OHIO CREDIT UNION LEAGUE

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

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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

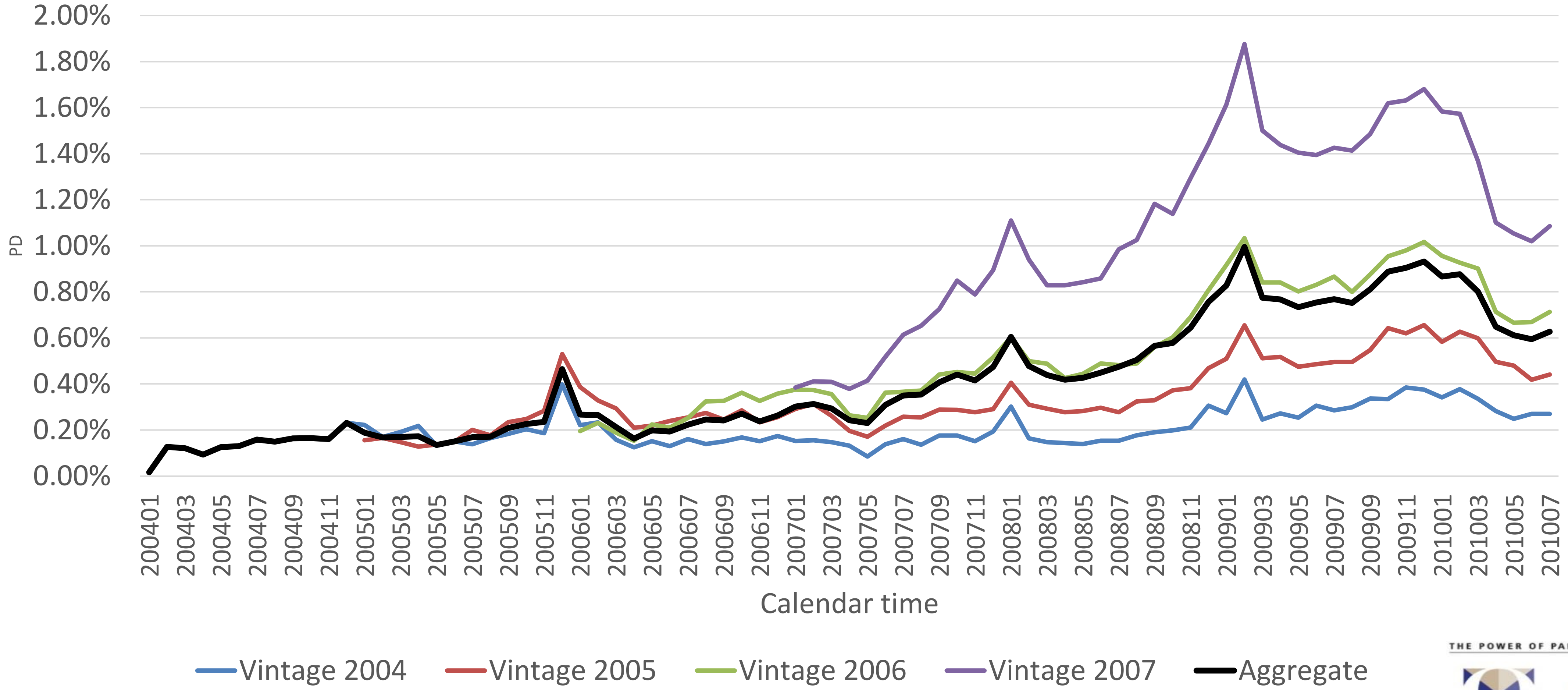
Adding loan age makes it a more granular approach relative to aggregate level model

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



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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?

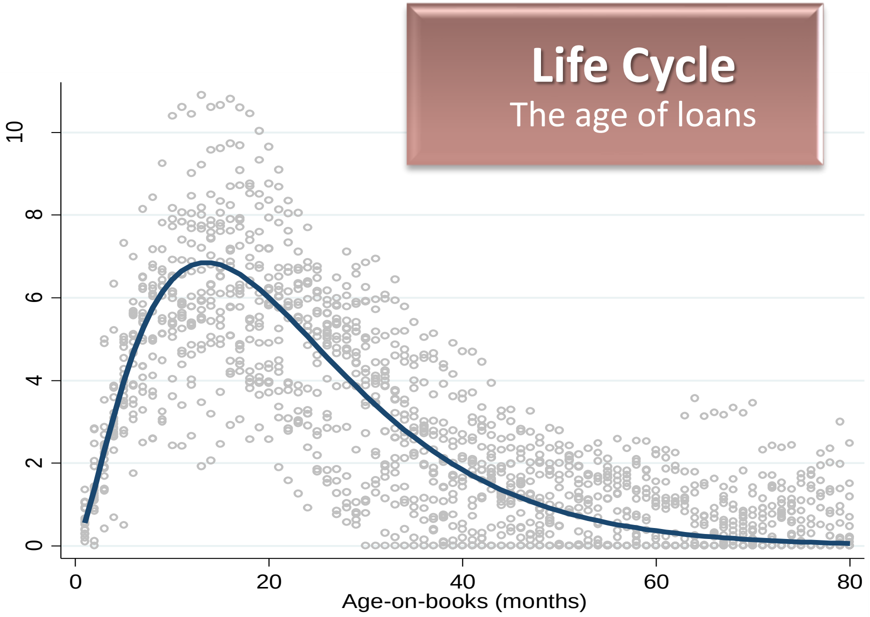
Models which predict future loss rates based on historical loss data

