Loss Reserving Analysis for Tech-Us-Out Insurance

Team Name: Risk Harmony

Date: 2025/11/14

Outline

- Challenge & Our Goal
- Methodology & Key Assumptions
- Core Results & Insights
- Business Implications & Recommendations

Challenge & Our Goal

- Challenge:
  - Long-tail nature of Workers Compensation liabilities
  - Uncertainty in medical cost inflation

- Our Goal:
  - Quantify outstanding claim liabilities
  - Identify key risk drivers and uncertainties
  - Provide reliable predictions
  - Support financial planning and capital management

Method

Method	Reason	Application
Loss Development Analysis	• Uses TUO's reliable internal data • Most objective, data-driven approach	Primary valuation method
Frequency-Severity Analysis	• In-depth diagnostic tool • Isolates key drivers like inflation • More granular than premium-based methods	Cross-validation tool

Why Not **Bornhuetter-Ferguson**?: When internal data is reliable, assuming external loss ratios introduces unnecessary guesswork and reduces objectivity.

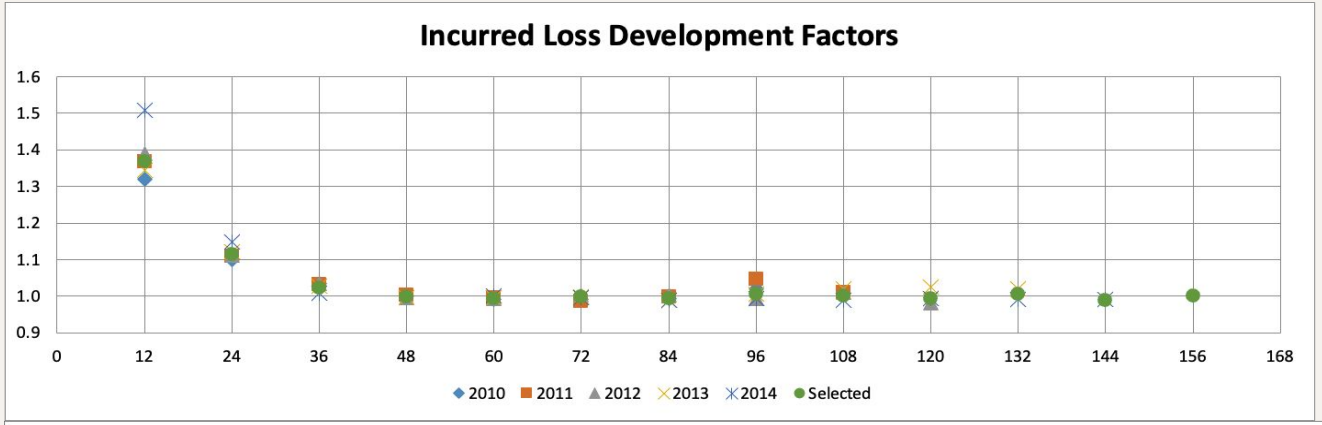
Key Assumptions & Data Foundation

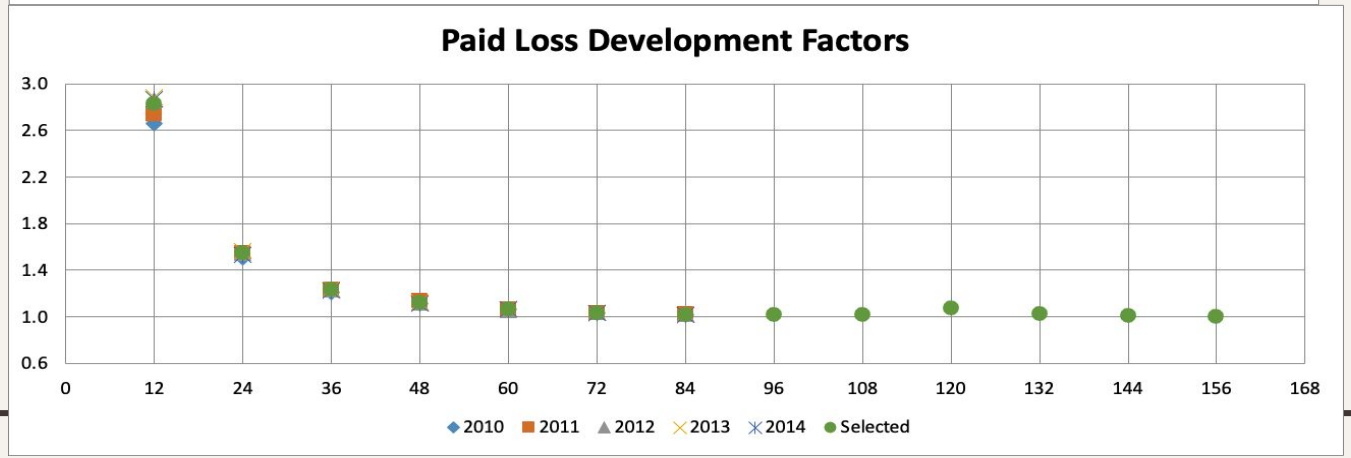
- Data Quality Assumptions:
  - Historical data is complete and accurate
  - Development patterns remain relatively stable
  - No structural changes in business environment
- Technical Assumptions:
  - Development factors based on historical averages
  - Tail factors reflect long-term development characteristics
  - Catastrophe events appropriately handled and excluded
- Logistical Assumptions:
  - Business environment remains consistent
  - Physical enviornment remains stable (no natural disasters, pandemics, etc)

Methodology

Loss Development

Base Indem Tri Factor Selection





Adjustment for outliers and catastrophe.

