CECL Methodologies: Loss Rate Model and Cohort Analysis

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Agenda

1. What is Cohort Level Analysis?
2. What are Loss Rate Models?
3. Examples Showing ECL Calculation
What is Cohort-Level Analysis?
Different Types of Analysis

Aggregate level

Historical time series of performance variables is available
The performance variable is linked to macro variables

Cohort level

Loan age is included in the model
Adding loan age makes it a more granular approach relative to aggregate level model

Loan Level

All available borrower attributes are included in the model in addition to loan age. The most granular approach
Aggregate vs Cohort Level Analysis

PD rate for first mortgages – Aggregate vs different vintages

Calendar time

PD

200401 200403 200405 200407 200409 200411 200501 200503 200505 200507 200509 200511 200601 200603 200605 200607 200609 200611 200701 200703 200705 200707 200709 200711 200801 200803 200805 200807 200809 200811 200901 200903 200905 200907 200909 200911 201001 201003 201005 201007

Pros and Cons of Different Types of Analysis

**Aggregate level**
- Simple data cleaning
- Easy to implement
- Could be inaccurate if loan characteristics are changing thru time

**Cohort level**
- More complex than aggregate level model
- Vintage differences are captured
- Still easy to implement

**Loan Level**
- More thorough data cleaning is needed
- Very complex in terms of estimation
- More accurate by including all loan attributes
- More applicable to different types of portfolios
- More difficult to implement
Pick Cohorts by Similar Risk Characteristics

Like:
- Product type
- Vintage
- Risk score
- Geography
- Collateral Type
- Materiality
- Term
- Historical or Expected loss Patterns

Too granular cohorts can result in too few loan counts and statistically insignificant results.
What are Loss Rate Models?

Models which predict future loss rates based on historical loss data
Loss Rate Model Pros and Cons

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
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<tbody>
<tr>
<td>▪ Transparent calculation. Simpler data requirements.</td>
<td>▪ Does not incorporate the cash flow schedule</td>
</tr>
<tr>
<td>▪ If sourced from a statistical model, it can capture the effect of</td>
<td>▪ Does not separate default risk from recovery risk</td>
</tr>
<tr>
<td>key risk drivers such as credit rating, loan age, size, industry,</td>
<td>▪ Cannot incorporate prepayment as a separate input; must be factored</td>
</tr>
<tr>
<td>and other loan characteristics</td>
<td>into the loss rate or remaining life</td>
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<tr>
<td>▪ Can incorporates the dependence on macroeconomic scenario</td>
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<td>▪ Possible to calibrate losses to institution’s historical experience</td>
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Modeling Loss Rates
Common Drivers of Loss Rate Models

**Life Cycle**
The age of loans

**Economy**
Conditions every month

**Pool Quality**
Parallel shifts

**Interactions**
Quality & Life-cycle
Incorporate R&S Future Economic Conditions

Include both national and regional forecast economic 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

Unemployment rate, %
Capture Local Economic Conditions

Unemployment rate, %

National

State

Metro

2019Q3
Which metro area has the LOWEST unemployment rate?
Which metro area has the HIGHEST unemployment rate?
Using Loss Rates in CECL Calculation
Using Loss Rates to Calculate ECL

- Unpaid Principal Balance = $1,000,000
- Amortized Cost = $986,732
- Remaining maturity = 5 years
- Fixed Coupon Rate = 5%
- Effective Interest Rate = 5.5%
- Amortization type = Linear
- Payment Frequency = Annual
- Annual Prepayment Rate = 5%
**Loss Rate Annualized Approach**

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Formula</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amortized Cost = $986,732</td>
<td>Allowance = EAD X <strong>Annualized Loss Rate</strong> X Remaining Lifetime</td>
<td>Allowance = 986,732 x 0.0025 x 5 = 12,334</td>
</tr>
<tr>
<td>Remaining maturity = 5 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed Coupon Rate = 5%</td>
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<tr>
<td>Amortization type = Linear</td>
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</tr>
<tr>
<td><strong>Annualized Loss Rate = 0.25%</strong></td>
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## Loss Rate Lifetime Approach

### Assumptions
- Amortized Cost = $986,732
- Remaining maturity = 5 years
- Amortization type = Linear
- **Lifetime Loss Rate = 4.2%**

### Formula

Allowance = EAD \times \text{Lifetime Loss Rate}

### Output

Allowance = 986,732 \times 0.042

= 41,443