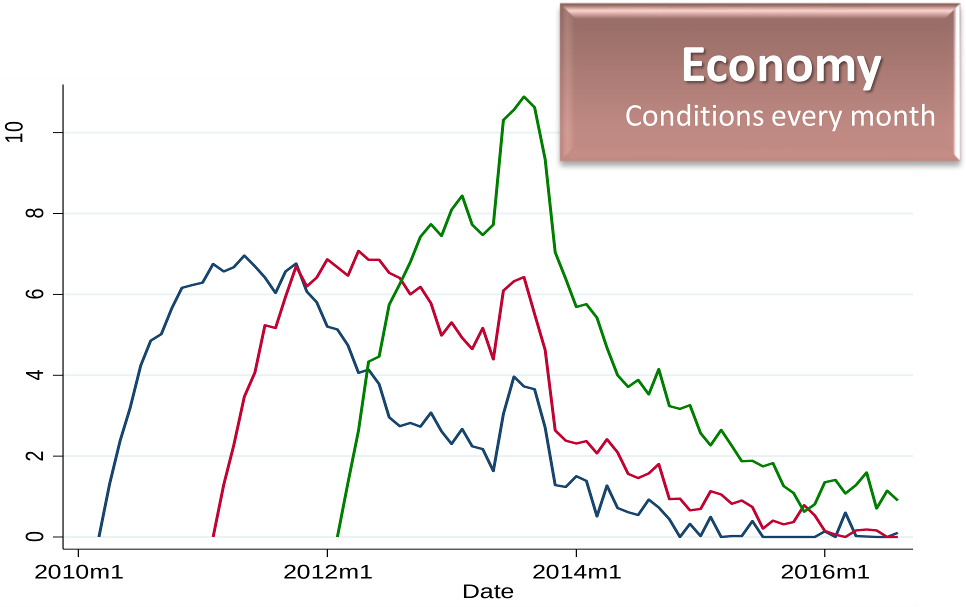
Loss Rate Model Pros and Cons

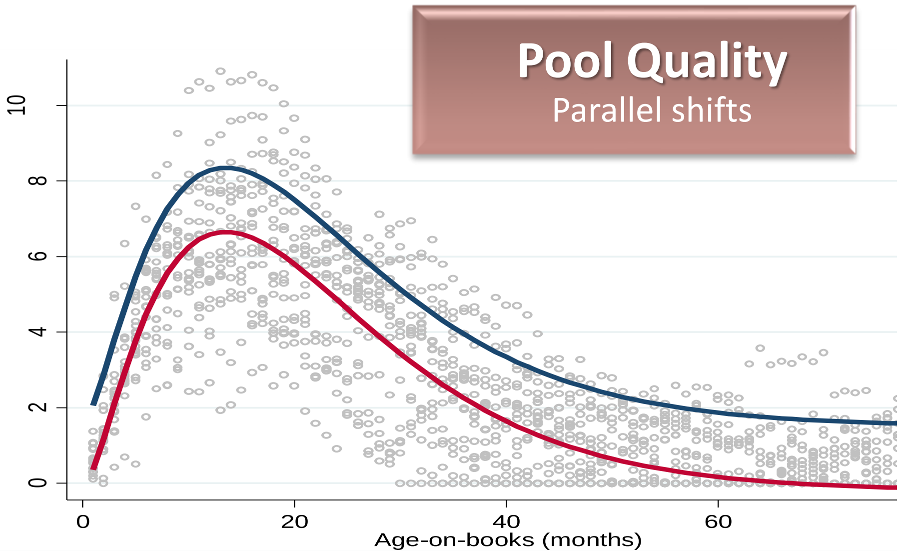
PROS	CONS
▪ Transparent calculation. Simpler data requirements. ▪ If sourced from a statistical model, it can capture the effect of key risk drivers such as credit rating, loan age, size, industry, and other loan characteristics ▪ Can incorporates the dependence on macroeconomic scenario ▪ Possible to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