Methodology for selecting paid factors

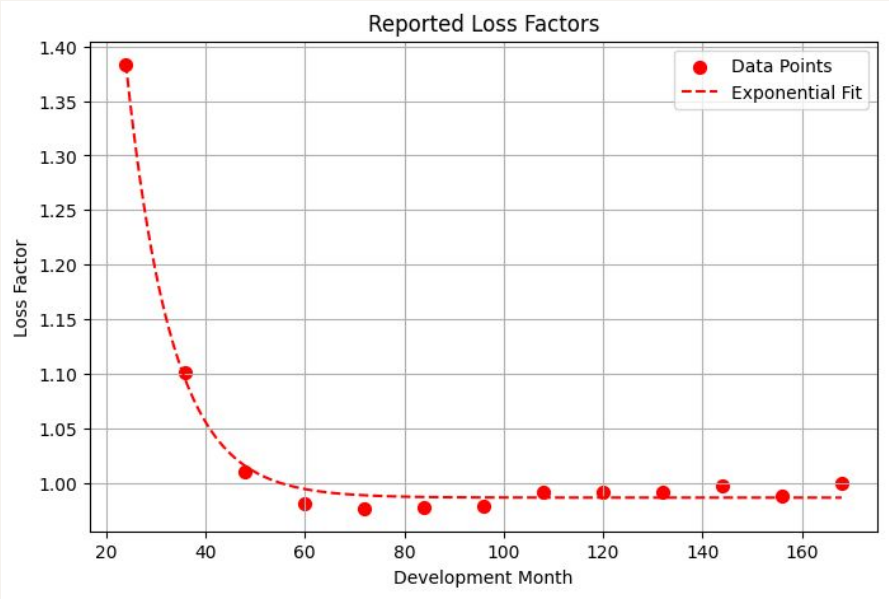
Time weighted average.

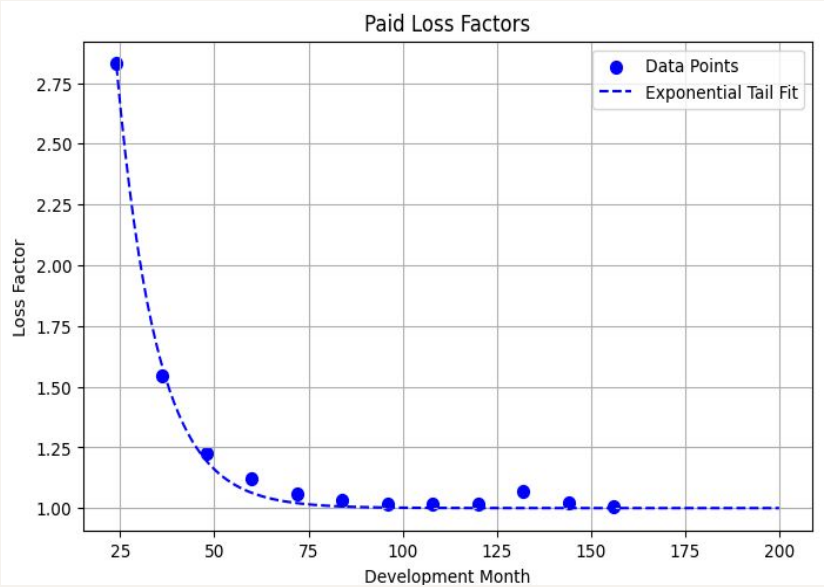
Methodology for selecting incurred factors.

Inflation adjustment and randomness reduction

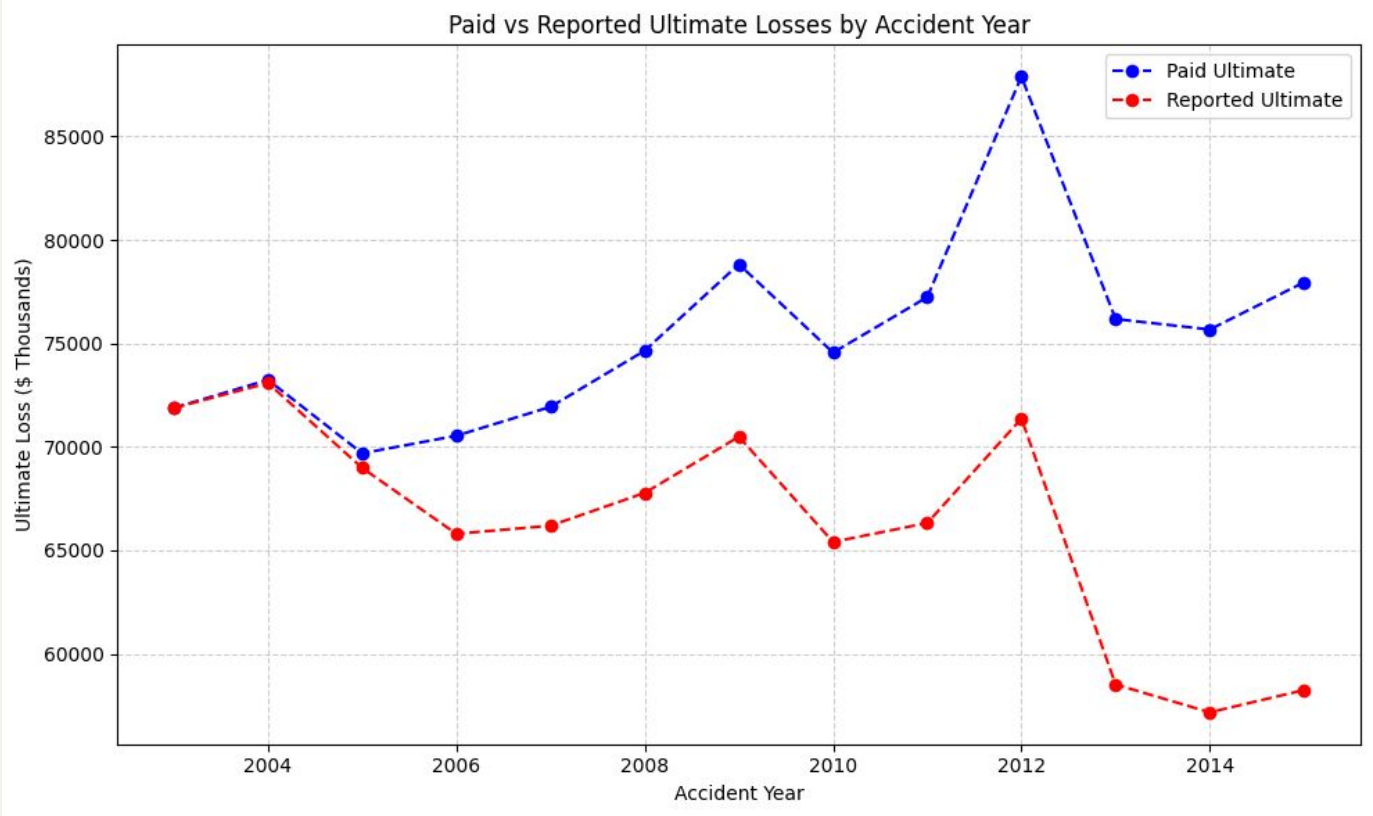
Finding Tail Factor

Fitting factors to the exponential decay curve. (40 year work period)

