PRIMA'S 2019 RISK MANAGEMENT
WEBINAR SERIES

Understanding Actuarial Reports

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Discussion Points

- The Why, Who, What, When and How of an actuarial report
- 2 conclusions of actuarial report:
  - Liabilities
  - Funding

An Actuary is…

- A business professional who analyzes the financial consequences of risk.

  Actuaries use mathematics, statistics, and financial theory to study uncertain future events, especially those of concern to insurance programs.

Actuarial Objective

- Quantify $$ of risk of future contingent events
  - Timing uncertain
  - Ultimate payment uncertain until claim closed

Who Uses Actuarial Results?

- Traditional uses:
  - Insurance: Casualty (WC, Liability, Property, etc.), Retirement, Social Security, Life insurance
- Self-insurance: affordability and availability
- Non-traditional uses:
  - Loyalty programs: frequent fliers, store coupons

Stakeholders

- Financial statement perspective:
  - What you own and what you owe
- Auditors – rely on actuary's estimate of liabilities
- Regulators protect public interest
  - Solvency monitoring
- Rating agencies
- Entities:
  - Financial compliance
  - Budgeting
  - Program structure: SIRs, deductibles, agg. stop loss, etc.

Definitions

- *Risk*: Deviation or variability around an expected outcome
  - Uncertainty in timing and amount of payment
- *Liquidity*: Ability to pay short term liabilities, usually in one year
- *Solvency*: Ability to pay all liabilities in the long-run

Insurance Characteristics

- Pay generally fixed premium up front for a promise to pay claims later
- Claims will not be known for a while and are subject to variability
- Surplus (net position) cushions variability

When Is The Actuarial Report Needed?

- Annually
  - Budgetary decisions for upcoming fiscal year,
  - To record on financial statements (CAFR) at year-end
- Quarterly
  - For regulators, etc.
- Biennially
  - Usually for small, stable programs

Key Process

- Estimate ultimate loss “today”
  - As of a given accounting or valuation date
  - Before all claims are closed or reported
- Ultimate a.k.a. final settlement cost
- Ultimate cost estimated by actuarial methods

Why An Actuarial Report? Estimate Liabilities

- Self-insurance program is like an insurance enterprise
  - Self-insures (maybe to a limit) Liability, WC risks
  - Some claims are reported and settled
  - Others are not closed or reported as of year-end
    - These claims have outstanding liabilities against the self-insured entity
- Accounting standards (GASB for public entities) require that outstanding liabilities be recognized so as to give a true financial picture of the entity

Why An Actuarial Report? Project Future Funding

- Estimate future losses
  - based on pool's or entity's claims experience
- Add expenses and risk loading
- Allocate costs amongst departments or members if a pool

Actuarial Report Structure

- 4 parts:
  - Background
  - Conditions and limitations
  - Conclusions
  - Technical exhibits

Background

- Background
  - History of entity – when self-insured, etc.
  - Coverage – e.g. WC
  - Self-Insured Retention (SIR) history
  - Entity type, e.g. school districts, etc.

History of Self-Insured Retentions

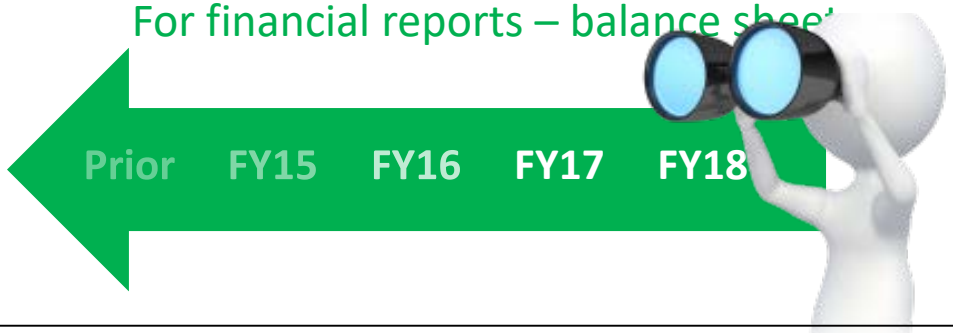
Claim Period	Self-Insured Retention
1987 to 2000	$250,000
2000 to 2002	300,000
2002 to 2004	350,000
2004 to 2018	500,000

Actuarial Report
Conditions And Limitations

- Estimates/projections subject to uncertainty
- What causes this uncertainty:
  - Legal – interpretations, change in regulations
  - Legislative changes, e.g. tort limits, WC benefits
  - Social – higher jury verdicts
  - Etc.

2 Actuarial Conclusions
2 Time Perspectives

Liabilities as of a given accounting date
For financial reports – balance sheet



June 30, 2018



Projected losses for upcoming years
For budgeting purposes

1st Actuarial Conclusion
Estimated Outstanding Losses

As of June 30, 2018		
	Undiscounted	Discounted at 2%
Outstanding Losses and ALAE	$11.6 M	$10.6 M
ULAE (8% of Losses)	0.9 M	0.9 M
Total	$12.5 M	$11.5 M

Balance Sheet
as of June 30, 2018

ASSETS ($ Millions)	
Cash	$7.4
Interest receivable	0.1
Investments	12.5
Total assets	**$20**

LIABILITIES AND NET ASSETS	
Liability for open and incurred but not reported (IBNR) claims	$10.6
Liability for ULAE	0.9
Other	0.5
Total liability	**12.0**
Net assets (Surplus)	**8.0**
Total Liabilities and net assets	**$20**

2nd Actuarial Conclusion
Future Projected Losses

2019	Payroll	Loss Rate per$100 of payroll	Projected Losses
Projected limited losses	$254 M	$2.20	$5.6 M
Expenses		0.50	1.2 M
Total		$2.74	$6.8 M

Actuarial Report
Technical Exhibits

- Data - Summary of loss and exposure
- Estimate of ultimate losses using different methods
- Selection of ultimate losses by year

Key Actuarial Step

Estimating Ultimate Losses

Actuarial Tools

- Data
- Graphics
- Standard methodologies
- Modeling
- Expert input
  - Claims and legal professionals
- Judgment



