# Update on P/C RBC Research Findings

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# Background

# General Information

- The analyses shown in these slides are solely the responsibility of the CAS DCWP and AAA RBC P/C Committee and not that of any committee member's employers, the Casualty Actuarial Society or the American Academy of Actuaries
- Some slides describe preliminary work, which may change materially as research progresses

# RBC Formula
# Underwriting (U/W) Risk Charges

- R4 - Reserve Risk and R5 – Premium Risk
- Factors applied to premium or reserves by LOB
  - Premium Risk Factors (PRFs)
  - Reserve Risk Factors (RRFs)
  - The resulting charges are adjusted for:
    - Investment income (IIO)
    - Own-company experience
    - Loss sensitive contracts
    - Own-company expenses (for PRFs).
- Diversification reflected through “MaxLine” approach

# Questions on RBC U/W Risk Charges

- *How well does the RBC formula work?*

Questions on Premium/Reserve Risk Factors:

- Is the data used to calibrate these factors appropriate?
  - Should more data be used?
  - How should intercompany pools be reflected?
- Are there biases to the current calibration?
  - Premium Volume in LOB?
  - Type of company?
- What safety level is implied by 87.5% VaR?

# P&C Actuaries Role in RBC Formula

- To answer these questions and others, the CAS established the Risk Based Capital Dependency and Calibration Working Party (DCWP).

- AAA Property and Casualty Risk-Based Capital Committee
  - Provides actuarial input on all RBC and solvency issues and ensures its communication to all relevant audiences.[1]

[1] American Academy of Actuaries website

# DCWP Findings/AAA Initiatives

# DCWP Research: Back-Testing

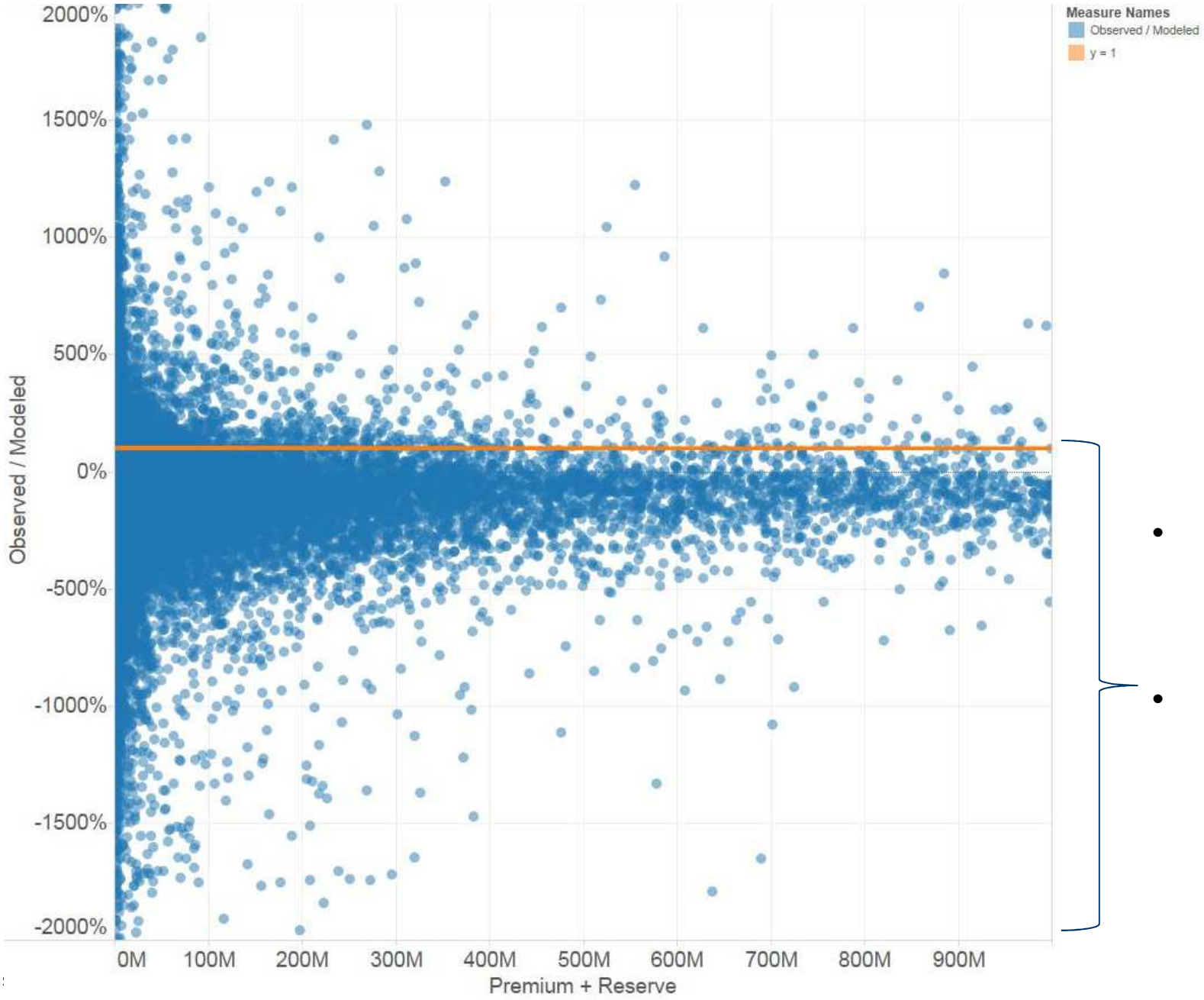
How well does the RBC formula work?

