CECL Consumer Credit Modeling

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Presenters

David Fieldhouse - Director, Consumer Credit Analytics

David specializes in various consumer credit modeling projects such as credit cards.

James Partridge - Director, Consumer Credit Analytics

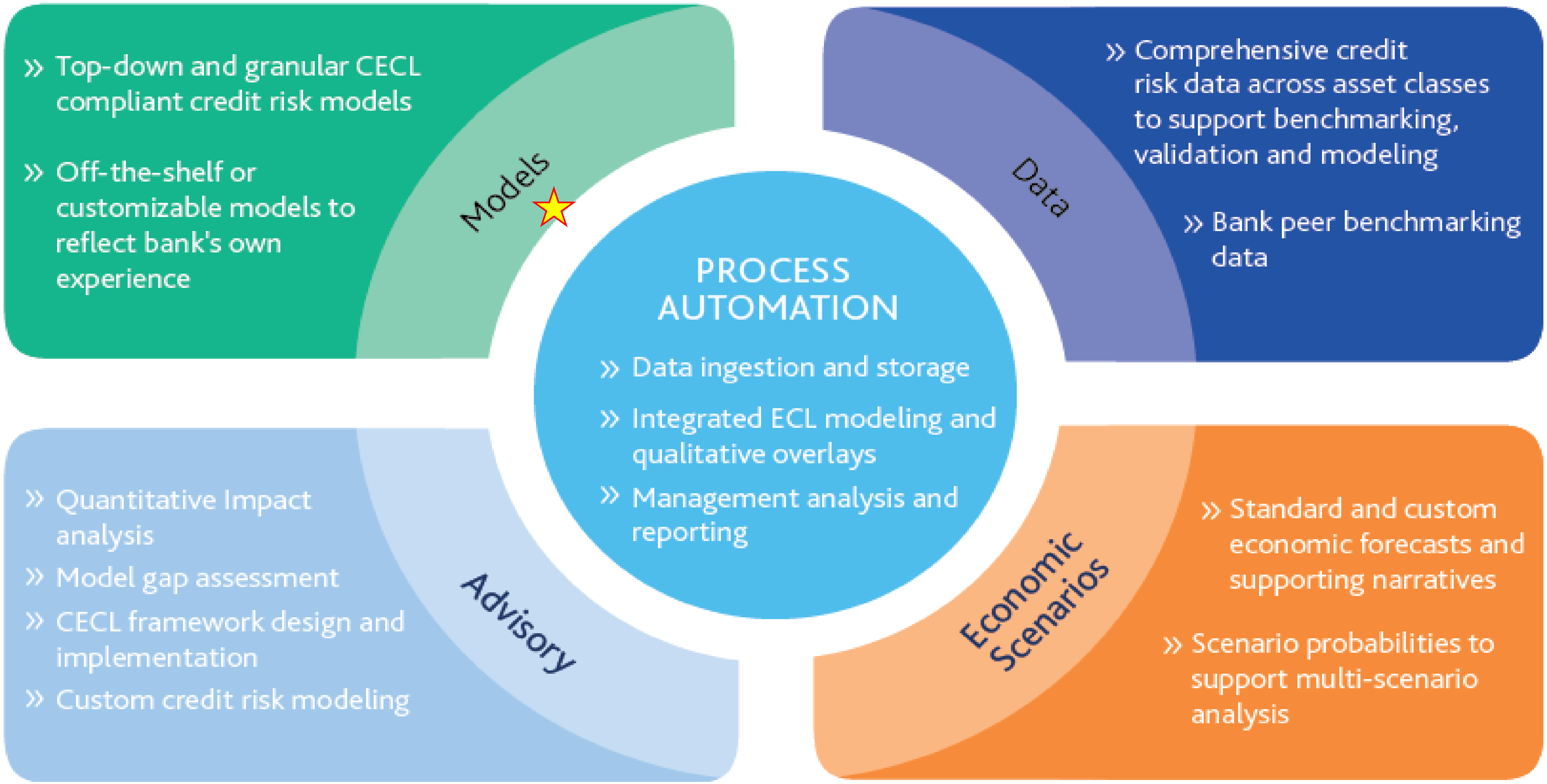
James specializes in various consumer credit modeling projects such as student loans and mortgages.

Moderator

Deniz Tudor - Director, Consumer Credit Analytics

Deniz specializes in U.S. consumer credit trends and the development of custom and industry-based econometric credit loss models for clients.