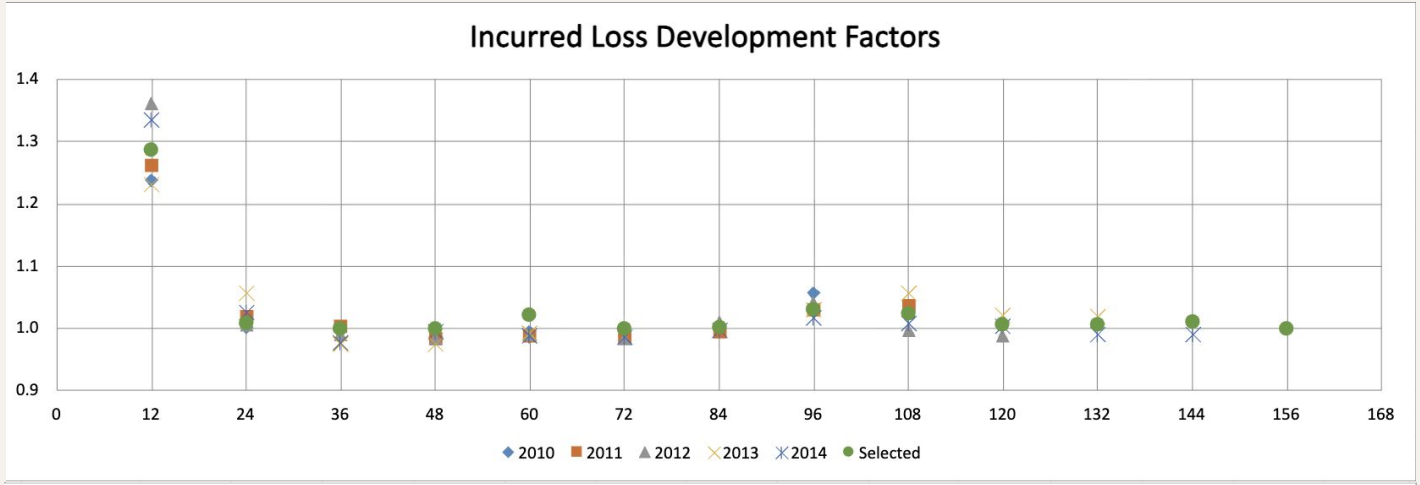


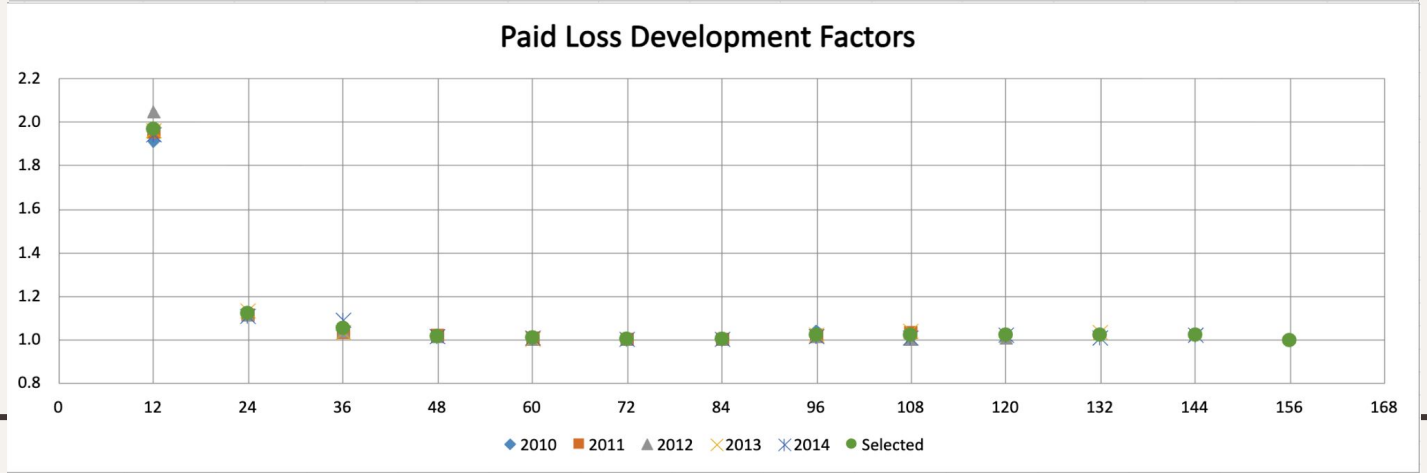


Ultimate Results (Comparison and Analysis)



Med Indem Tri Development Factors





Dealing with incomplete data

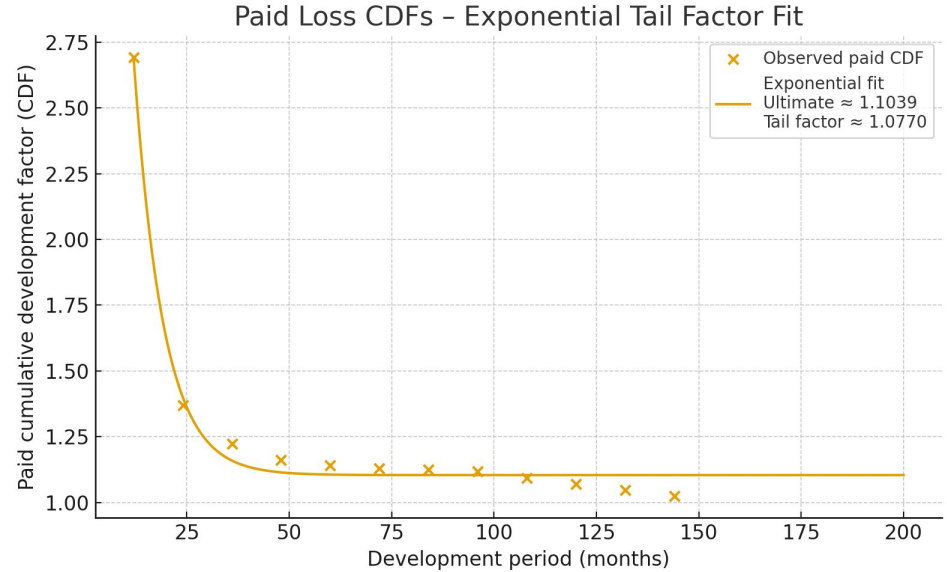
Volume Weighted Averages for Paid and Incurred