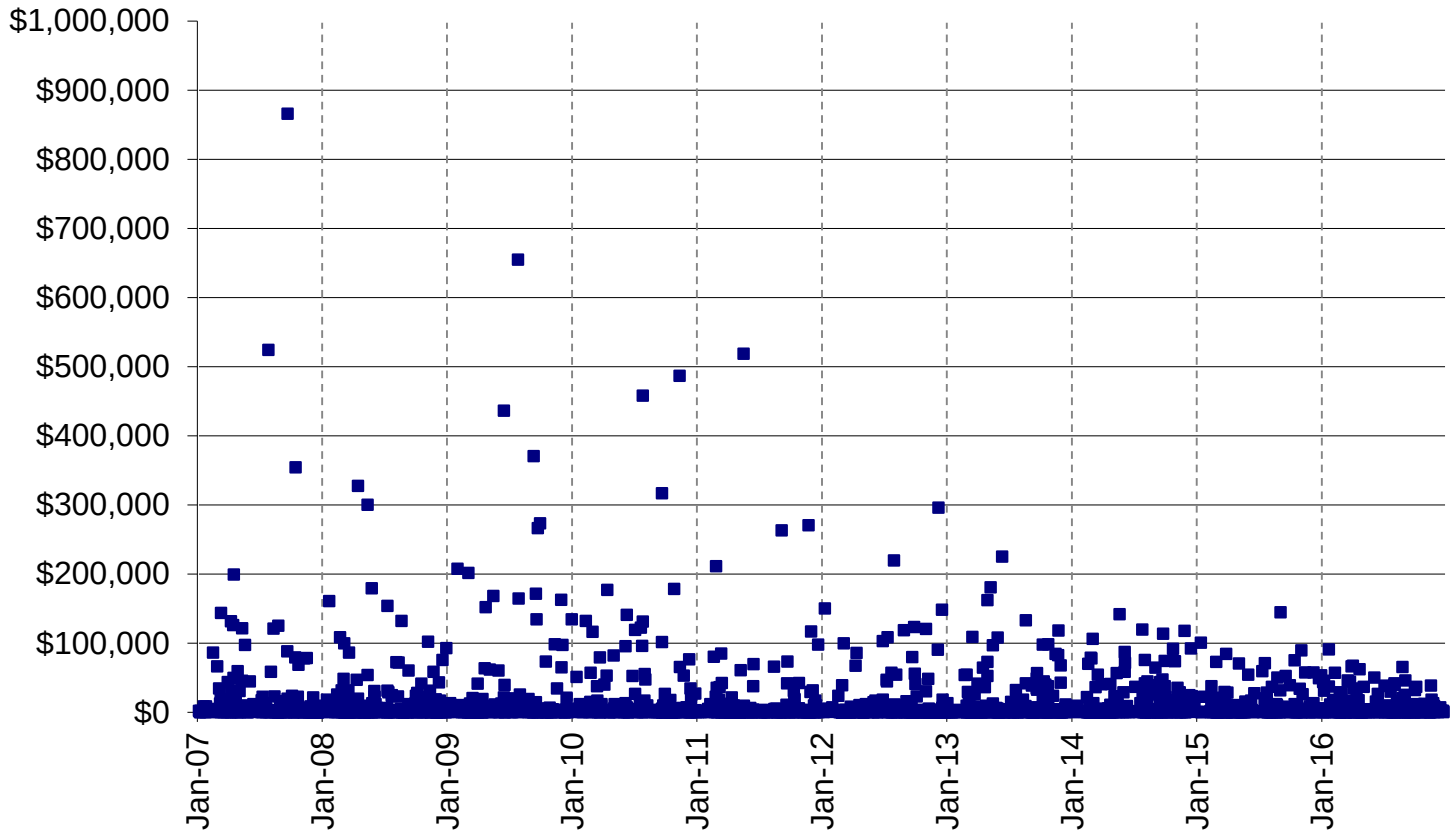
Data

- Gather data
  - Entity's own data
  - Supplementary benchmark data
- Organize data
- Detect trends, anomalies
- Use supplementary data if
  - Data not credible (too few data points to give stability); or
  - Relevant data or historical not available
    - Often in new benefit, e.g. PTSD, or law change, e.g. tort limits

Graphics

- Use scatter diagram to see spread of claims
  - Identify data anomalies
  - Spread of large claims (80/20 rule)
- Detect trend
  - What claims are emerging,
  - e.g. from which department, or what types of claims/injury
- Loss development curves
  - Use for interpolation

Distribution of Incurred Losses



Actuary's Key Factors

- Loss Development Factors (LDFs)
  - Assumes future payouts will be approximately reflected by past patterns
  - Adjust factors if past not mirroring changed circumstances
  - Mind the "tail factor"
- Trend – bring past claim costs to today's dollars
- Misc. factors – change in SIRs, benefit changes

GASB 10: Determination of Liability

1. Liability for unpaid claim costs,
   including Incurred But Not Reported (IBNR) claims

2. Liability should be based on:
   - the estimated ultimate cost (including effects of inflation and other societal and economic factors),
   - using past experience adjusted for current trends,
   - Other factors that would modify past experience

   (GASB Statement No. 10, Paragraph 22)

3. **Discounting is "neither prohibited nor mandated"**
   - Depends on entity's yield rate
   - Use entity's settlement (payout) pattern

Some Actuarial Considerations

- Homogeneity of data
- Credibility of data
  - Measure of predictive value given a body of data.
  - Increased with homogeneity or volume of data
- Development patterns
  - Claims procedures will affect the manner in which case reserves develop for any group of claims, and changes in claims practices may affect consistency of historical developments.
- Etc.

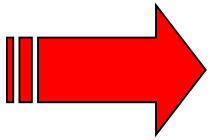
Standard Actuarial Methods

Loss development

Bornhuetter-Ferguson analysis

Frequency/severity

Loss rate analysis

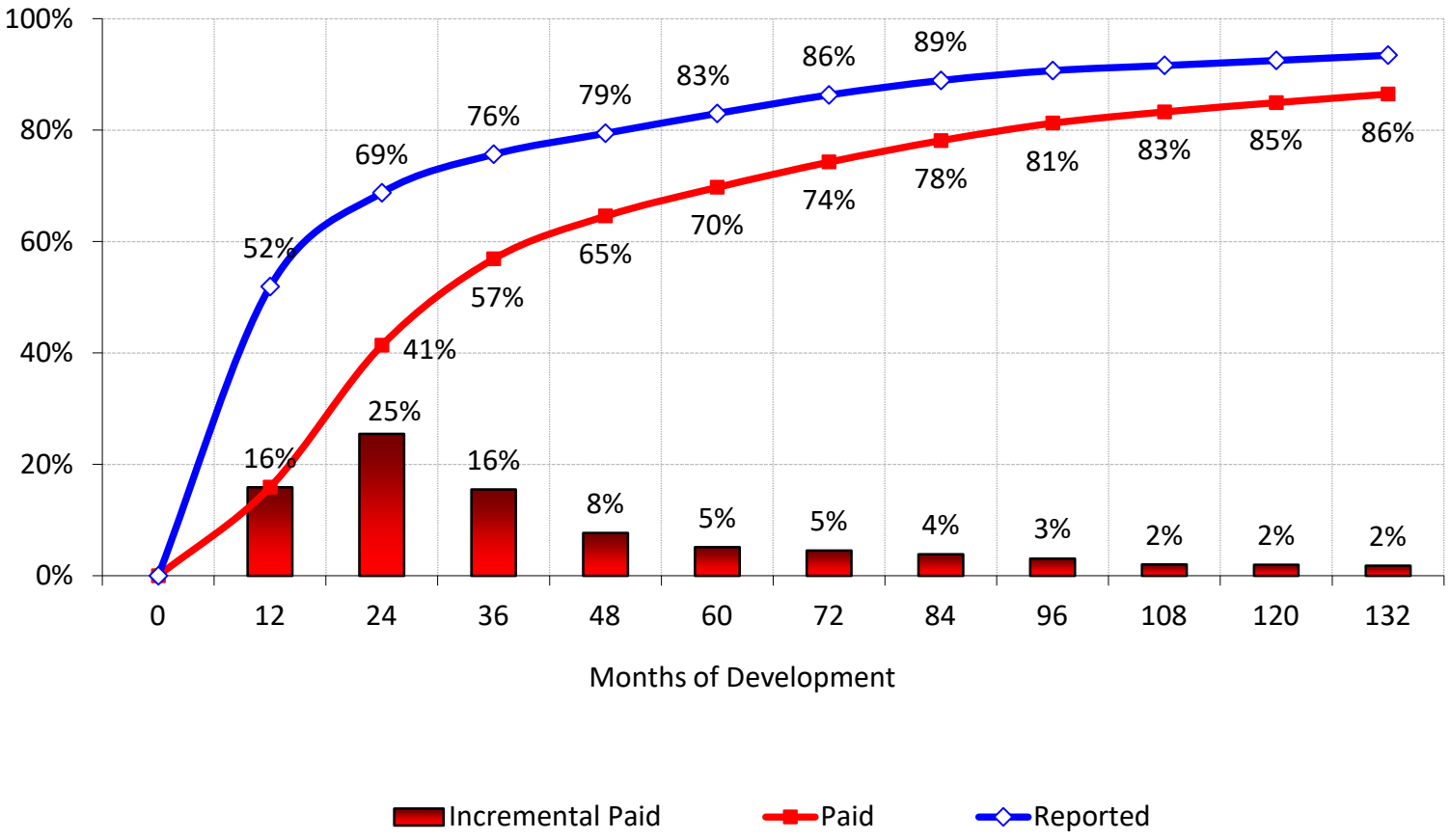


Select **ultimate** losses based on appropriate methods and **actuarial judgment**