Moody's Analytics CECL Solution Suite



Agenda

1. Acceptable CECL Methodologies

2. Adjusting Stress Testing and IFRS9 Models for CECL

3. Challenges with Credit Card Modeling

4. Challenges with TDR and Recoveries Modeling

1

Acceptable CECL Methodologies

CECL Will Impact All Lenders

In a nutshell:

» CECL is a **lifetime loss estimate.**

- Forecast losses over a ***reasonable and supportable*** horizon
- Extrapolate beyond this horizon using historical averages over the remaining life

» CECL standards are **principles-based**.

- Not prescriptive in how institutions address specific modeling challenges
- Flexibility to account for firms of different size and complexity

» Require increased **transparency** in assumptions and more granular **disclosures** to support the allowance estimate.

» Selection of forecasts and assumptions will need **quantitative** support.

» Under CECL standard, we need to estimate and account for the potential losses from almost **all loans**.

CECL Acceptable Methodologies

Primary Methodologies

- » Loss rate method (Pool/cohort/vintage, loan level analysis).
- » Probability of default method (PD & LGD) (Pool/cohort/vintage, loan level analysis).
- » Roll rate method (Migration analysis/Transition matrices) (loan level analysis).
- » Discounted cash flow analysis (loan level analysis).

Moody's Analytics supports all acceptable CECL methodologies

Pros and Cons of Different Approaches

Include Macro & Regional Factors

- Cohort models run quicker and easier to model and stress under alternative scenarios. Easy for CECL disclosures.
- Loan level models are appropriate when user needs to slice and dice portfolio into different segments on the fly.
  - Allow the portfolio to be analyzed at any level of aggregation, using any segmentation.
  - May need a simulation engine, and may take longer operationally to get results.
- Transition matrix approach could be complex but will cover transitions much better.

Excerpt From FASB Guidance

Paragraph 326-20-30-3 states:

“The allowance for credit losses may be determined using various methods. For example, an entity may use discounted cash flow methods, loss-rate methods, roll-rate methods, probability-of-default methods, or methods that utilize an aging schedule. An entity is not required to utilize a discounted cash flow method to estimate expected credit losses. Similarly, an entity is not required to reconcile the estimation technique it uses with a discounted cash flow method.”

Paragraph 326-20-30-6 states:

“An entity shall consider prepayments as a separate input in the method or prepayments may be embedded in the credit loss information in accordance with paragraph 326-20-30-5.”

Main Modeling Decisions

Key Questions

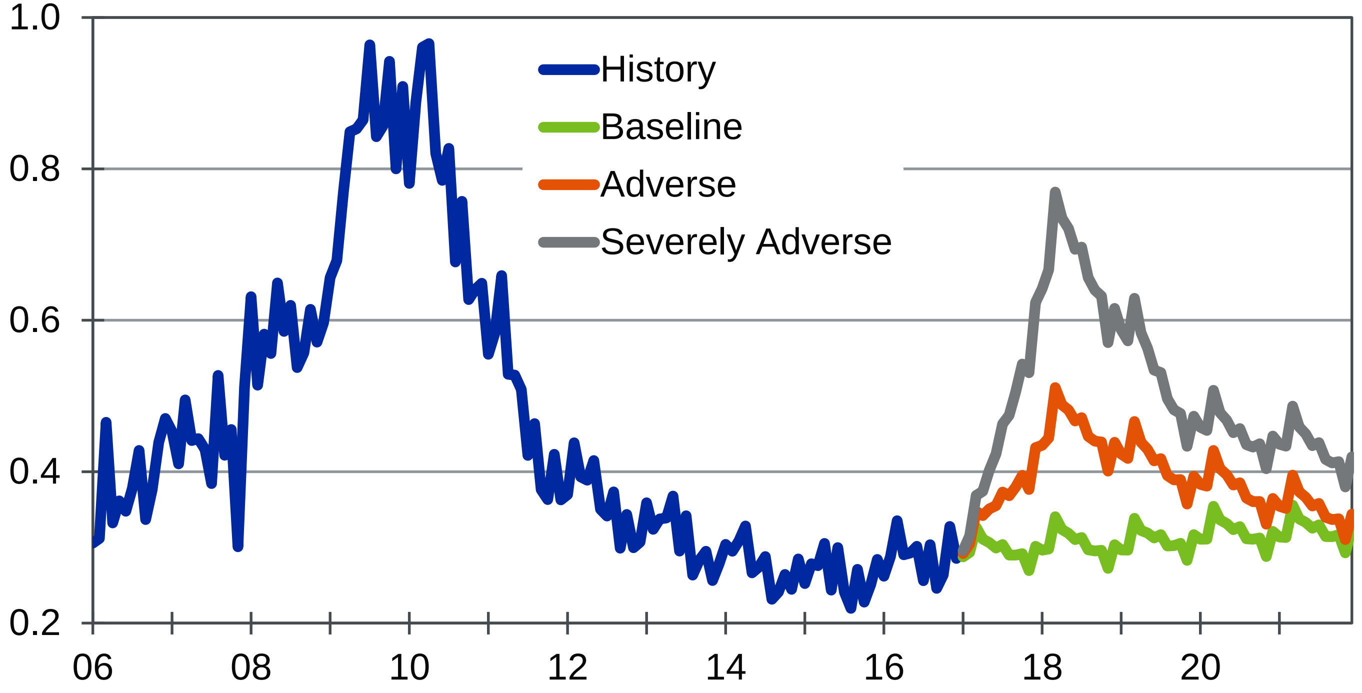
- What sample period should/can be used?
- What kind of segmentation is necessary? What kind of drivers are needed?
- Will the models have multiple purposes?
- What is the required turnaround time?
- What is a reasonable and supportable forecast horizon?
- Is mean reversion necessary? If so, how?
- How should we define or calculate lifetime? Are prepayments necessary?
- What needs to be modeled for each product? PD, LGD, EAD? Delinquencies?
- How much should I involve my accounting department in modeling decisions and output?