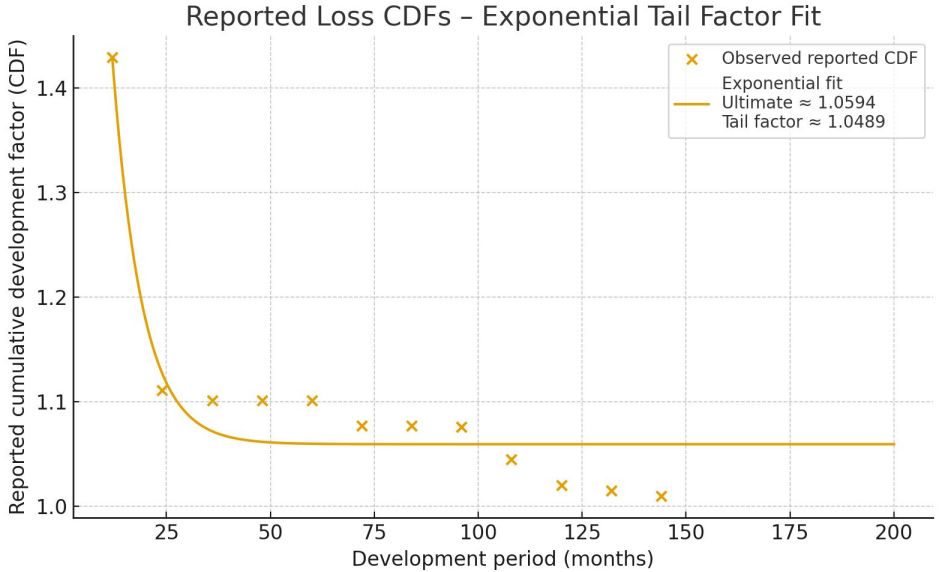
Considering Inflation

Dealing with outlier factors

Med Indem Tri Tail factors

Tail factors were computed by fitting CDF's to a curve





Core Results For Loss Development Method

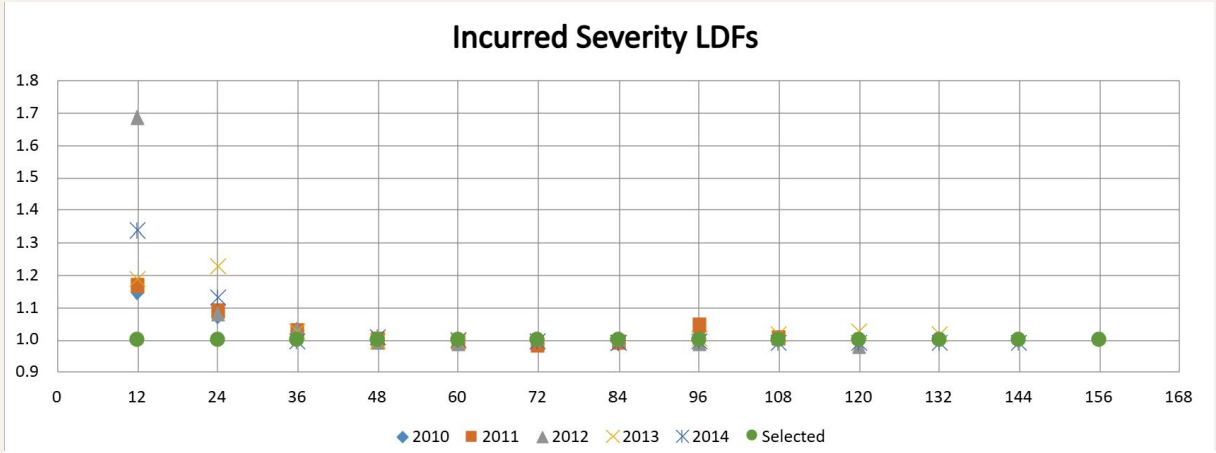
Ultimate Loss Projections:

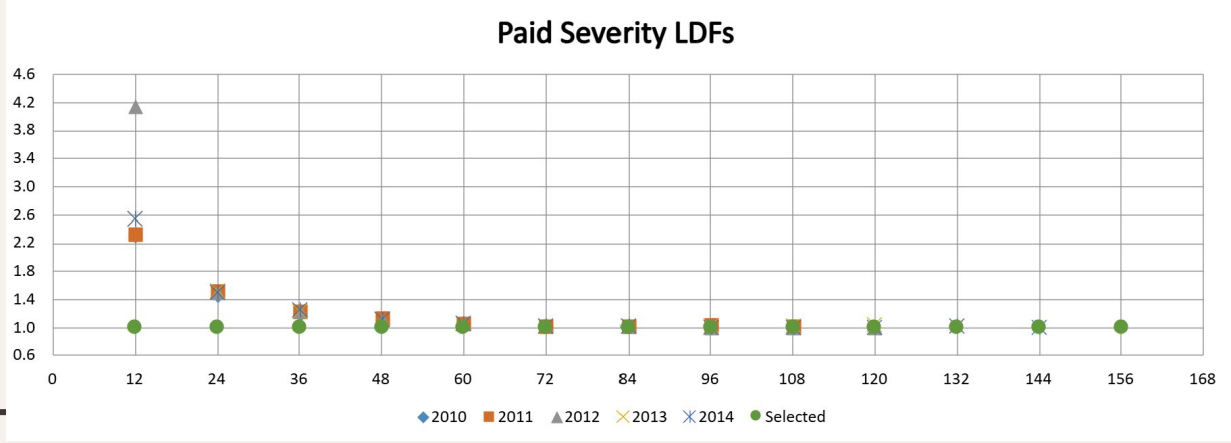
Component	Amount ($)	Percentage
Indemnity Ultimate Losses	$988,232.63	46.9%
Medical Ultimate Losses	$1,115,654.00	53.1%
Total Ultimate Losses	$2,103,886	100%