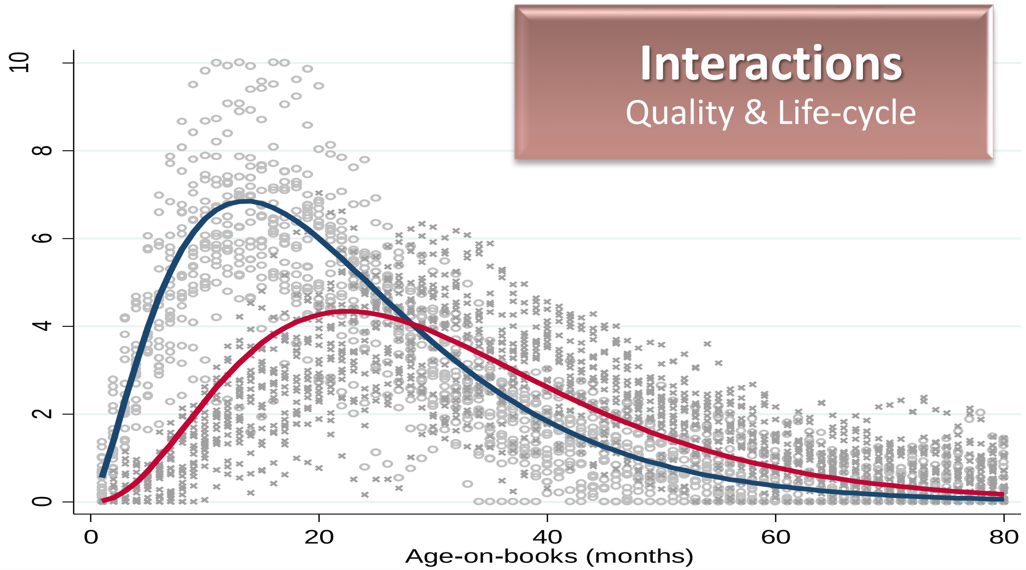
Modeling Loss Rates

Common Drivers of Loss Rate Models









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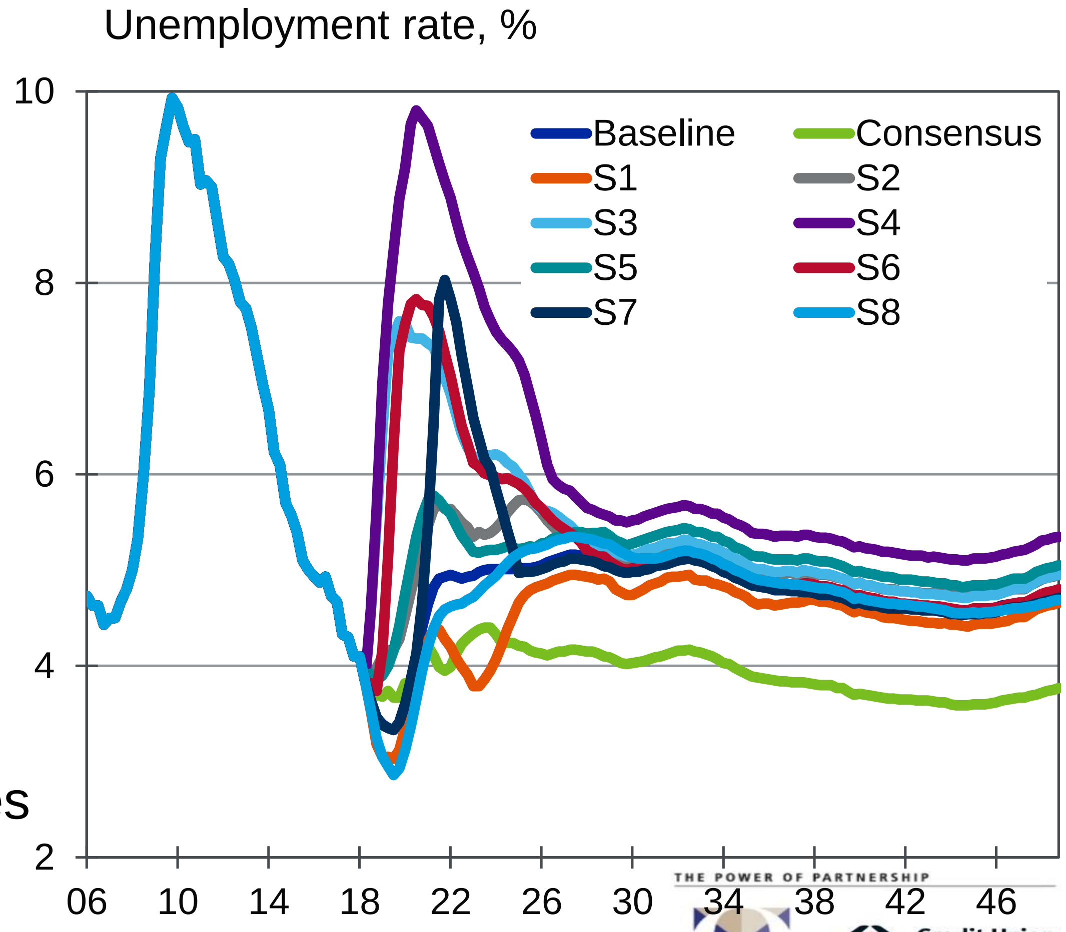
Incorporate R&S Future Economic Conditions

