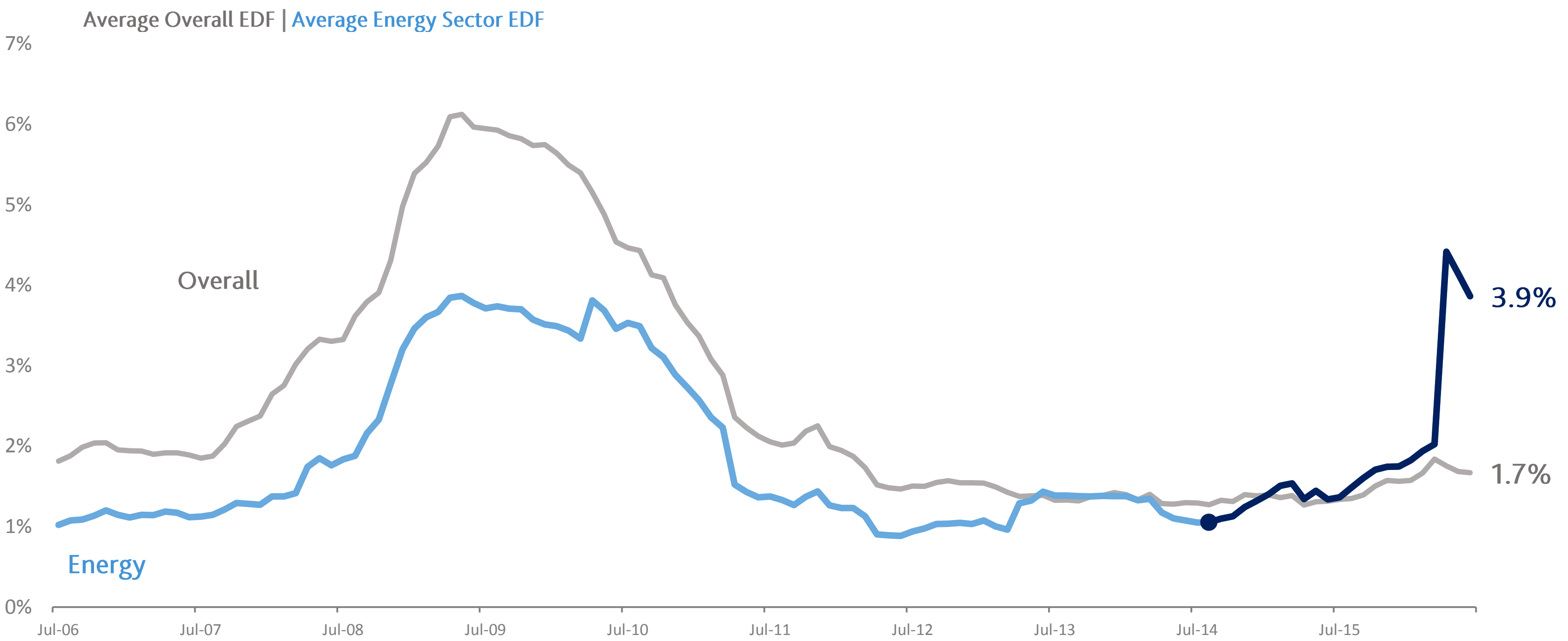


* Structured Securities

3.1 CASHFLOW AND CREDIT MODELING – DIRECT OBLIGATION BONDS

Moody's Analytics

Forward Looking Impairments Depends Where One is in the Credit Cycle



- When incorporating forward looking projections for impairment analysis one needs to account where in the credit cycle we are starting from.
- This requires ability to convert from internal ratings/TTC PD to a point in time estimate.
- Both industry and regional effects should be accounted for forward looking impairments.

Moody's Approach to Model CECL Impairments

» Moody's Analytics has data/models covering C&I, CRE, Sovereign, Muni, Project Finance and Retail.

» Design to work with internal ratings or PD/LGD.