Methodology

Frequency Severity Method

Base Indem Sev Factor Selection





Early growth, later stable

Paid settles faster than incurred

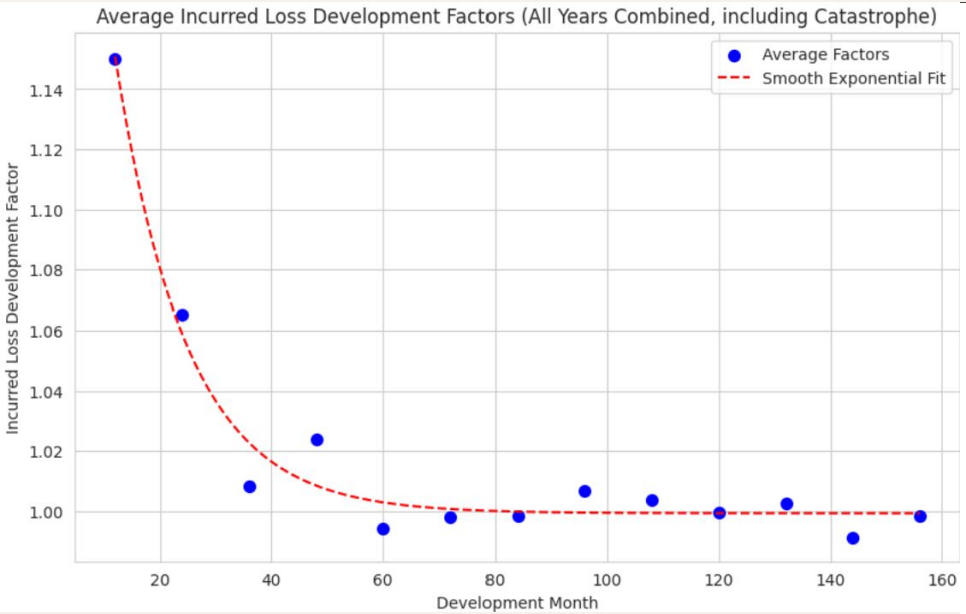
One outlier year (AY 2012) shows abnormally large severity

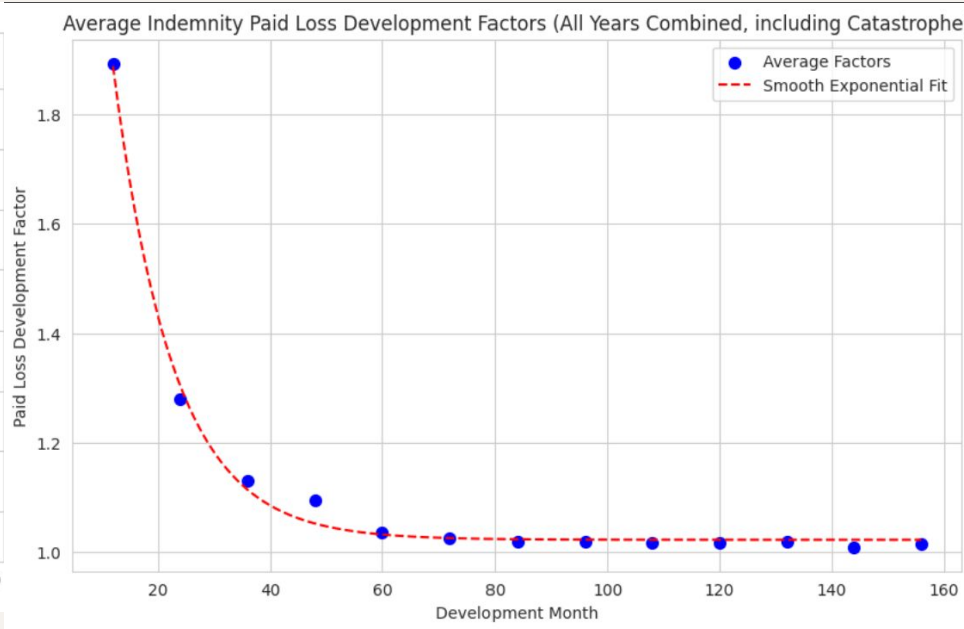
Smoothed / weighted to reduce impact of 2012