- DCWP research has back-tested the formula by comparing:
  - **Modeled Underwriting Risk** – incorporating PRF, RRF, IIO, Loss Concentration Factor, and Premium Concentration Factor, Company Expense Ratio, NEP, and Initial Reserve

  With

  - **Observed Underwriting Risk** - subsequent year discounted operating loss plus discounted runoff on prior years
- These tests observed variability in underwriting risk against "expected' variability.

# Observed % Difference from Modeled

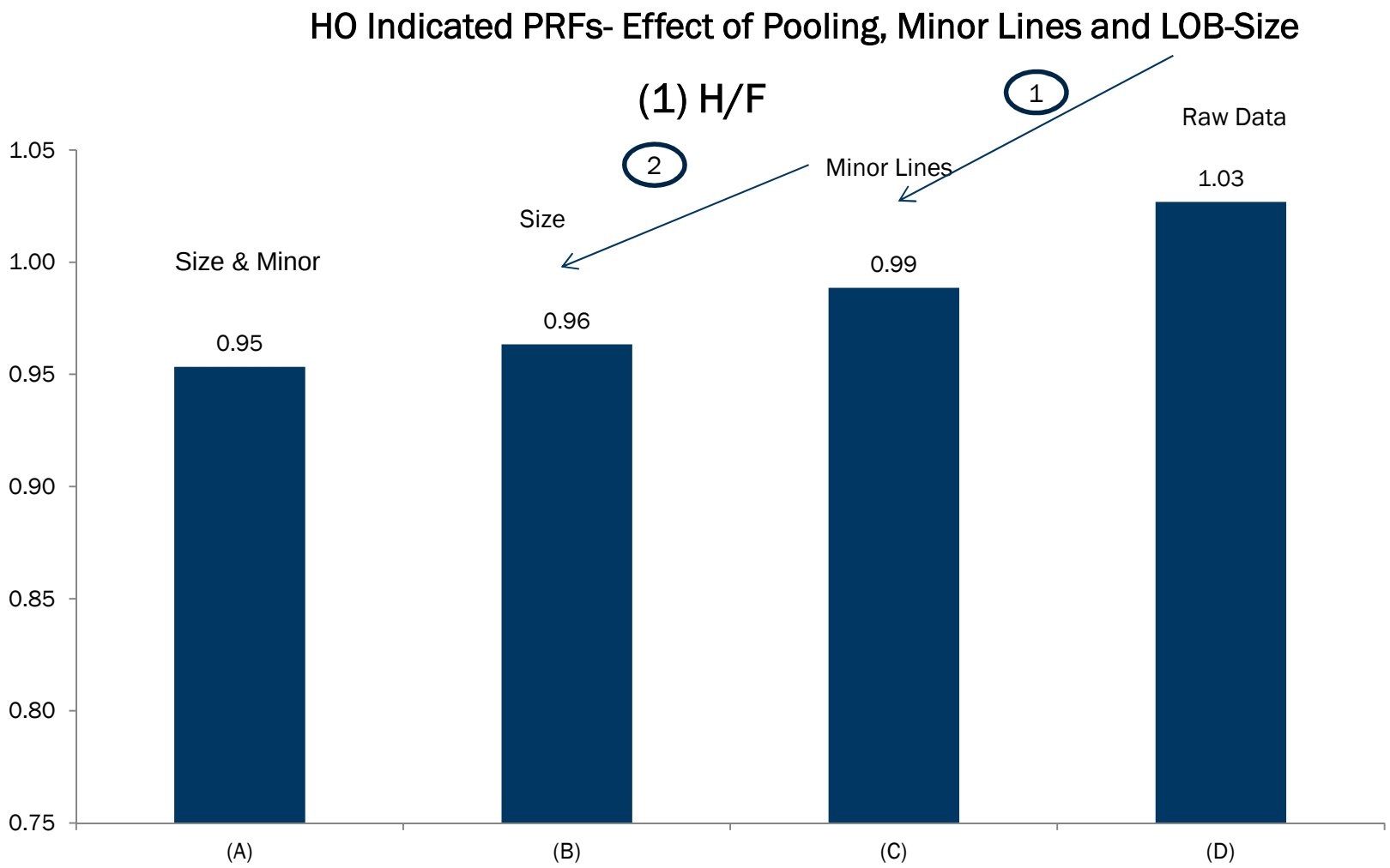