PD MODELS

» TTC Rating/PD to PIT PD Conversion

» Lifetime PD/PD Term Structure

» Scenario Based PD Modeling

LGD MODELS

» Lifetime LGD/LGD Term Structure

» Scenario Based LGD Modeling

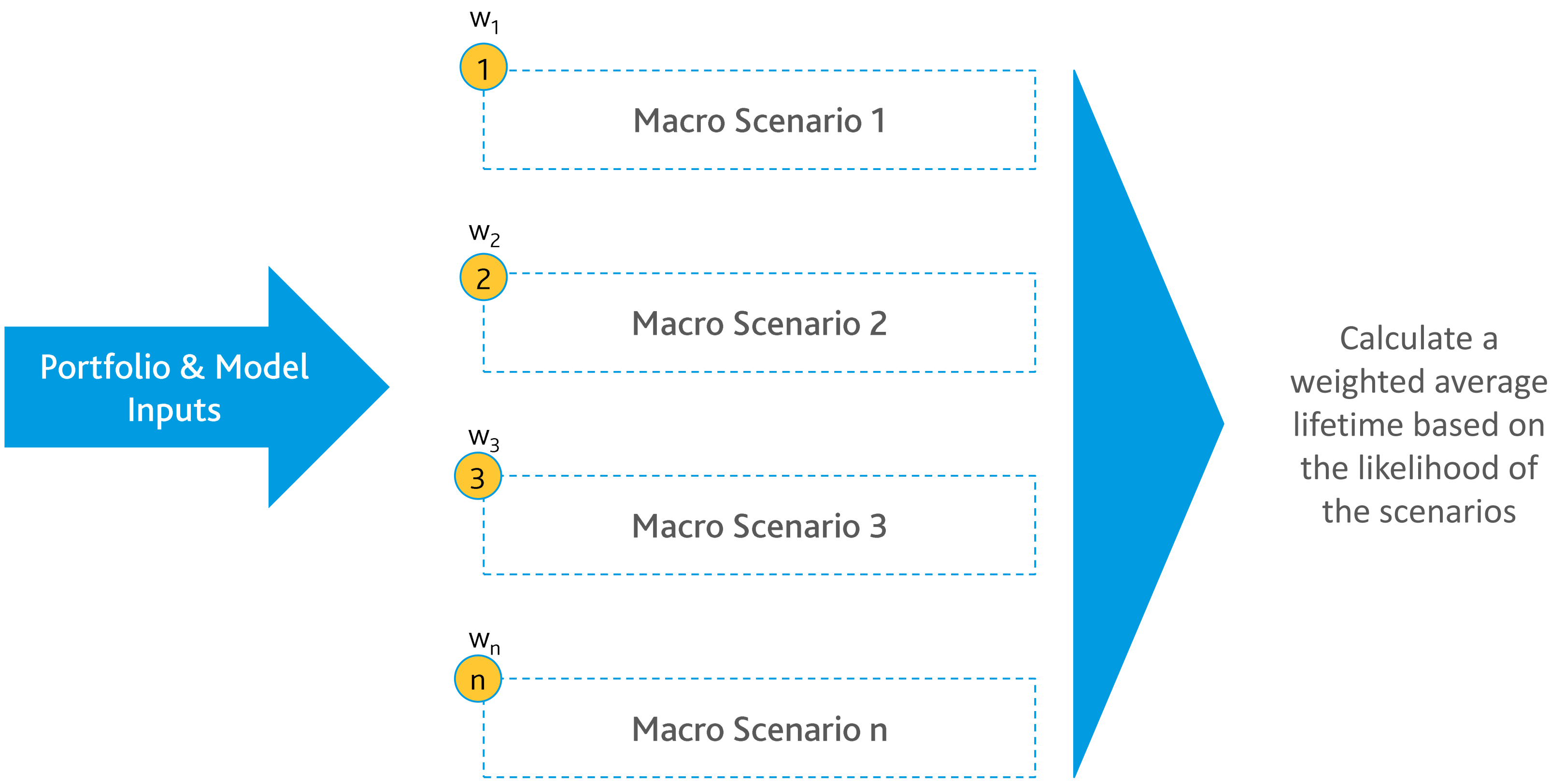