Common Drivers of Loss Models

Primary Model Drivers

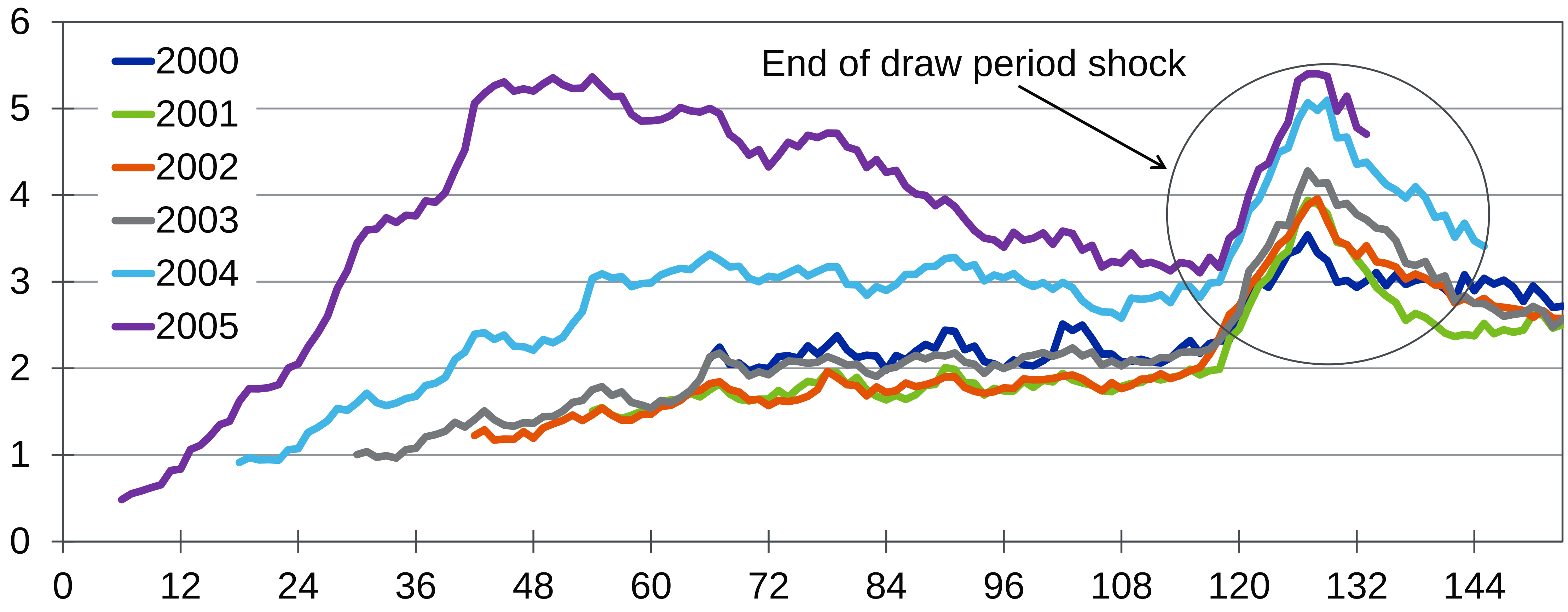
- » Life Cycle/Maturation Component
- » Time-Varying Macro Conditions
- » Vintage Quality Variables
- » Seasonality Dummies
- » Delinquency Roll Rates/Daisy Chain
- » Segment × Macro factor interactions