Selected LDFs ≈ 1.0 → stable & mature claims

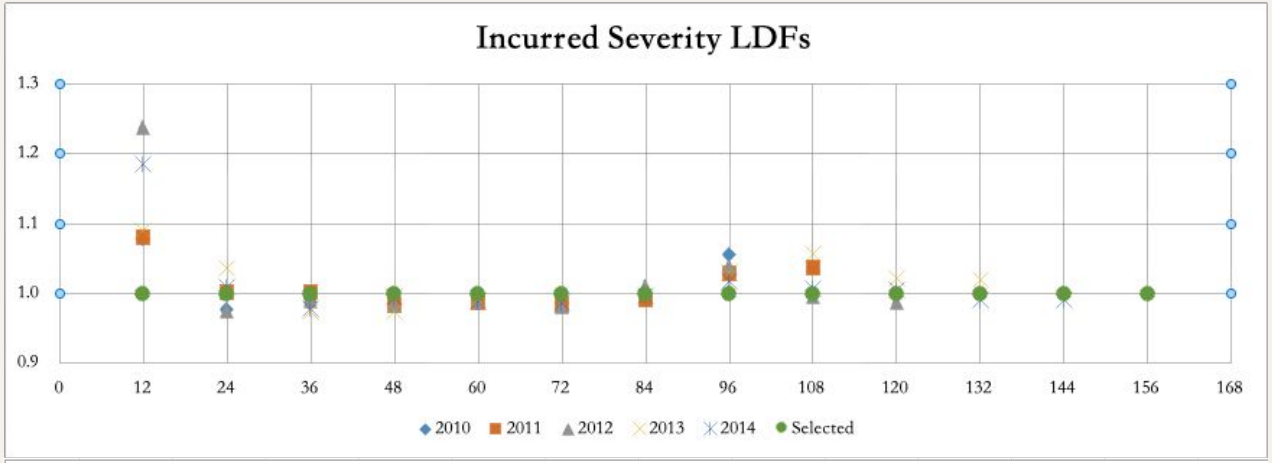
Low reserve development risk

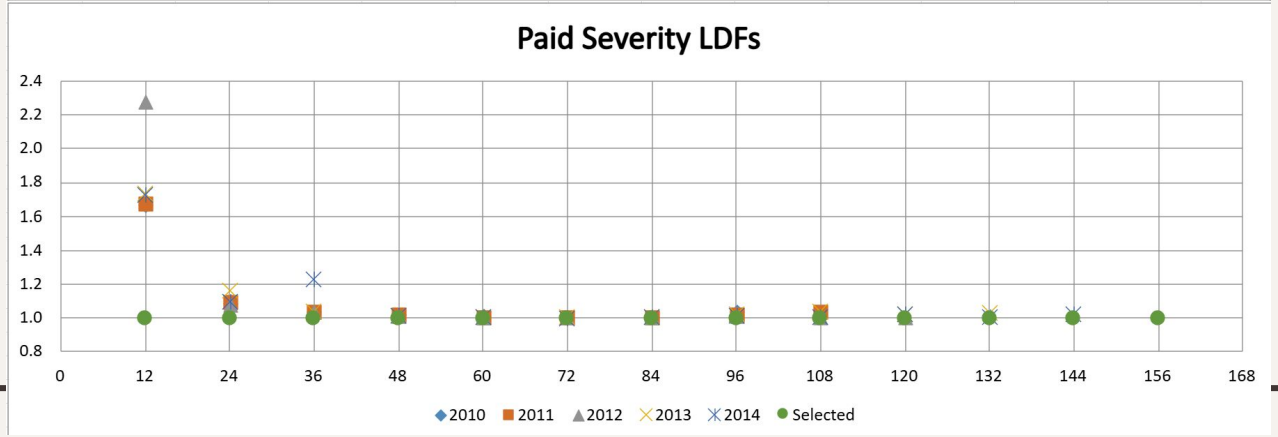
Finding Tail Factor（with catastrophe)





Base Med Sev Factor Selection





Early development > 1.0 → claims still maturing

Stabilizes after ~60–84 months

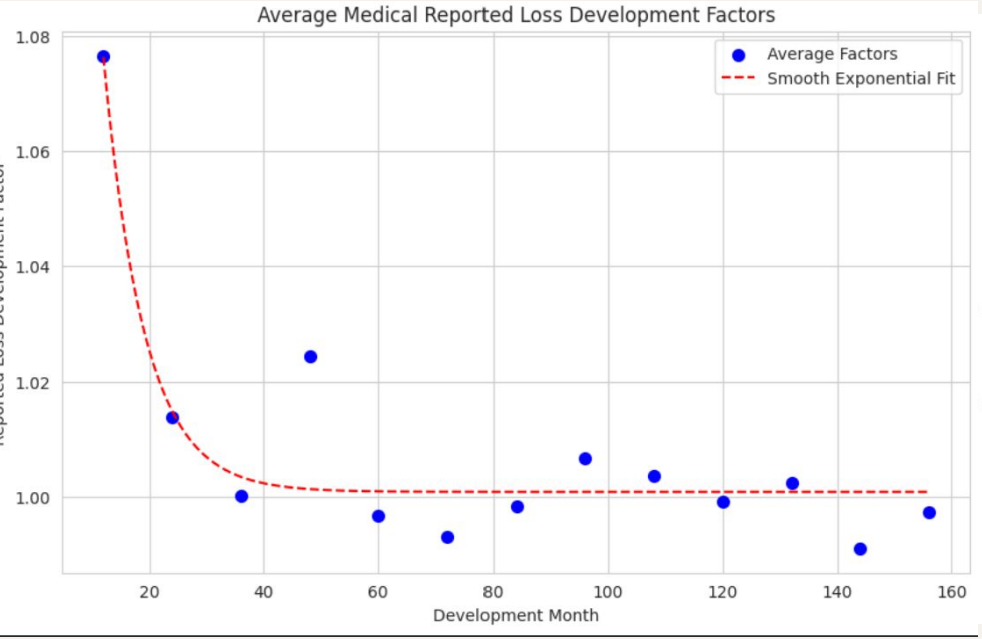
Paid settles faster than reported

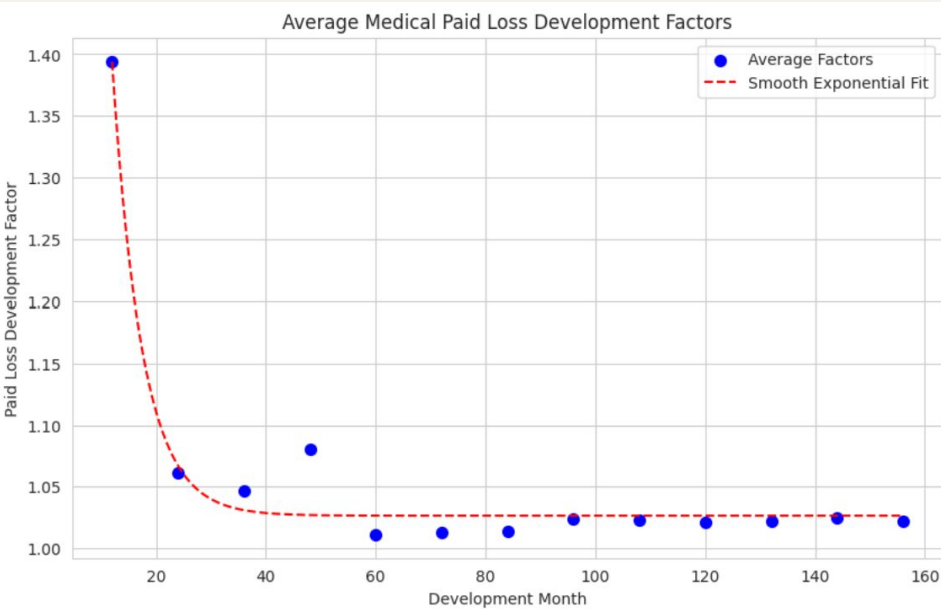
One outlier year (AY 2012) with unusually high medical severity