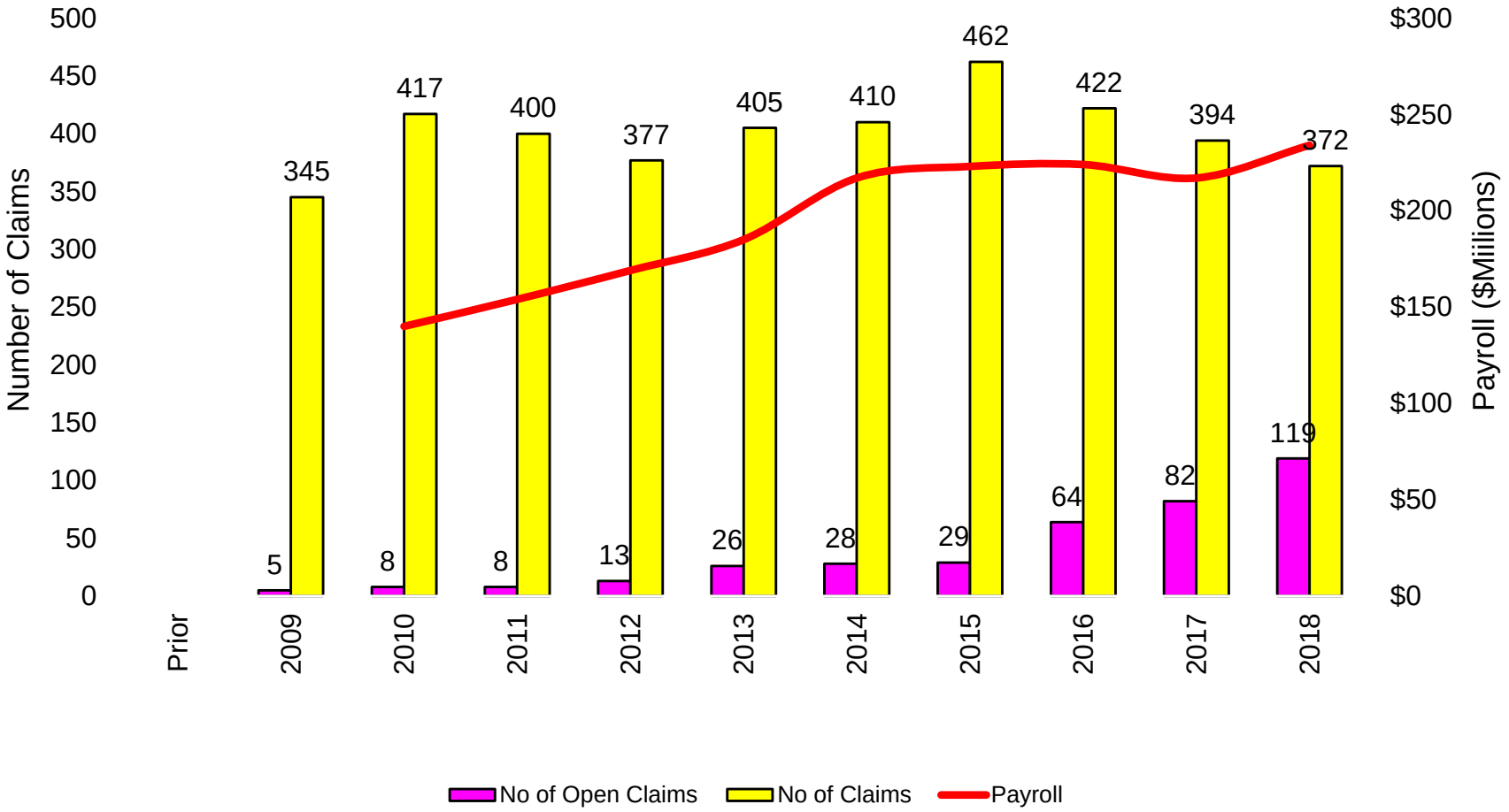
Estimating Ultimate Losses
Paid Loss Development

- The payments are sorted by the year in which the accident occurred
- The payments from inception are summed at the end of each year
- Losses paid to date are shown on the most recent diagonal (fiscal year)
- The data is organized in triangular format to highlight historical patterns