Bankcard Default Rate
% of outstanding balance



Maturation Analysis

HELOC Delinquency rate by origination vintage, % of $ volume outstanding

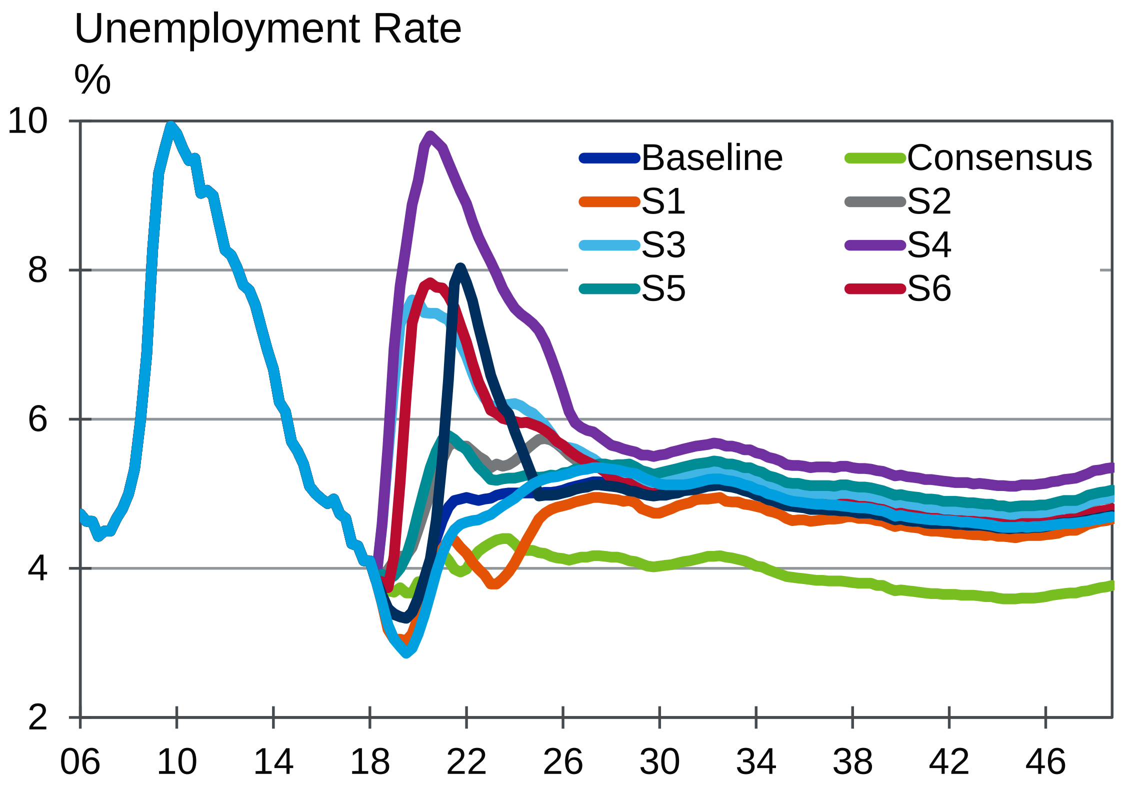


Sources: Equifax, Moody's Analytics

Models Should Consider Future Economic Conditions

Include Macro & Regional Forecast Factors

- » **Economic 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 Mark Indexes