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



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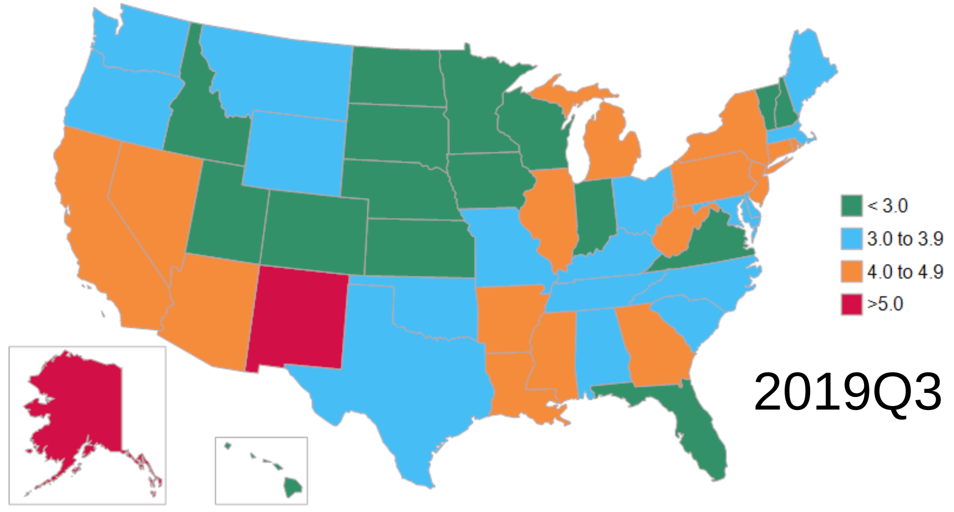
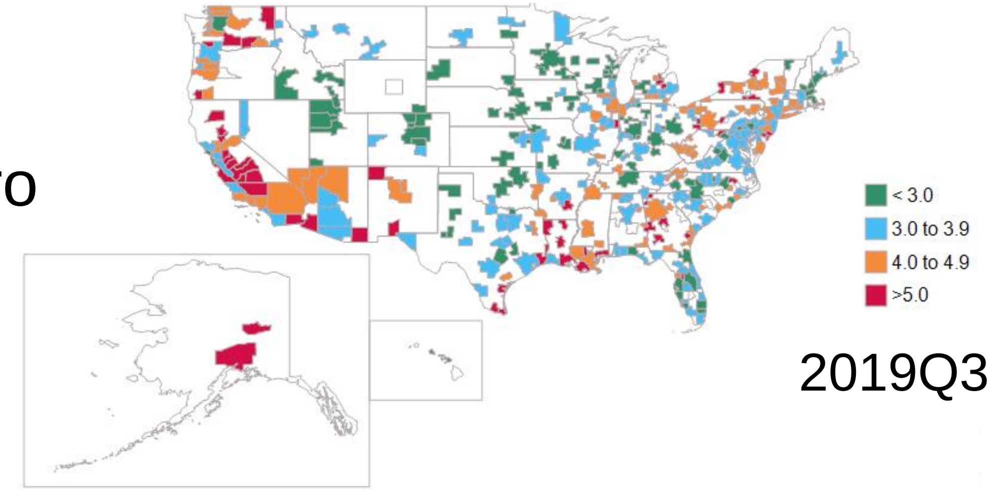
Capture Local Economic Conditions

State



Metro



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

Assumptions	Formula	Output
» Amortized Cost = $ 986,732 » Remaining maturity = 5 years » Fixed Coupon Rate = 5% » Amortization type = Linear » **Annualized Loss Rate = 0.25%**	Allowance = EAD X **Annualized Loss Rate** X Remaining Lifetime	Allowance = 986,732 x **0.0025** x 5 = 12,334

Loss Rate Lifetime Approach

Assumptions	Formula	Output
» Amortized Cost = $986,732 » Remaining maturity = 5 years » Amortization type = Linear » **Lifetime Loss Rate = 4.2%**	Allowance = EAD X **Lifetime Loss Rate**	Allowance = 986,732 **x** **0.042** = 41,443

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