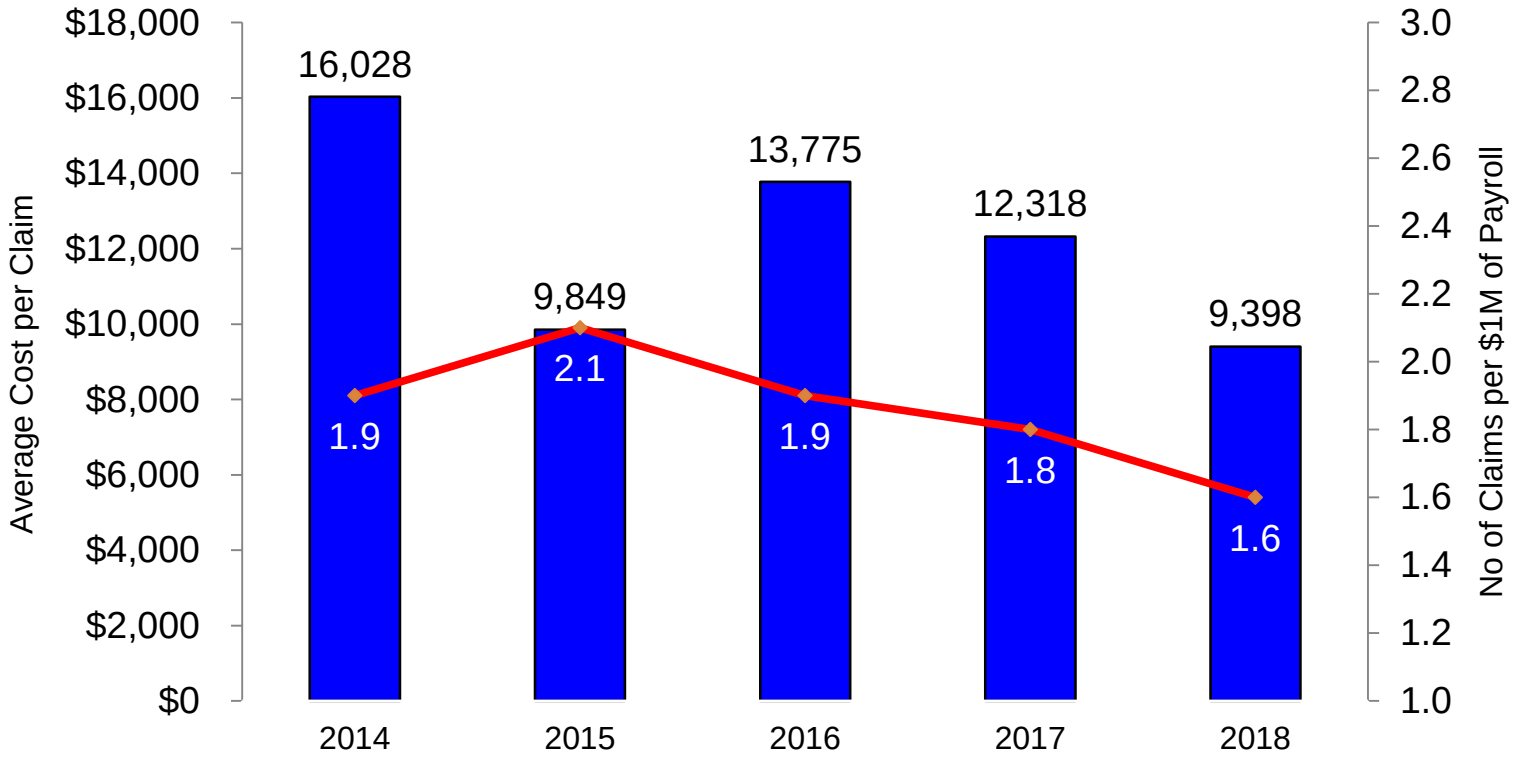
Development Methods



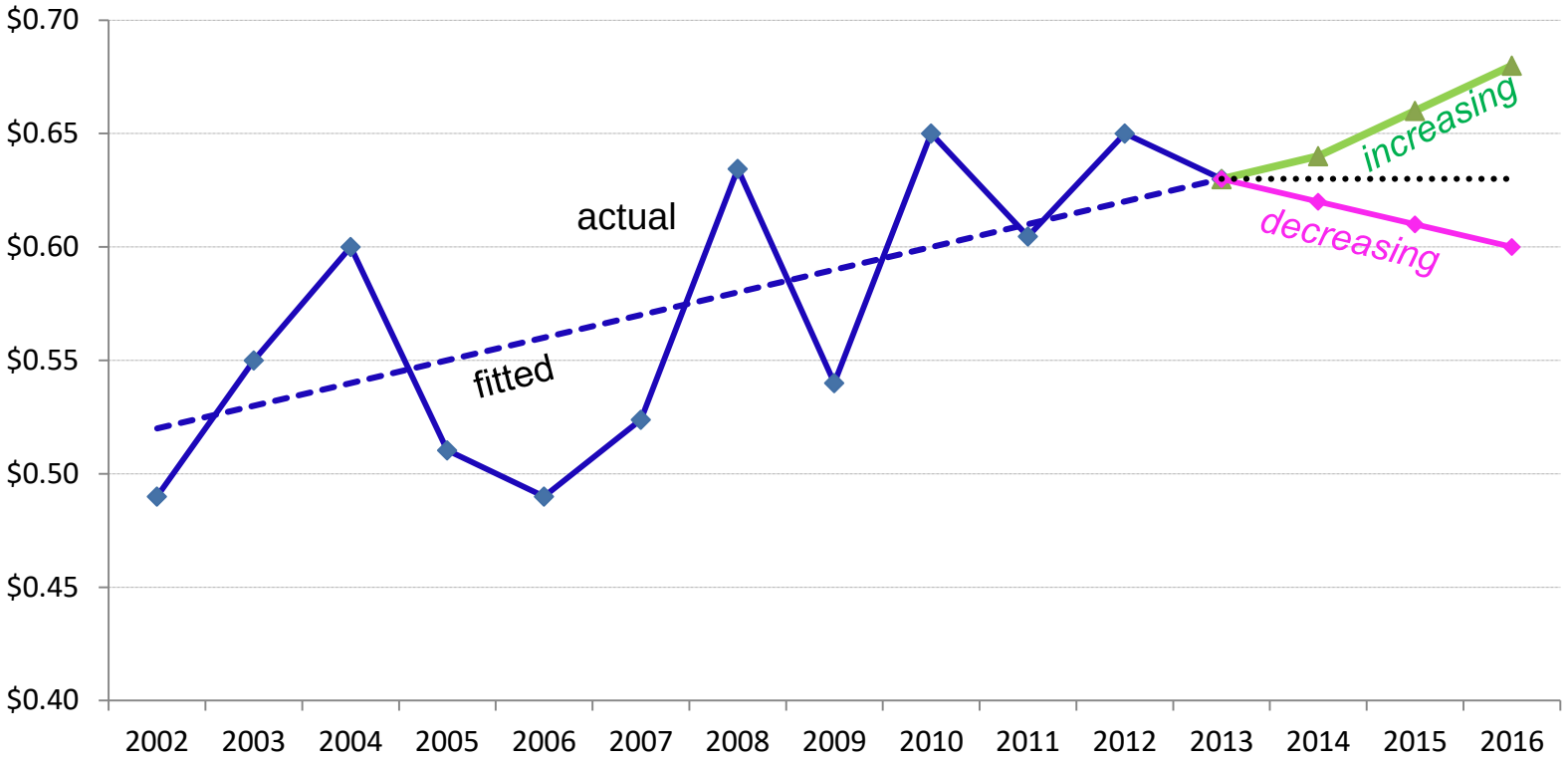
Number of Projected Claims, Payroll



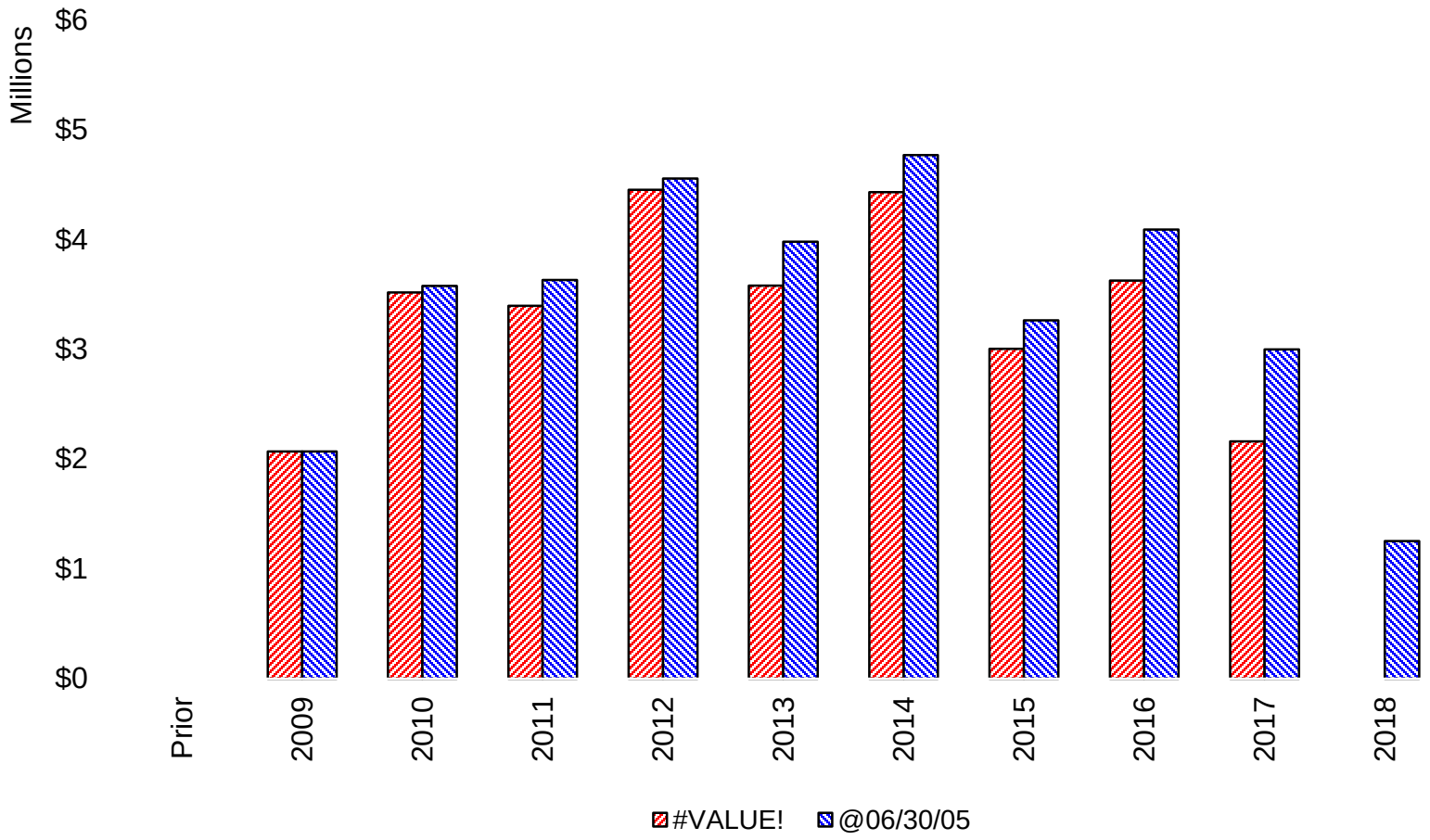
Frequency and Severity



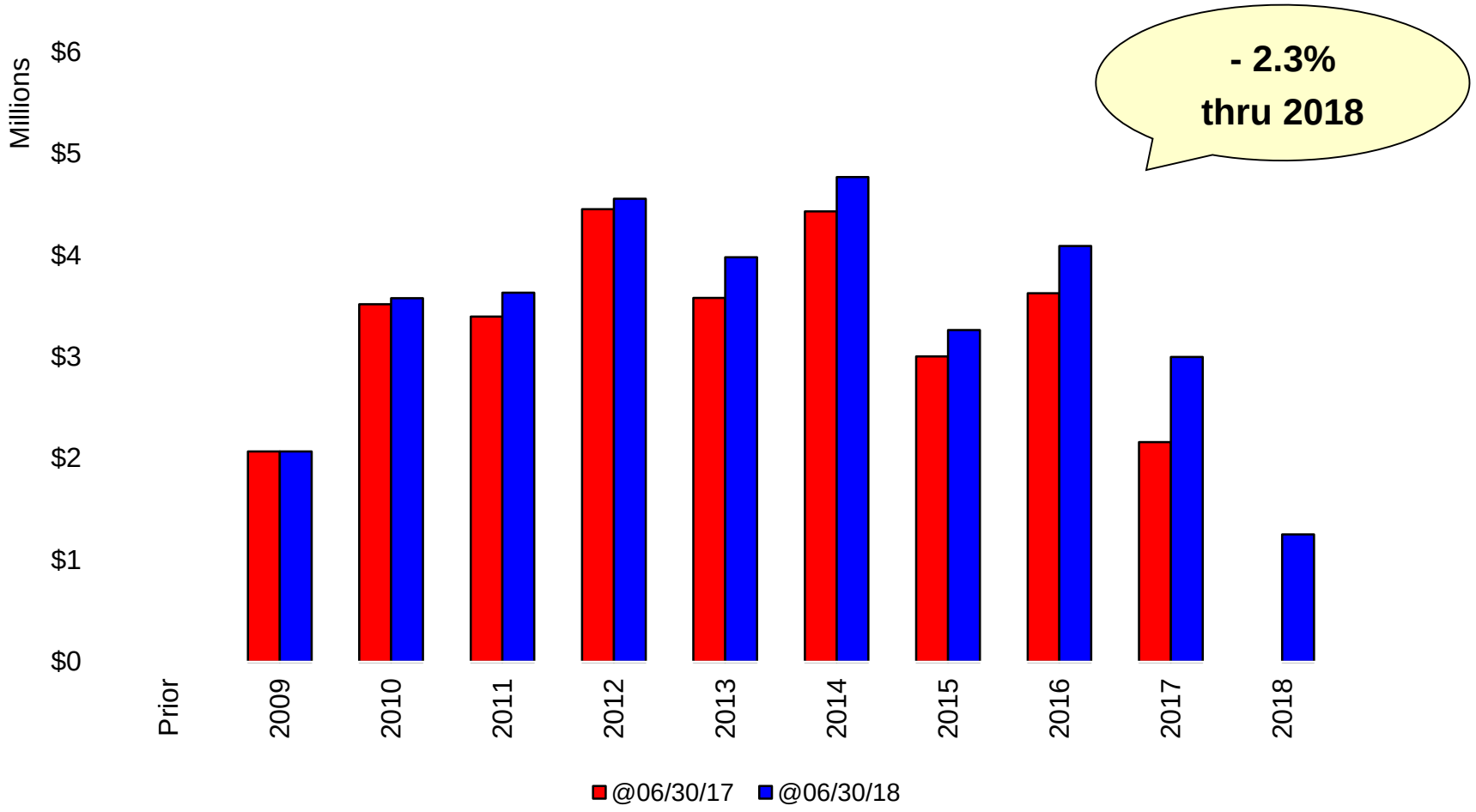
Trend, *graphically*