- 89% of company-year data points, representing
- 91% of premium plus reserves

# Failure Rates by Size Band

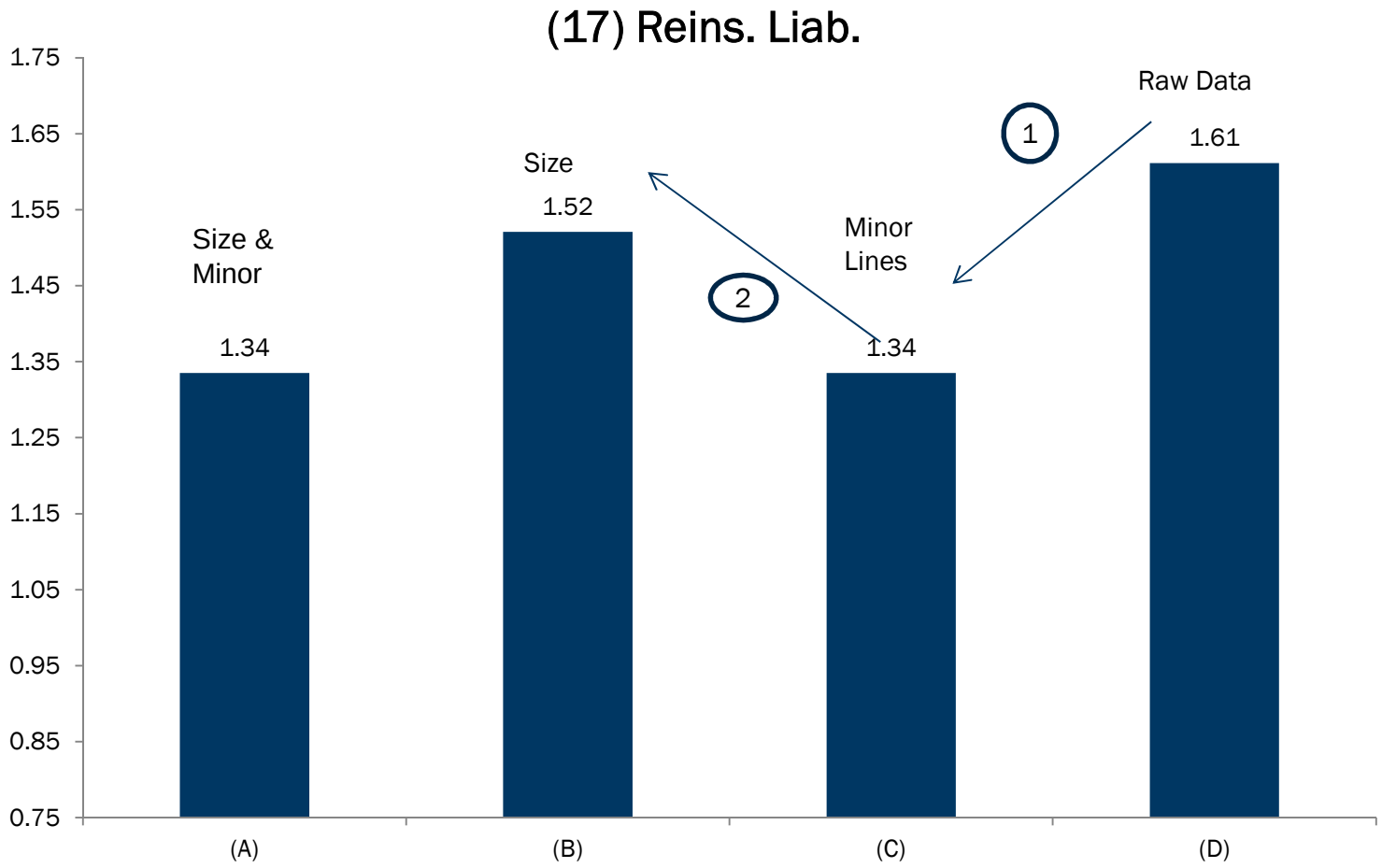
| Size Band | Upper Size | Dollars/Counts of Observed Value Higher Than RBC CAL "Failure Rate" | |
|---|---|---|---|
| | ($millions) | By dollars | By Counts |
| 0-20% | 4 | 14.3% | 16.5% |
| 20-40% | 15 | 12.4% | 12.6% |
| 40-60% | 50 | 9.6% | 9.7% |
| 60-80% | 203 | 8.4% | 8.5% |
| 80-100% | 80,000 | 8.8% | 8.5% |
| All | | 8.8% | 11.1% |