EAD MODELS

» Lifetime EAD/EAD Term Structure

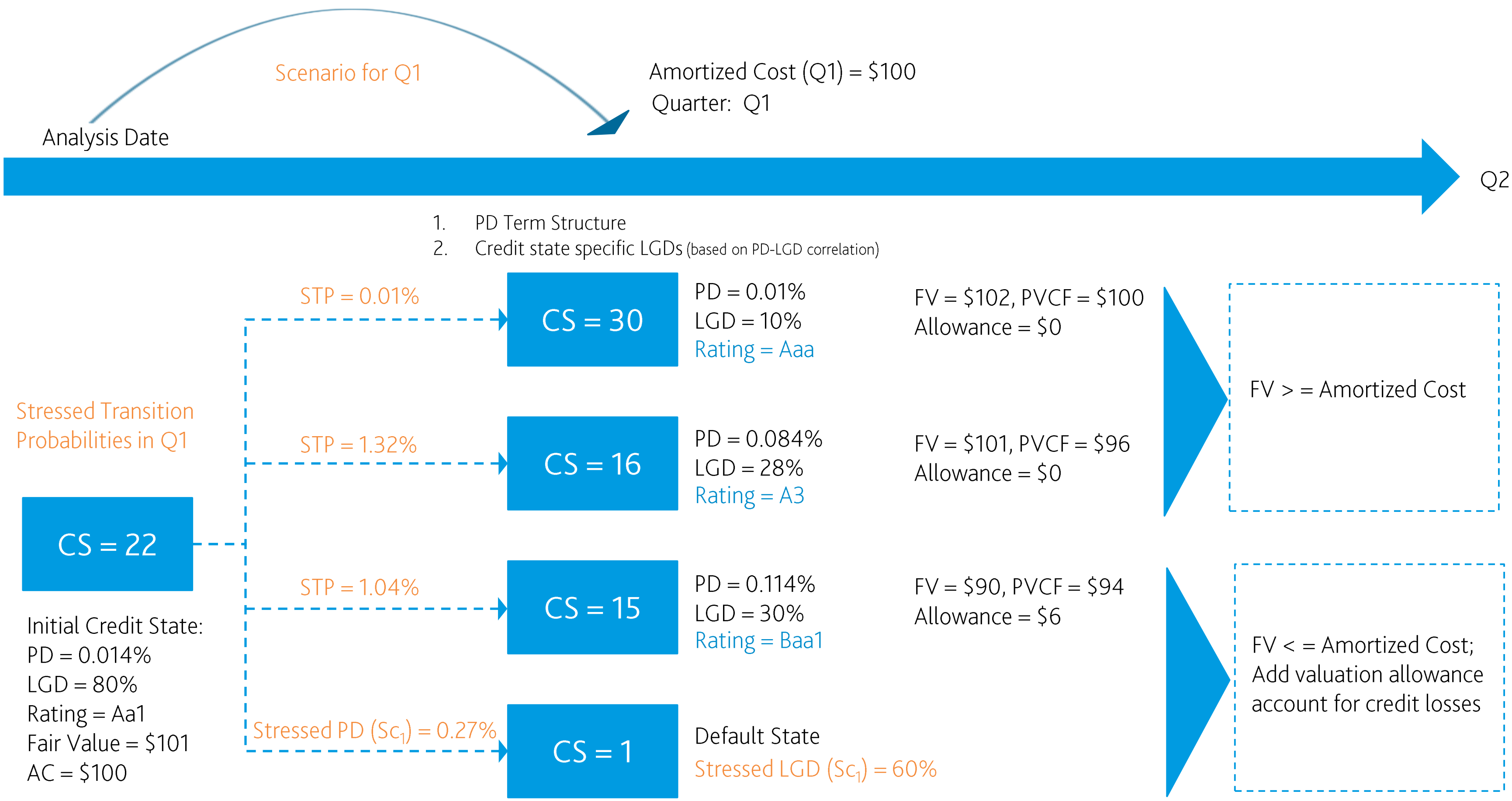
» Discounting (EIR)

» Prepayment

Impairment Calculation using Scenario Analysis



Stress Testing AFS Debt Securities under CECL



Q1 Outputs:

- » Stressed EL due to default
- » Expected Allowance
- » Expected Fair Value

3.2

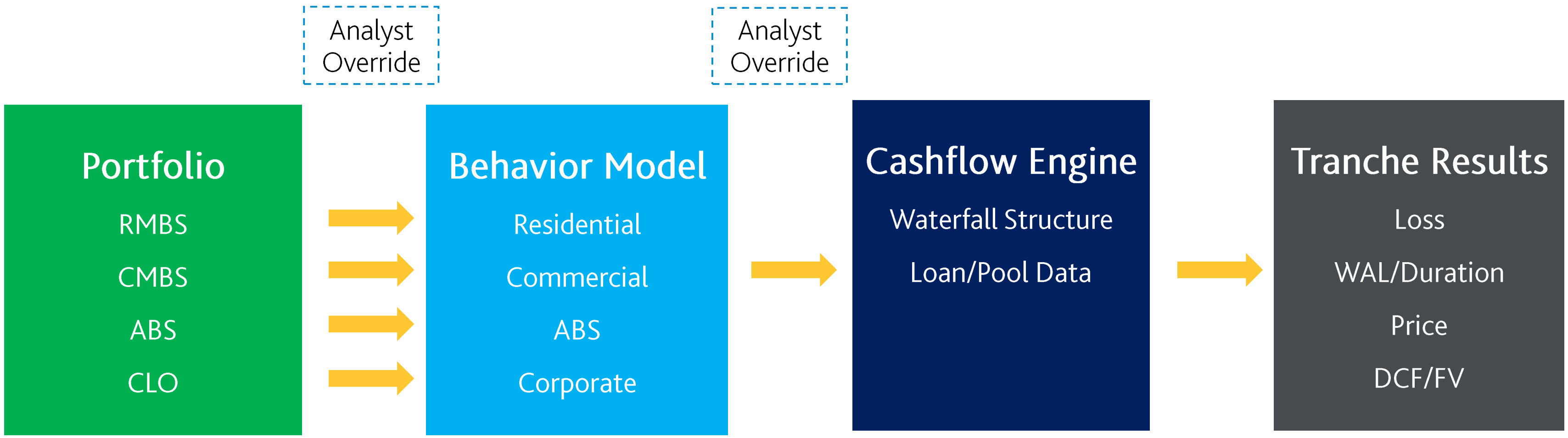
CASHFLOW AND CREDIT MODELING – STRUCTURED SECURITIES

Moody's Analytics

Modeling Process

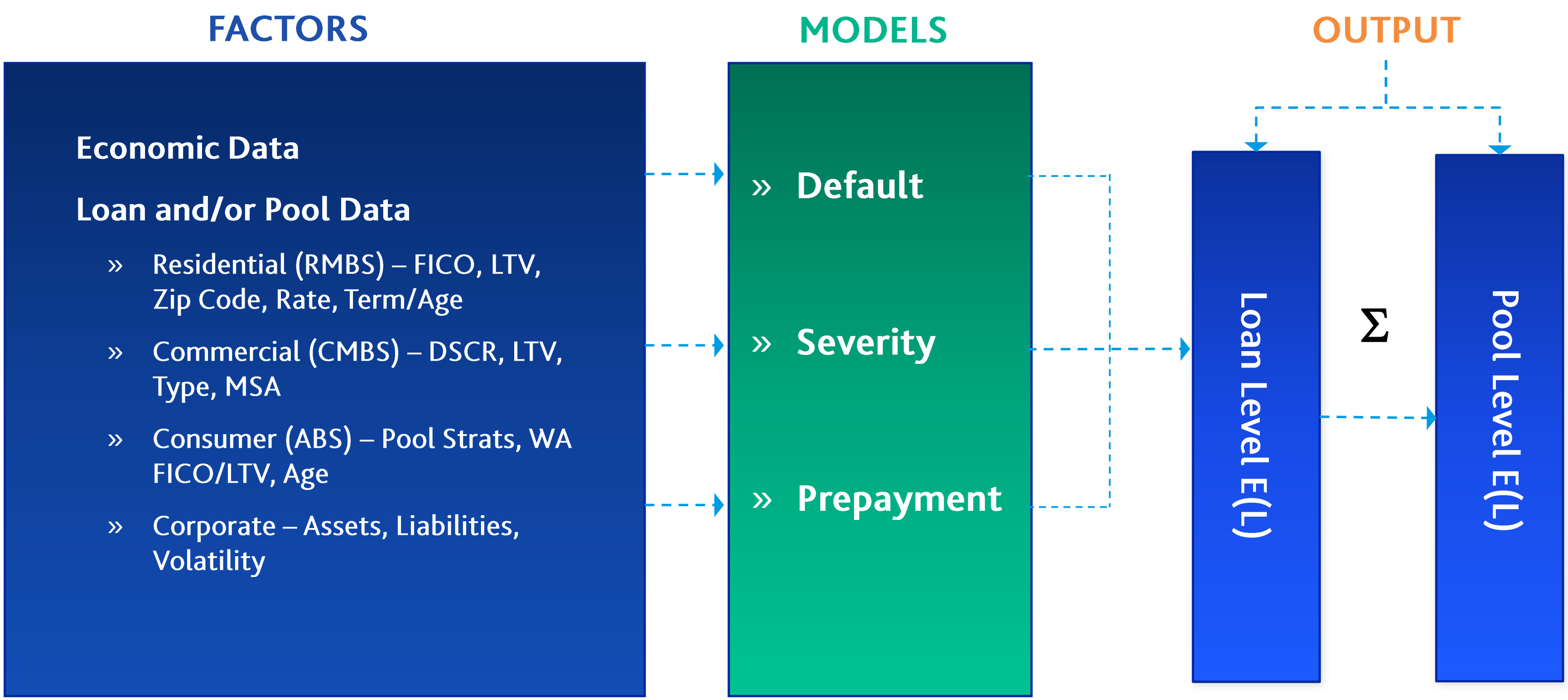
Quantitative Approach