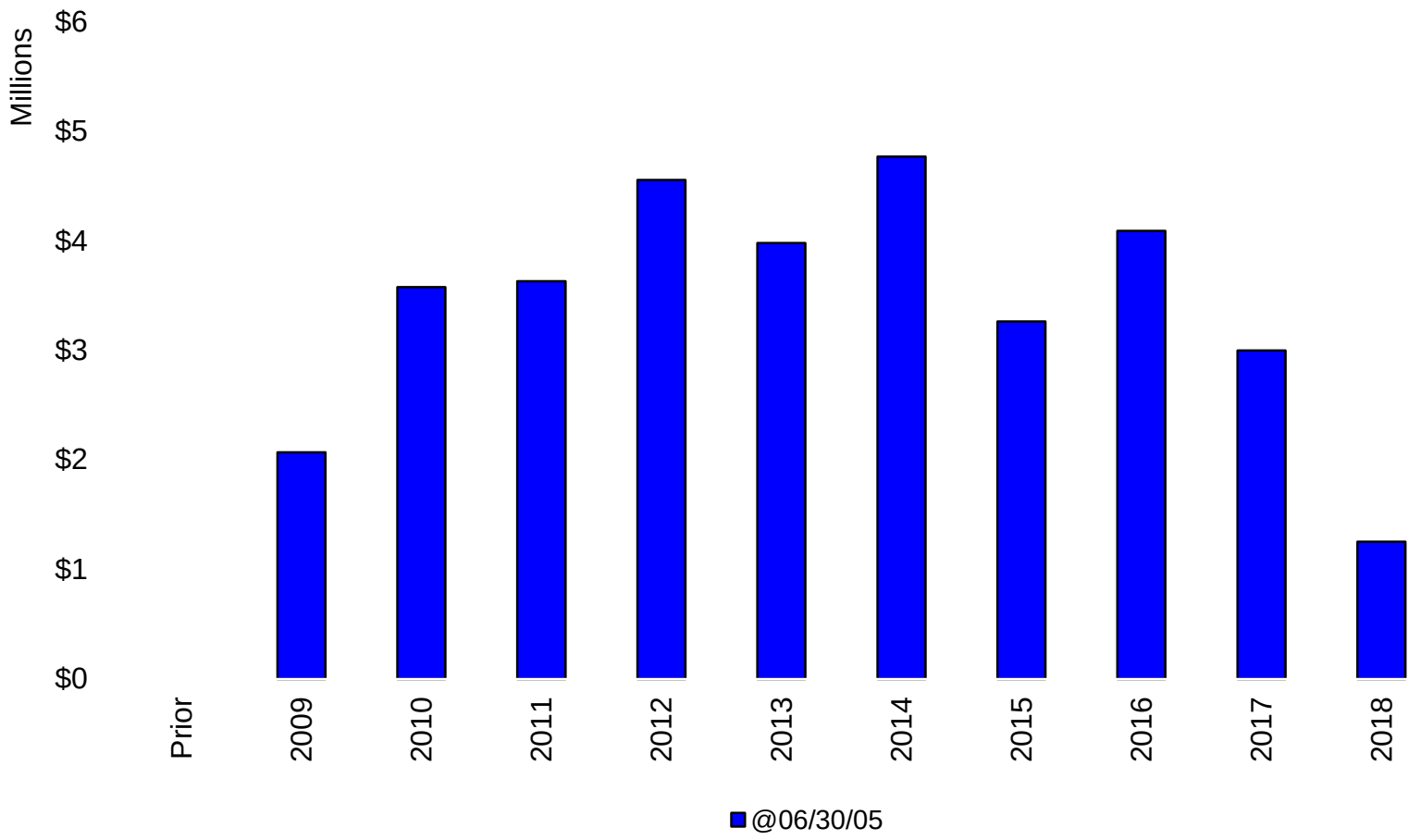
Summarize Data By Year
Incurred Limited (to SIR) Losses



Project Losses to Ultimate
By year



Projected Ultimate Losses



1st Conclusion of Actuarial Report

Estimating Liabilities

How Is The Liability Determined?