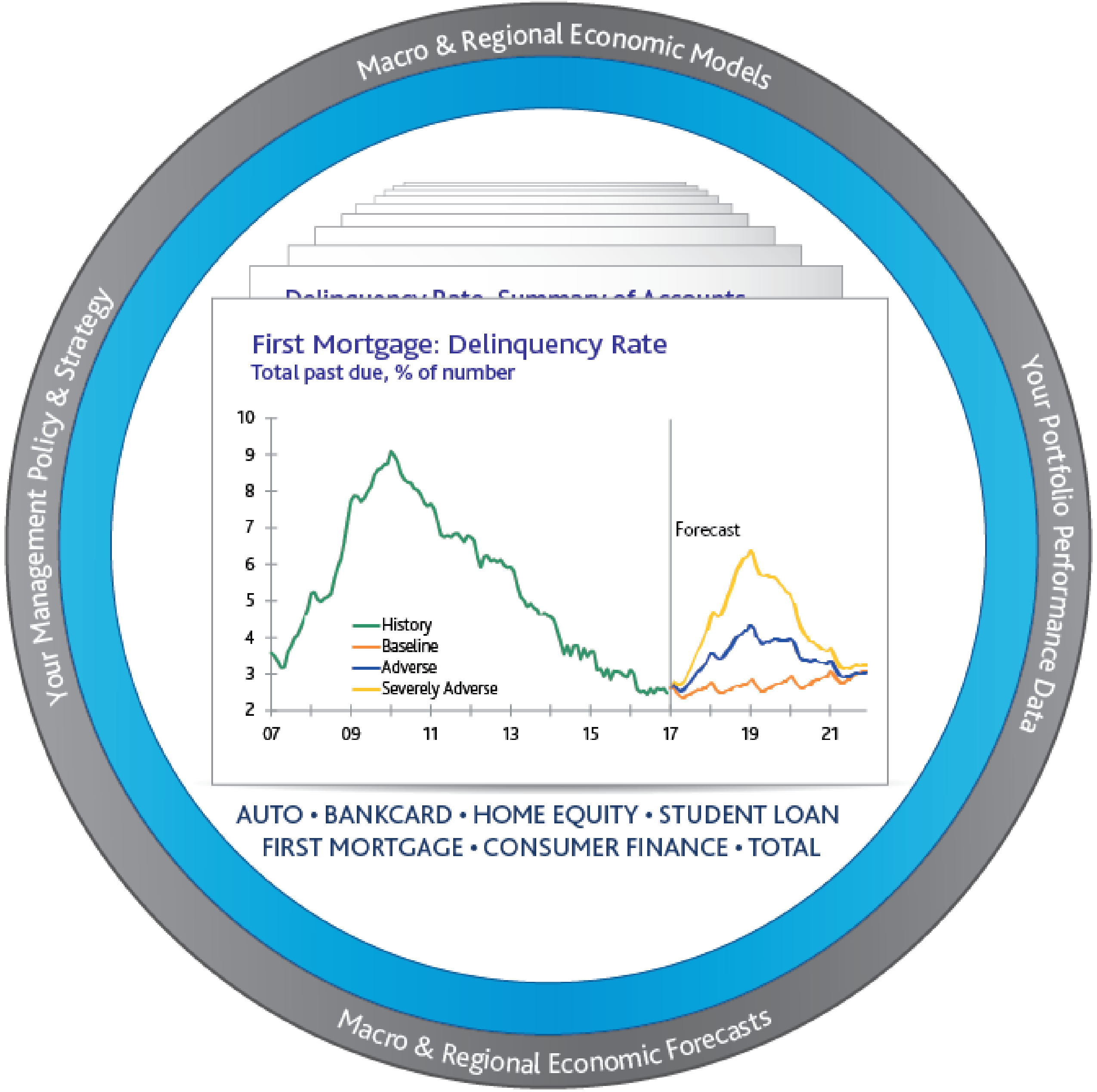
Our Integrated Consumer Credit Approach

» Macro & Regional Economic Forecasts

» Macro & Regional Economic Models

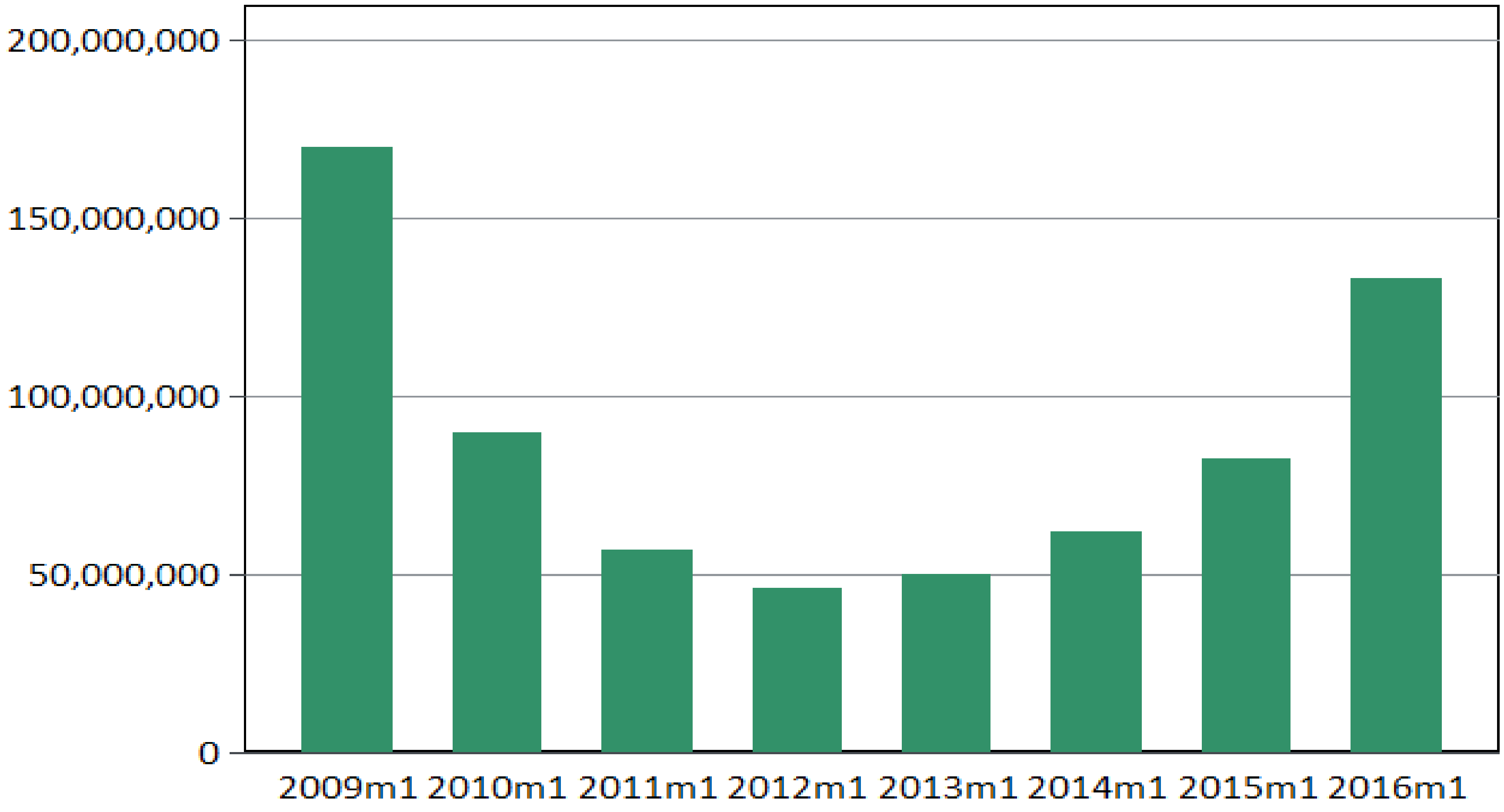
» Your Management Policy & Strategy

» Your Portfolio Performance Data



Final Output Will Vary Over Time

Lifetime net present value of losses by forecast start date



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Adjusting Stress Testing and IFRS9 Models for CECL

Stress Testing vs. CECL vs. IFRS 9

Requirement	Stress Testing	CECL	IFRS 9
Credit loss model	Wide range of models	• Single measurement • Wide range of models	• Dual measurement • Wide range of models
Forecast horizon	9 or 13 quarters	Expected lifetime	Expected lifetime
Future new accounts	Included	Excluded	Excluded
Future draws, cards	Included	Excluded	Included
Discounting	No	DCF method only	Yes
Scenario	Multiple	One or more	Multiple; probability weighted
Disclosures	N/A	Required	Required

Common Reports and Disclosures Needed for CECL

- Portfolio and Loss Allowance Reports (by segment)
- Qualitative Adjustment Reports
- Scenario Analysis Reports
- Trend Analysis Reports
- Variance and Comparison Reports
- Attribution Analysis
- Disclosures (Vintage Analysis, Allowance Roll Forward, Credit Quality Indicators, Past Due Receivables)

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Challenges with Credit Card Modeling

Paydown Curves Are Essential

Key Considerations

- Motivation
  - Under CECL, no credit losses should be recognized for credit exposures that are unconditionally cancellable by the issuer.
  - Allowance for unfunded commitments on credit cards (available credit) should not be evaluated.
- The standard defines lifetime as the life of the balance as of the evaluation date and not the account booking.
- To that end, pay-down curves must be constructed and applied to the snapshot balance in order to calculate losses under CECL.
- How do we apply payments to liquidate an account?

Payment Assumptions

» Payments could be applied to pre-existing balances or to any new purchases, finance charges, or other fees.

» How should payments be applied?

- "First In, First Out" (FIFO) where payments could be applied first to the "oldest" balances.

  Straightforward, but that approach is facing scrutiny from regulators.

- CARD Act

  Requires forecasting payments and balances and interest rate tiers to understand how future payments would be applied

- Other techniques such as a modification of FIFO or haircut based on draws.

  More conservative than FIFO. Implicitly allows for some payments to go to new draws.

» Modifications may depend on data– e.g. draws.