- Complexity of underlying collateral and deal structure
- Model-driven collateral forecasting
- Analyst assumptions/overrides



Credit Modeling Overview

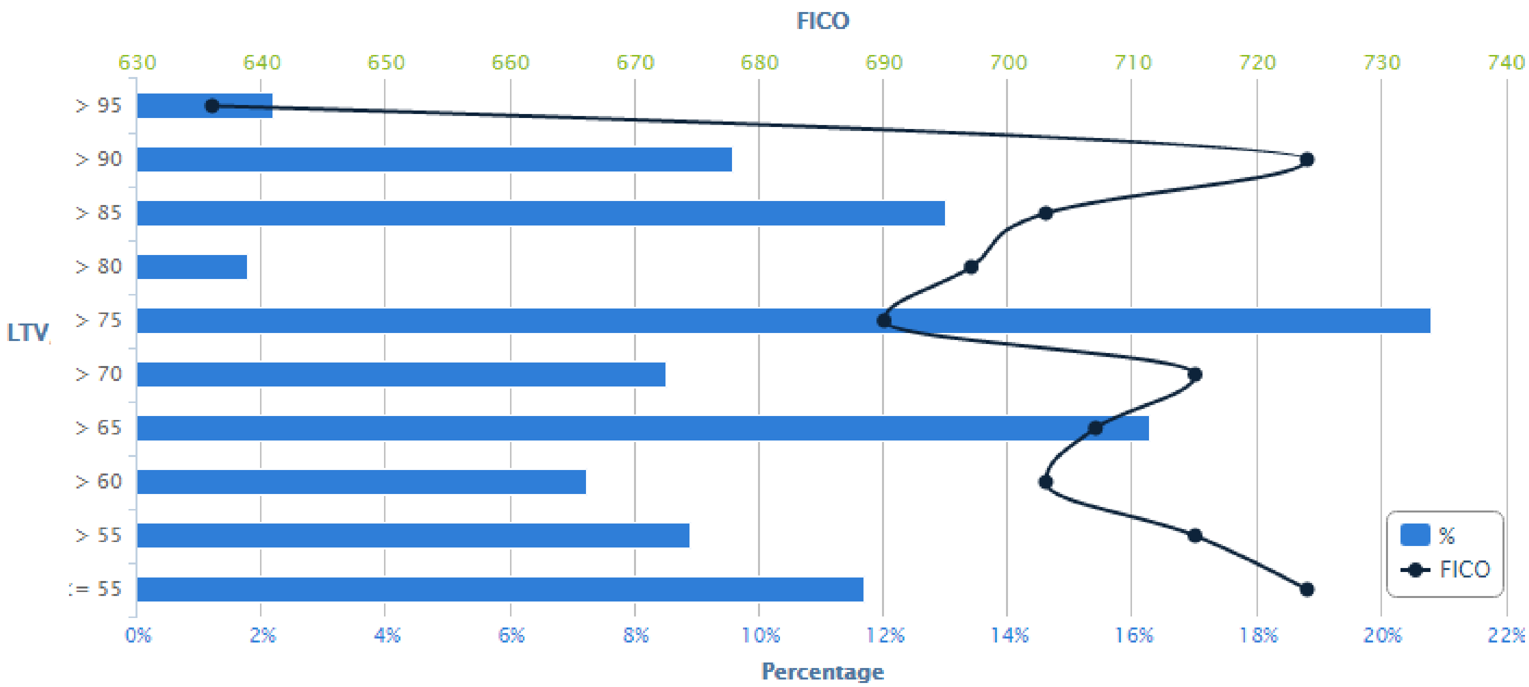
For each asset type, forecast default, prepayment, and severity for each loan or pool in the transaction.