- Apply reserving principles and considerations
- Deduct payments from ultimates

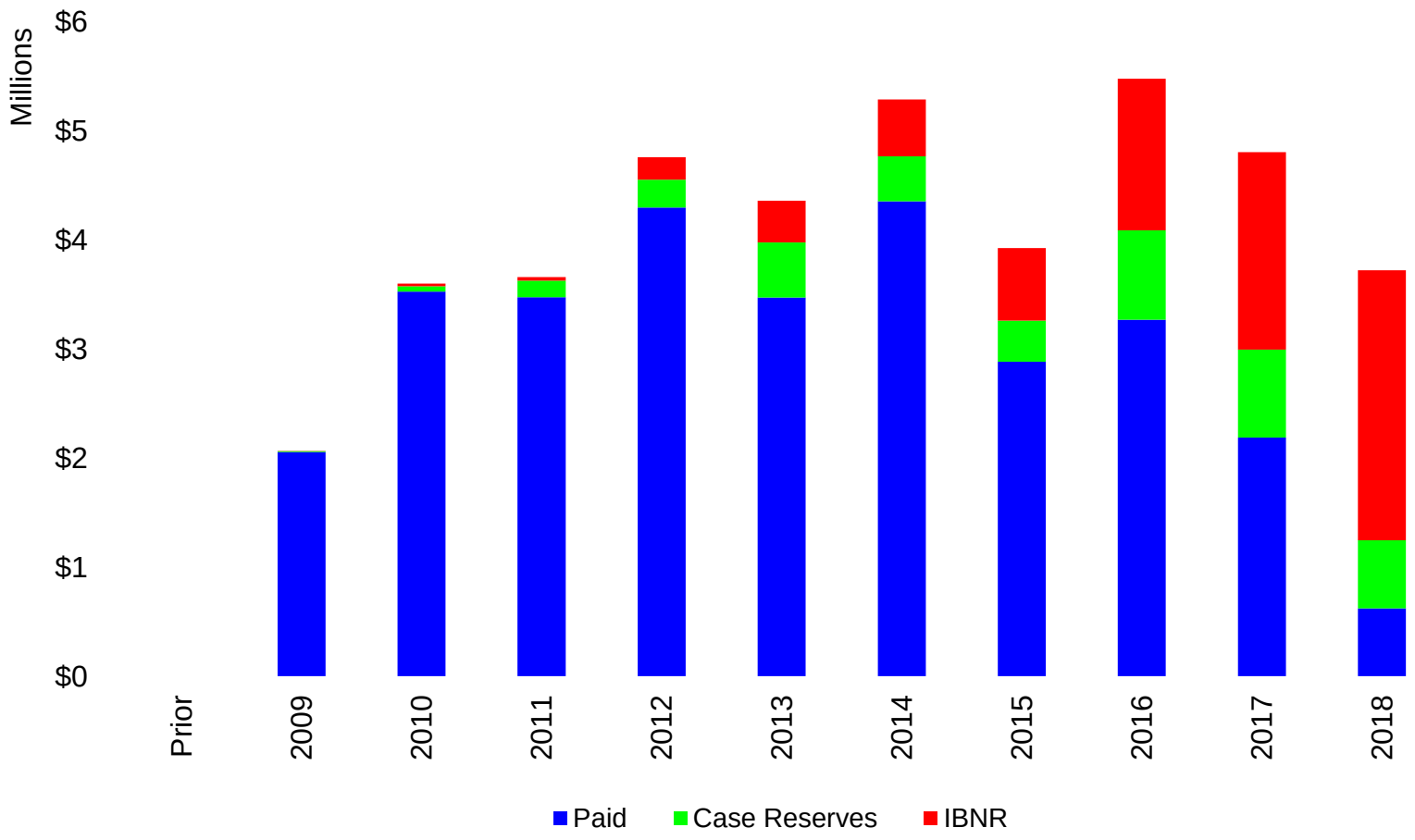
What Are The Reserving Principles?

- Actuarially sound reserves
  - based on *estimates*
  - derived from reasonable *assumptions*
  - using appropriate *methods*
- Inherent Uncertainty
  - a range can be actuarially sound
  - true value known only after all claims settled
- Most appropriate reserve depends on:
  - relative likelihood of estimates in range
  - financial reporting context

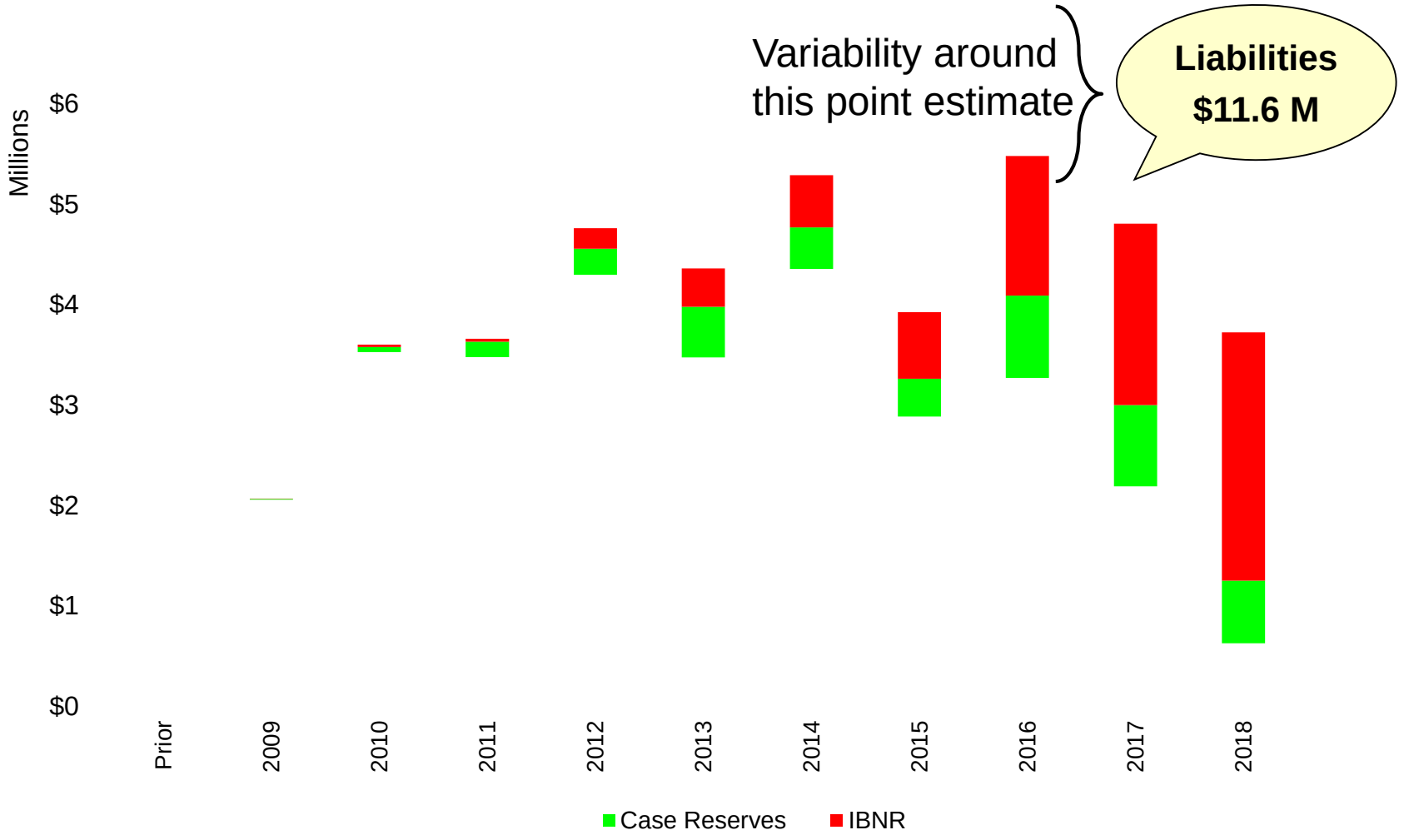
Components of Ultimate Losses
Paid Losses, Case Reserves, IBNR

- Paid losses
- Case reserves
  - Assigned a value by an adjuster or staff
  - Value assigned to each individual claim
- Incurred But Not Reported (IBNR)
  - Known loss events expected to become claims
  - Unknown loss events expected to become claims
  - Future development on claims already reported
  - Generally estimated in aggregate

Components of Projected Ultimate Limited Losses



Liability = Case Reserves + IBNR



Liabilities = unpaid amounts as of accounting date

- Liabilities = Case reserves + IBNR
- Liabilities = Estimated ultimate losses *minus* losses paid to date

Central Estimates of Liabilities

- Range of reasonable estimates
  - Actuaries select "central estimate"
  - "expected" (or average) level at about 50% to 55% confidence level
  - 55% based on "skewed" distribution of claims vs. "symmetrical" bell shaped distribution
- Reasonable estimates do not connote all possible outcomes

What to Look for in Liabilities?