# DCWP Research: Size, Minor Lines



# DCWP Research: Size, Minor Lines

Reins Liab. – Indicated PRFs- Effect of Pooling, Minor Lines and LOB-Size



# What to do with these findings?

| DCWP Findings | P/C RBC Committee Approach[1] |
|---|---|
| Size | Remove data points with small LOB – sizes. |
| Type of Company | Remove minor lines |
| Time Frame | Use all available annual statement data |
| Pooling | Combine pooled companies into one data point. |
| Maturity | Exclude data points which are not sufficiently mature |
| Company Age | Exclude data points which have low # years with premium |
| Survivorship | Include data points for companies that ceased writing in that LOB. |

[1] Proposed factors pending. Approach is described AAA P/C RBC committee's letter to NAIC dated March 13, 2015.

# Appendix

# Data used by DCWP

14 Annual Statements (1997-2010)

- 24 accident years
- 23 years of reserve runoff, up to age 10 years
- By company (3700 in total across years)

## Premium risk

- Premium and L&LAE ratios by company and year
  - 20,000 data points for PPA
  - 4,500 for med mal occurrence

## Reserve risk

- Incurred & paid by company, AY, age
  - 20,000 data points for PPA
  - 6,000 for med mal occurrence

# DCWP Publications To Date

Overview of Dependencies and Calibration in the RBC Formula (Report 1)
www.casact.org/pubs/forum/12wforum/DCWP_Report.pdf

2011 Research – Short Term Project (Report 2)
www.casact.org/pubs/forum/12wforum/RBC_URWP_Report.pdf

Solvency II Standard Formula and NAIC RBC (Report 3)
http://www.casact.org/pubs/forum/12fforumpt2/RBC-DCWPRpt3.pdf

A Review of Historical Insurance Company Impairments (Report 4)
http://www.casact.org/pubs/forum/12fforumpt2/RBC-DCWPRpt4.pdf

An Economic Basis for P/C Insurance RBC Measures (Report 5)
http://www.casact.org/pubs/forum/13sumforum/01RBC-econ-report.pdf

# DCWP Publications To Date

Premium Risk Charges – Improvements to Current Calibration Method (Report 6)
http://www.casact.org/pubs/forum/13fforum/01-Report-6-RBC.pdf

Reserve Risk Charges – Improvements to Current Calibration Method (Report 7)
http://www.casact.org/pubs/forum/14wforum/Report-7-RBC.pdf

Differences in Premium Risk Factors by Type of Company (Report 8)
http://www.casact.org/pubs/forum/14spforum/01-RBC-Dependencies-Calibration-Working-Party.pdf

Differences in Premium and Reserve Risk Charges by Ceded Reinsurance Usage (Report 9)
http://www.casact.org/pubs/forum/14fforumv2/DCWP__Report.pdf

Reserve Risk Charges – Standard Formula vs. Individual Company Assessments (Report 10)
http://www.casact.org/pubs/forum/15wforum/DCWP-Report.pdf

# Academy Letter to NAIC

Letter to NAIC regarding Underwriting Risk Factors in the NAIC Property/Casualty (P/C) Risk-Based Capital Formula

https://www.actuary.org/files/Academy_Letter_PC_Underwriting_Factors_031315.pdf

# Critical Thinking at the Critical Time ™