Mitigated using smoothed / weighted averages

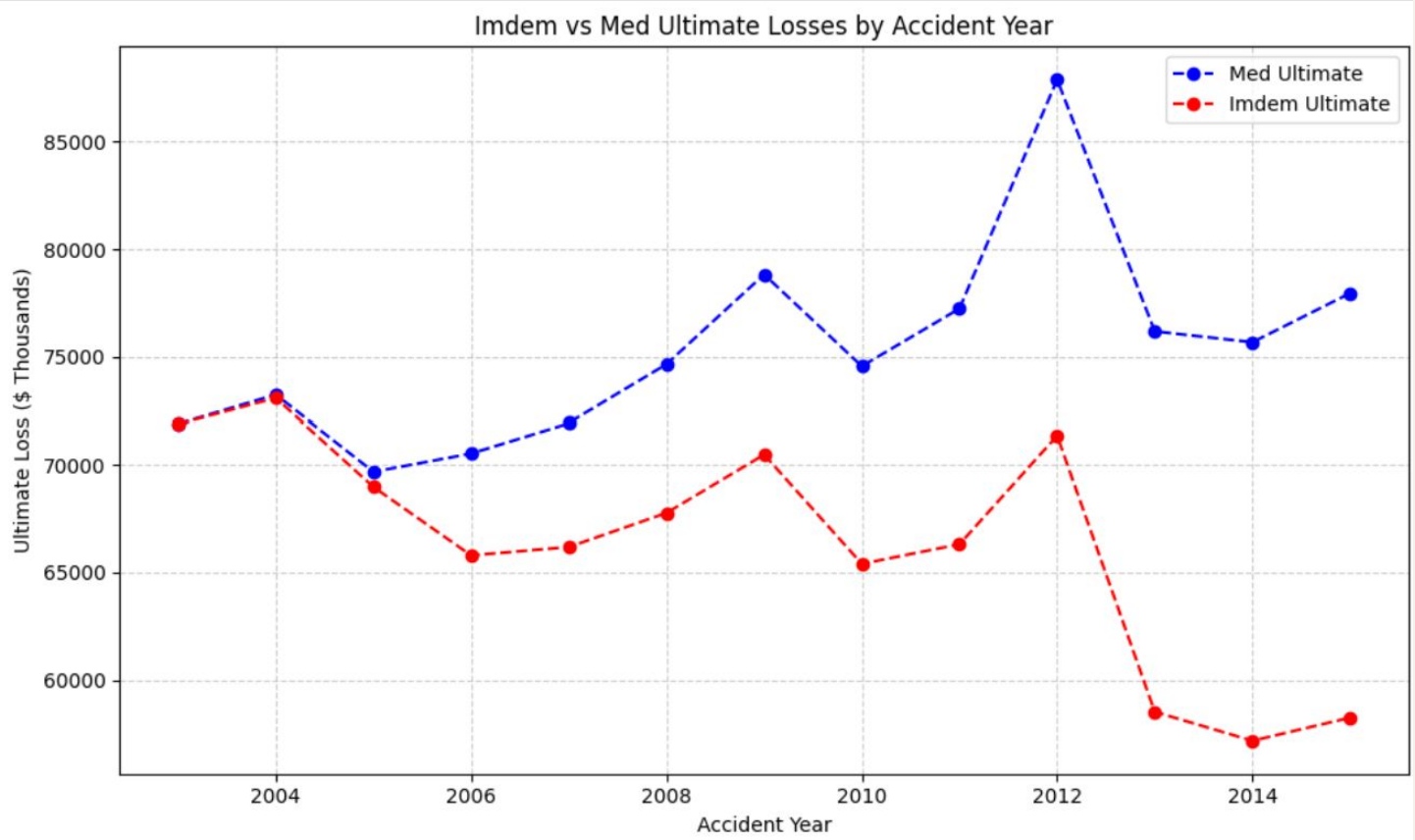
Selected LDFs ≈ 1.0 → stable reserves with low future risk

Tail Factor


Average Medical Reported Loss Development Factors
Average Factors
Smooth Exponential Fit
1.08
1.06
1.04
1.02
1.00
20
40
60
80
100
120
140
160
Development Month


Average Medical Paid Loss Development Factors
Average Factors
Smooth Exponential Fit
Paid Loss Development Factor
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
20
40
60
80
100
120
140
160
Development Month

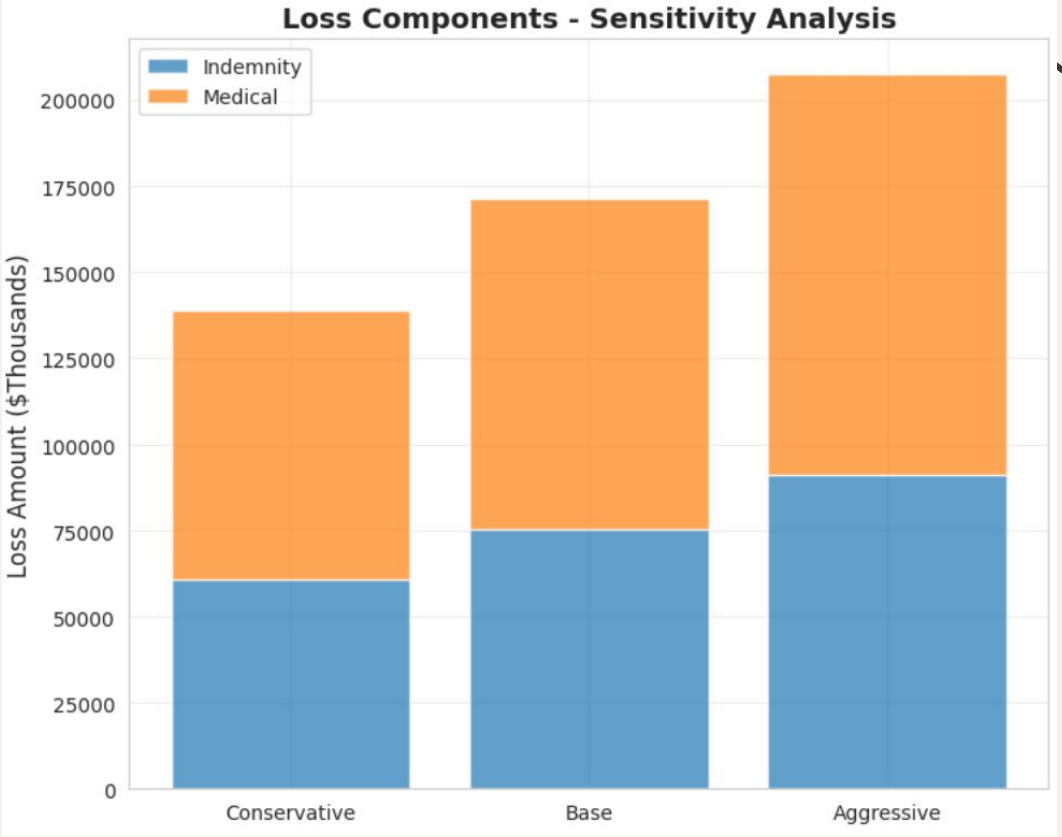
Ultimate results (aspect 1: comparsion of two losses)