- Long tail vs short tail
  - More open years vs fewer open years
- More uncertainty (more IBNR) in recent years
  - Case reserves more established for older open claims
  - Large open claims have more information about loss potential
- Liability is the sum of [case reserves] + [IBNR]
  - Only IBNR estimated by actuary
- Actuary opines on reasonability of liability *in total*
  - Not by year
- NAIC formal letter of opinion
  - Reasonable [R], Inadequate or deficient [I], Excessive or redundant [E], Qualified (e.g. data limitations) [Q], or No opinion [N]

Who Owns the Liabilities?

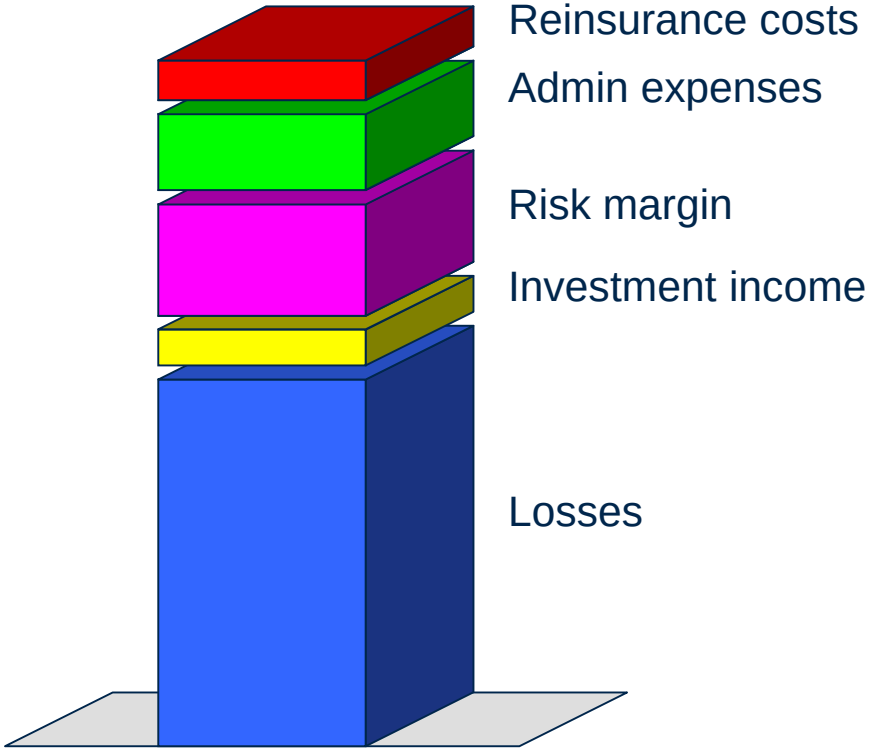
- Adjusters set individual case reserves
- Actuaries estimate the IBNR
- Actuaries provide “central” (expected) estimate within a range of reasonable estimates based on several actuarial methods
- Management posts its “best estimate”
- Auditors provide opinion on fair representation of financial statement transactions
- Board owns the results!

2nd Conclusion of Actuarial Report

Funding

Overall Funding Components

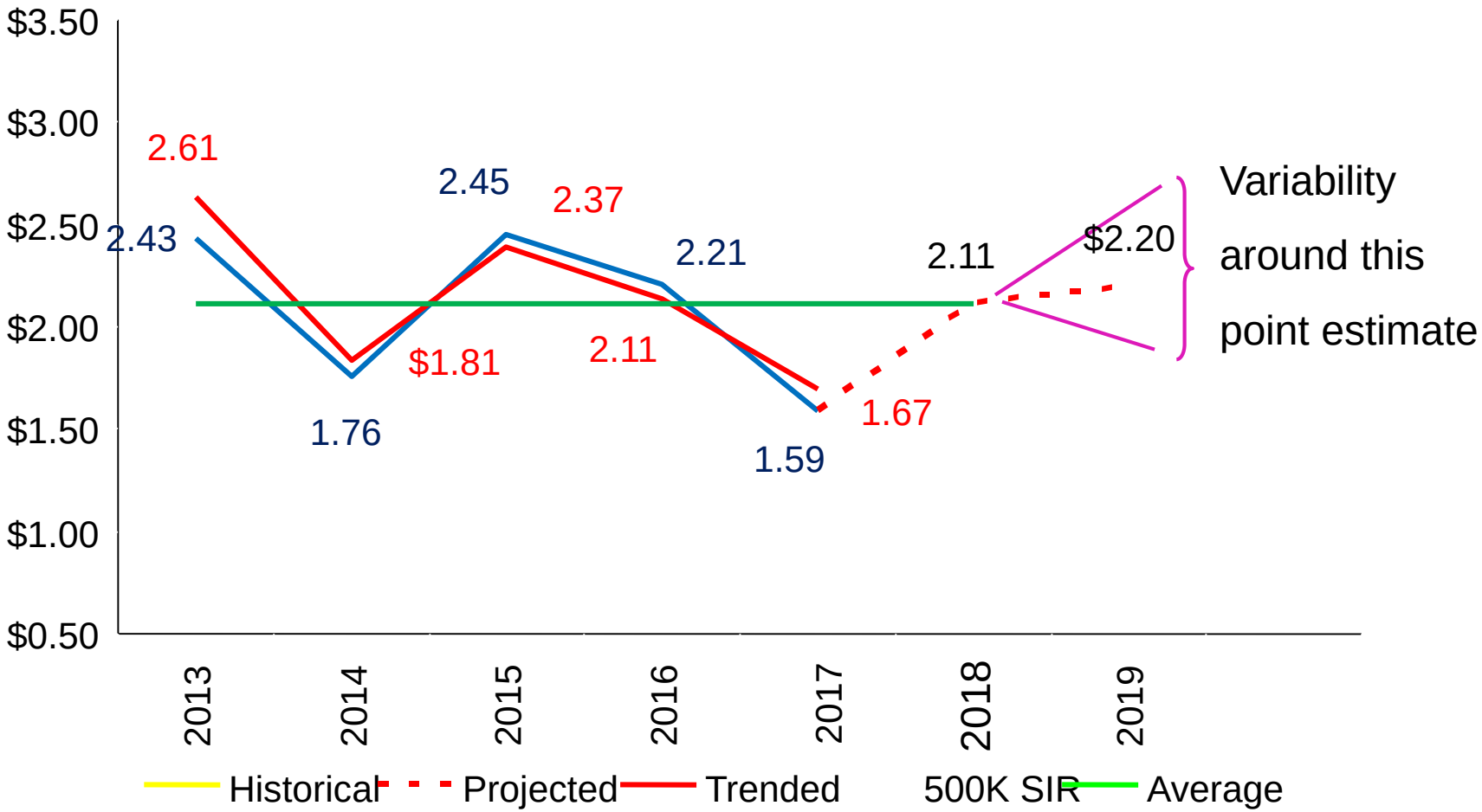
- Add:
  - Expected losses
  - (Investment income)
  - Risk margin
  - Admin expenses
  - Reinsurance costs
- Rate:
  - Divide funding amount by exposure units (e.g. per $100 payroll)



2nd Conclusion From Actuarial Report Project Losses for Future Years

- Project losses for upcoming year
  - Use ultimate losses
  - Calculate loss rates = ultimate losses/exposure
    - E.g. Use loss rate, e.g. $2.20 per $100 of payroll
  - Trend to projected year
  - Multiply selected loss rate by exposure units
    - E.g. $2.20 per $100 payroll x $100M = $5.4M