FIFO

All payments go to pay down CECL balance if there is no new draw

Month	UPB	Draw	Principal Payment	CECL Payment	CECL Balance	CECL CO
0	1000				1000	
1	900	0	100	100	900	
2	800	0	100	100	800	
3	700	0	100	100	700	
4	600	0	100	100	600	
5	600					
6	600					
7	600					
8	600					
9	600					
10	600					600

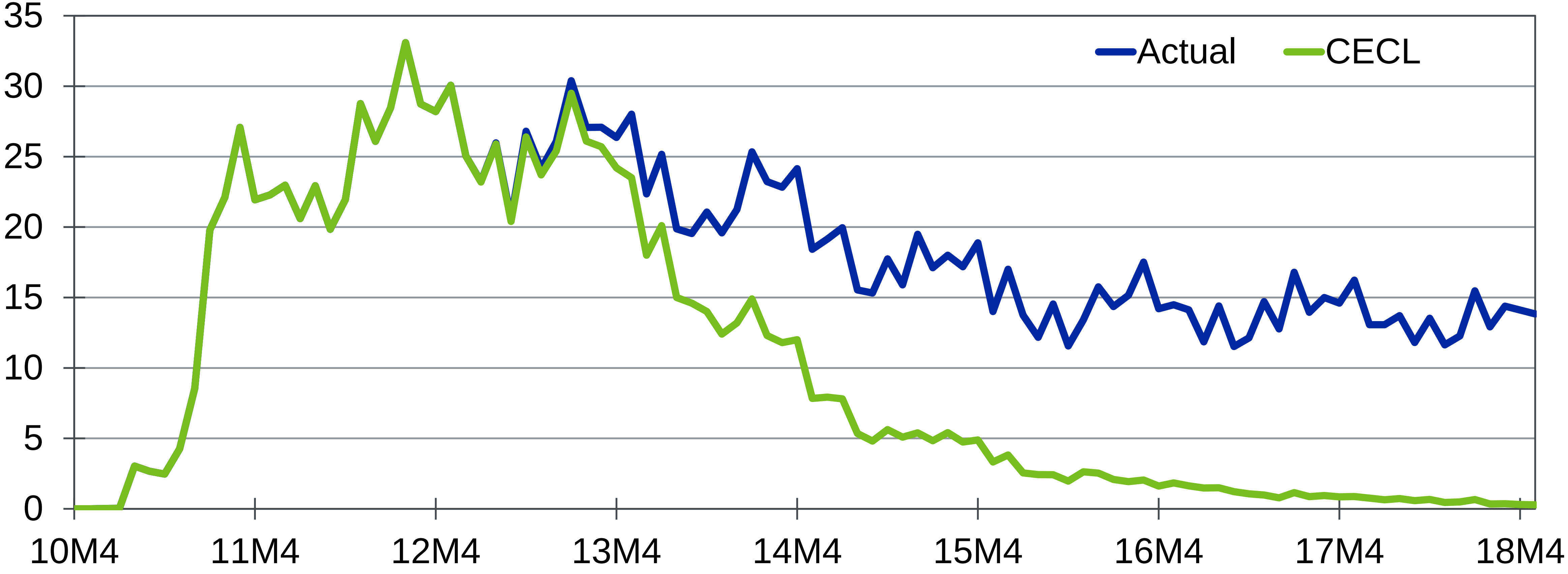
Proportional

CECL payment=payment*min(1, balance(0)/balance(t))

Month	UPB	Draw	Prin. Payment	CECL Payment	CECL Balance	CECL CO
0	1000				1000	
1	1100	200	100	100*1000/1100=91	909	
2	1200	200	100	100*1000/1200=83	826	
3	1300	200	100	100*1000/1300=77	749	
4	1400	200	100	100*1000/1400=71	677	
5	1400					
6	1400					
7	1400					
8	1400					
9	1400					
10	1400					677

Paydown Curves Are Essential

$ mil, 2012M6 balance sheet date, 2010Q2 booking



Sources: CFPB, Equifax, Moody’s Analytics

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Challenges with TDR and Recoveries Modeling

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.
- New: Reasonably expected TDR concept.

Challenges:

- TDR impact on expected losses.
- General institution specific policy matters.
- Transitions.
- Disclosures.

Troubled Debt Restructurings Definition and Modeling

TDR definition is important - What is considered a TDR?

If TDR, how to capture the behavior – Pool vs individual basis

- The amendments in Update 2016-13 eliminated the concept of an individually impaired loan.
- Separately, the Board rejected an approach that would require ECL on TDR to always be measured by using a DCF method on an individual basis.
  - This decision allows entities to assess credit risk on TDRs individually, or in a pool using other ECL methods such as loss rates.
- Standard allows losses to be projected on a pool basis when loans share similar risk characteristics.
- TDR transition is difficult to capture (If not TDR yet, what to do?).
- Should entities forecast all types of reasonably expected future TDRs on and include those in the calculation of expected credit losses?