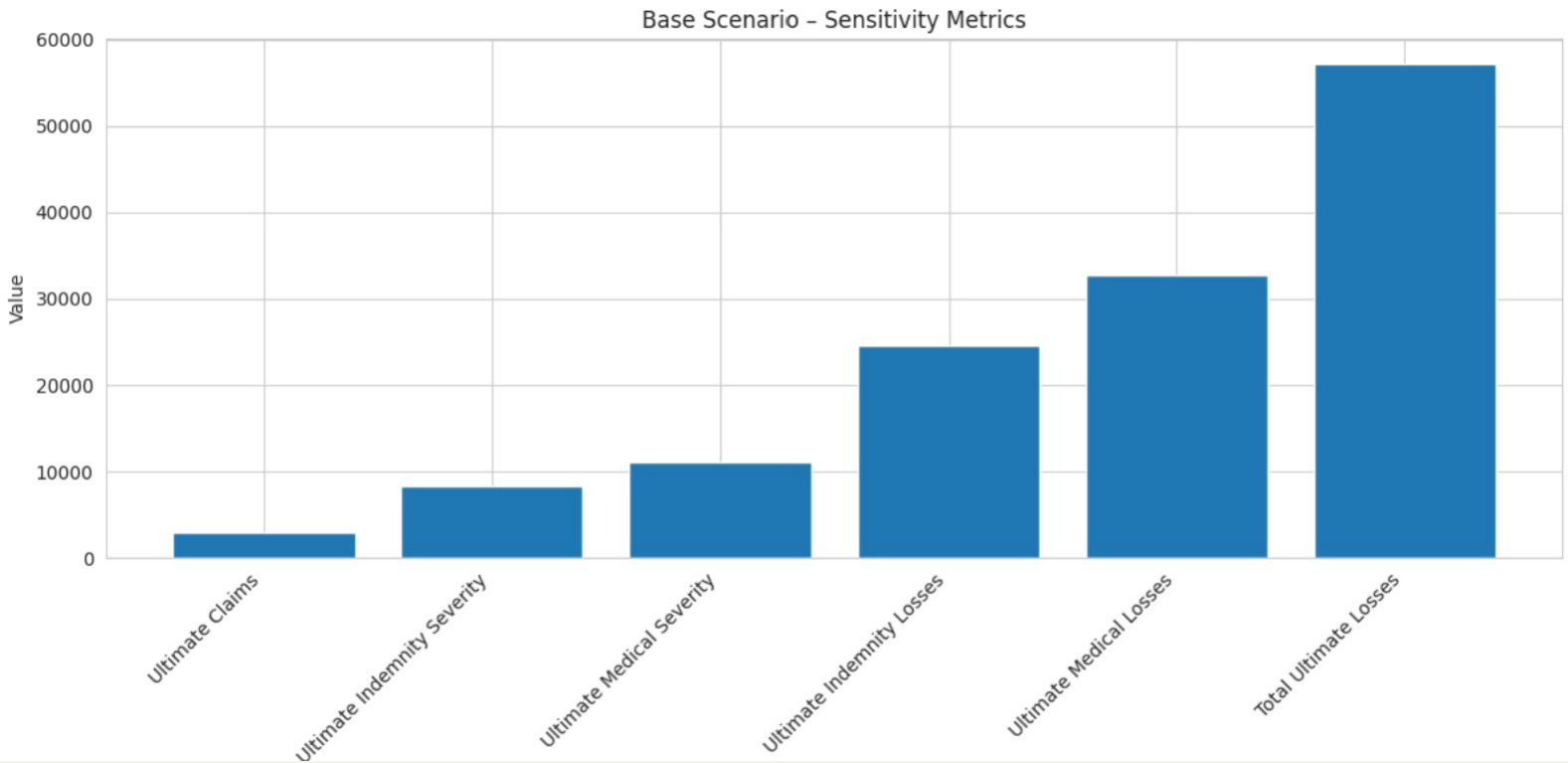
Aspect 2: Sensitivity Analysis

rate of change(increase):

Indemnity < Medical



Aspect 2:
Sensitivity Analysis



Core Results For Frequency Severity Method

Ultimate Loss Projections:

Component	Amount ($)	Percentage
Indemnity Ultimate Losses	$988,232	46.3%
Medical Ultimate Losses	$1,145,040	53.7%
Total Ultimate Losses	$2,133,272	100%

Comparison of Results

LDA	FSA
Total Ultimate ≈ $2.1M Loss patterns are stable, Low rate of future developments.	Total Ultimate = $2.1M Rising medical severity; Stable claim frequency

Overall: Reserves are in good shape, but inflation and increasing medical losses should be monitored.

Insights

- Medical costs = 53% of total → shift to medical-driven losses.
- Inflation is a concern.
- Need stronger focus on medical cost control.
- Faster settlements and LDF ≈ 1.0 → low reserve development risk.
- Both show stability in the cost of claim amounts
- FSA confirms LDA estimate

Further Action

- Invest in medical infrastructure
- Update tail factors annually to maintain long-tail accuracy.
- Integrate FSA into routine reserve reviews for early trend detection.
- Develop dynamic reserving models that adjust for inflation and legal shifts.
- Enhance collaboration between actuarial and data collection teams.

Thanks for Listening

We appreciate your interest compounded annually :)