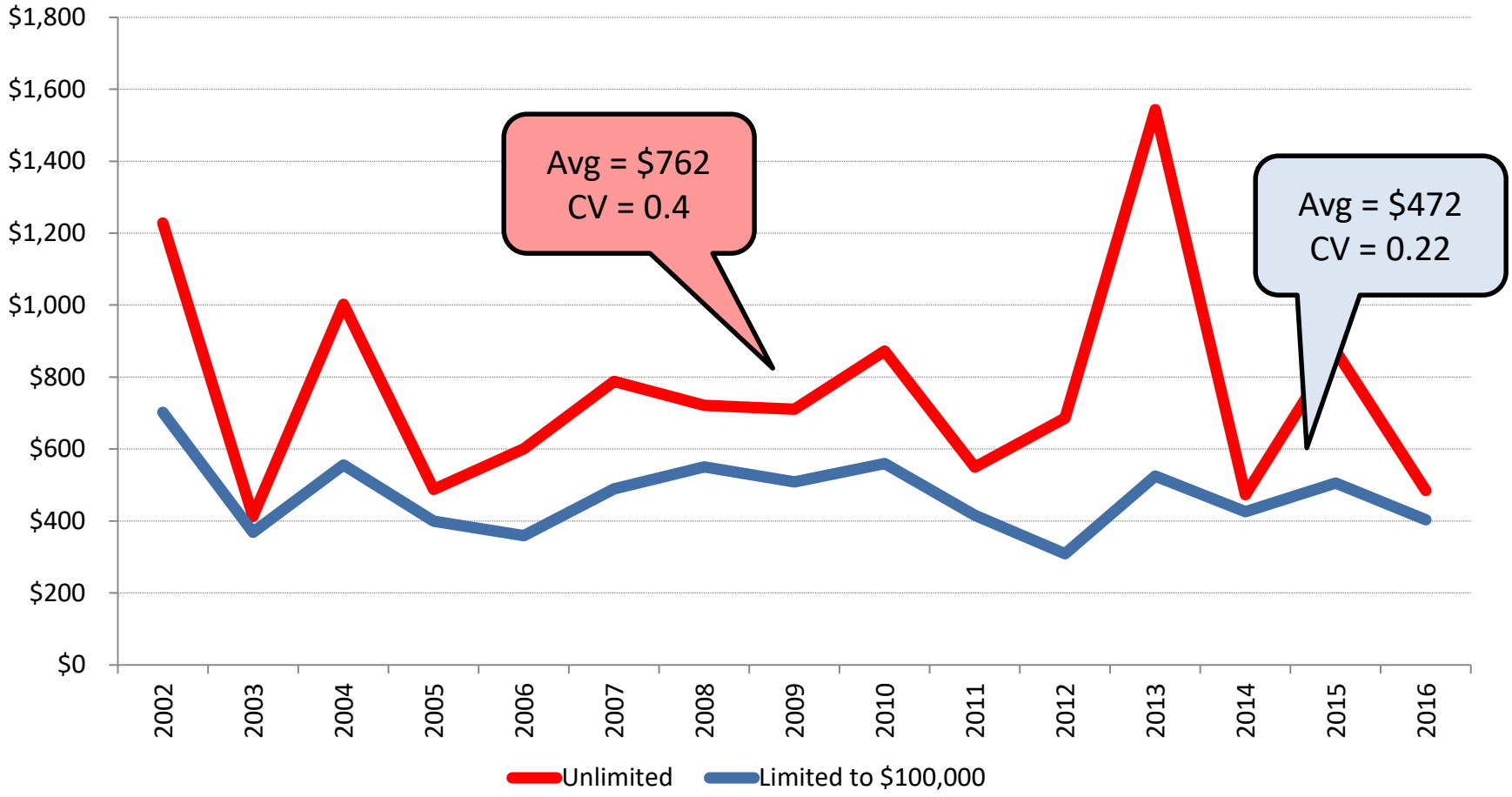
Loss Rate Projection
Per $100 of Payroll



Why Reinsurance

- Catastrophe and/or large claims protection
- Reduces underwriting risk
- Stabilizes Total Cost of Risk (TCOR)
  - Fixed reinsurance cost substituted for potential variability of higher level losses
  - Stable budgets

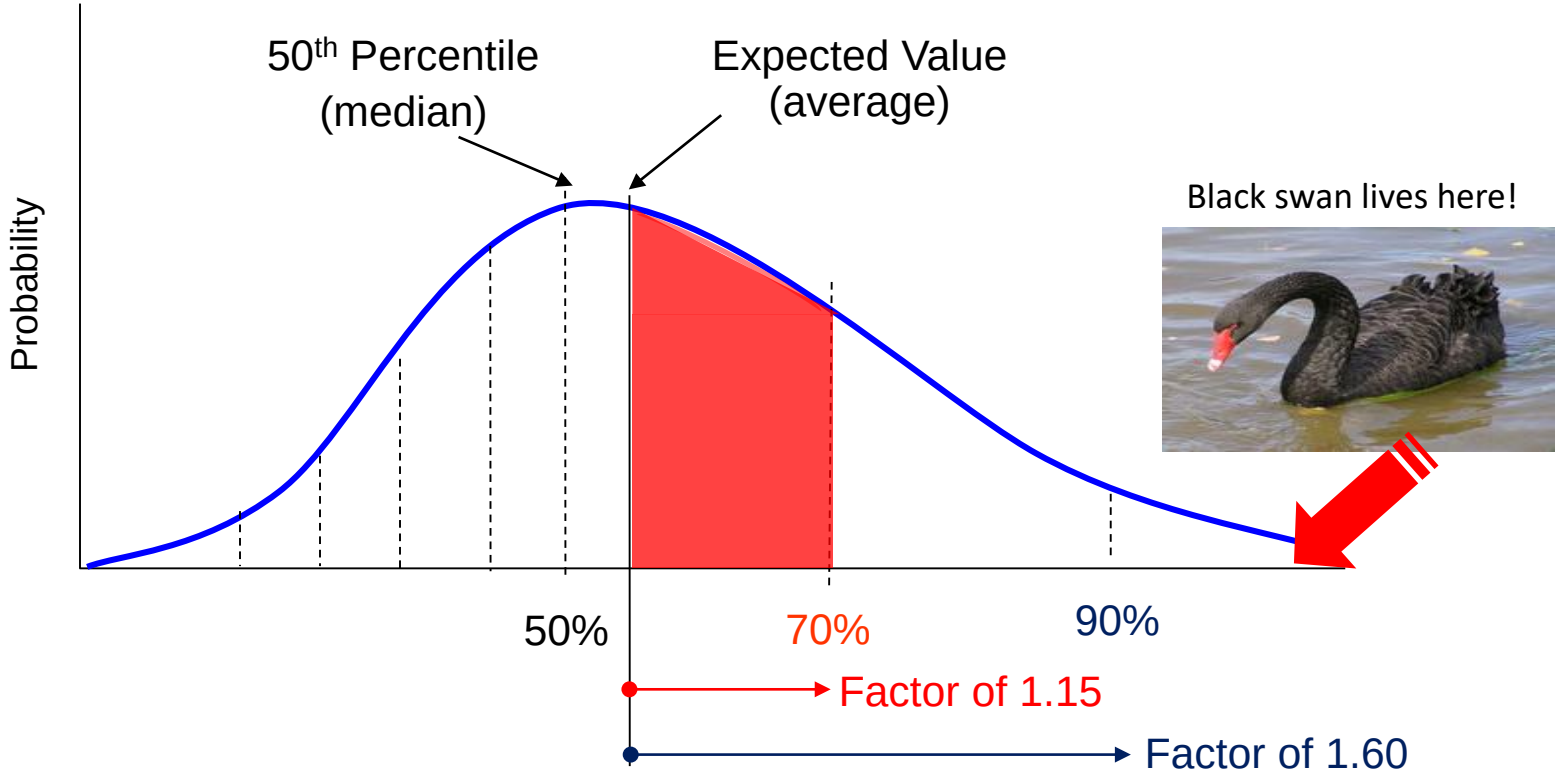
Loss Rates: Limited vs Unlimited



Variability

- Claims are random events
  - If events can be priced with certainty then no need for actuarial estimation
- Variability has multiple measures
  - Standard deviation, Coefficient of Varian (CV), Value at Risk (VaR), etc.
  - Simulation (Monte Carlo) approaches
    - Simulating frequency and severity from fitting empirical data

Variability
Confidence Levels



Summary

- Actuarial report estimates
  - Liabilities for financial statements
    - Board's fiduciary responsibility
  - Funding needs for upcoming year
- It is based on actuarial principles
  - Standards of Practice
  - Judgment
- It is an estimate at a point in time
  - It is the best estimate given all the information
  - Subject to variability



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