Modeling Process EXAMPLE

COUNTRYWIDE ALTERNATIVE LOAN TRUST 2003-4CB – Tranche M

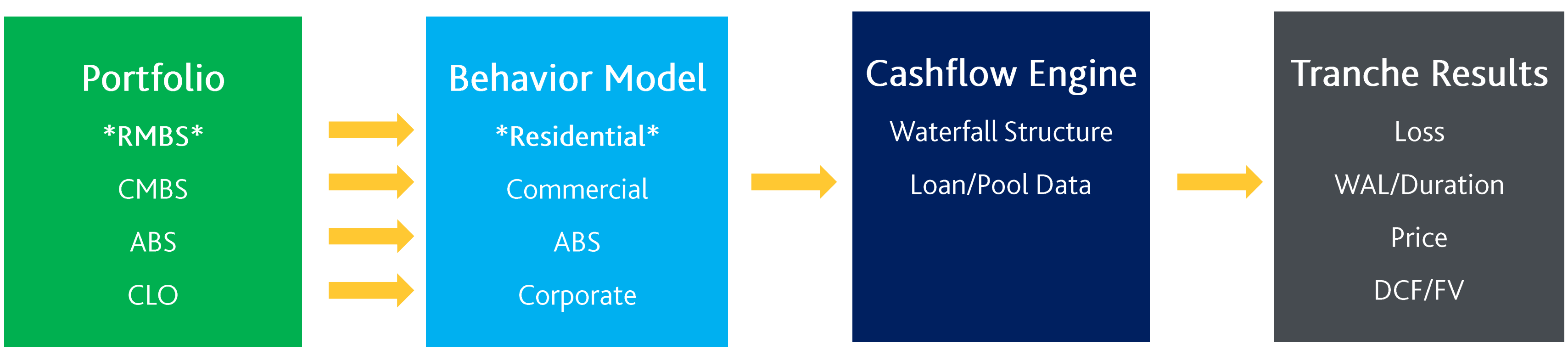
- Current attachment/detachment – 7%/18%
- Defaulted/Delinquent 90+ – 7.5%
- Pool average FICO/LTV – 706/73 (27% of pool with LTV > 80)



Modeling Process EXAMPLE

Analytic process

- » Run loans through residential credit model
- » Credit model outputs pool cashflows – principal, interest, default, loss
- » Run pool cashflows through waterfall
- » Baseline scenario pool projections
  - 10.6% cumulative default (~2 CDR)
  - 3.2% cumulative loss (~30% Severity)
  - 36% cumulative prepayment (~8.5 CPR)
- » Tranche loss – 2%, PVCF at 6% Yield - 87



Modeling Process EXAMPLE

	Pool Default	Pool Loss	Pool Prepayment	Tranche Loss	PVCF
Baseline	10.6% (~2 CDR)	3.2% (~30% Severity)	36% (~8.5 CPR)	2%	87
Upside	8.3% (~1.6 CDR)	2.7% (~25% Severity)	38% (~9 CPR)	0%	91
Downside	14.0% (~2.75 CDR)	5.6% (~40% Severity)	34% (~8 CPR)	16%	79
Blended	**10.6% (~2 CDR)**	**3.2% (~30% Severity)**	**36% (~8.5 CPR)**	**5%**	**86**

QUESTIONS

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