Troubled Debt Restructurings and Concessions

How to deal with concessions, e.g. term extension, interest rate, etc?

- Could complicate DCF method.
- Will increase behavioral lifetimes.
- Impact prepayments delaying them.

Interest rate issue

“The Board agreed with the staff’s recommendations that an entity should recognize the effects of the TDR in the allowance for credit losses when a loan is individually identified as a reasonably expected TDR and use the DCF method if the TDR involves a concession that can be captured using only a DCF method (or another method that is reconcilable with a DCF method).”

Term issue

“An entity shall not extend the contractual term for expected extensions, renewals, and modifications ***unless it has a reasonable expectation at the reporting date that it will execute a TDR with the borrower****.”*

Recoveries

» Whether to include recoveries or not. And for which loans, e.g. existing defaults, future defaults.

» Future expected cash receipts ~~should~~ can be included in the pool-level and individual-level ECL, whether expected prior to individual charge-offs or post.

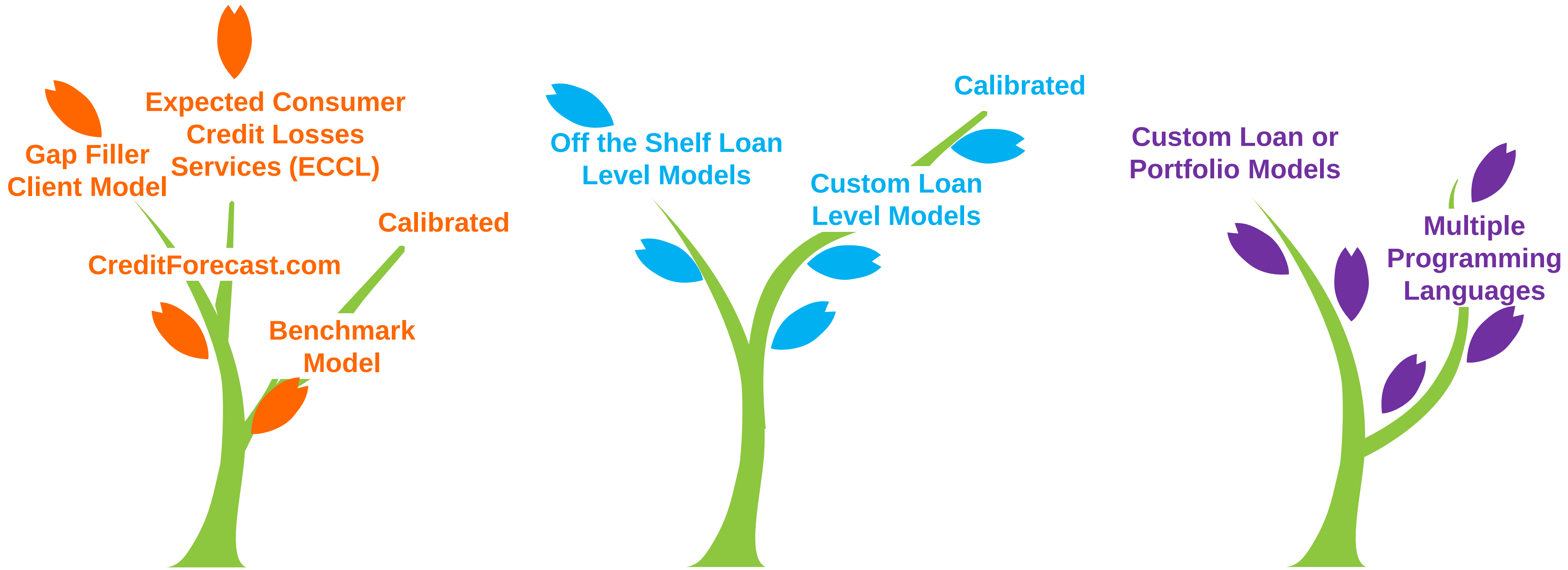
» Will be more important for loans such as mortgages and student loans with longer lifetimes.

» Issues with choice of methodology and timing of recoveries.

Moody's Analytics models take into account timing of recoveries.

Multiple Solution Paths

Matched to your unique portfolio characteristics and needs.



EXTERNAL DATA	INTERNAL DATA	INTERNAL DATA
EQUIFAX	SECURITIZED	LOAN/PORTFOLIO

Q&A

Additional questions?

Send an email to help@economy.com or contact:

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Upcoming Events

- August 15, 2018 Webinar: U.S. Consumer Credit Outlook
- September, 2018 Roundtable – Washington D.C.
- October 16, 2018 Webinar: CECL Off the Shelf Modelling Applications

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