Taylor & Mulder

Property and Casualty Consulting Actuaries

Loss Simulation Model Background

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Purpose

- Create a tool that will help actuaries get into individual claims reserving
- Target audience:
  - Educators
  - Actuaries and students hoping to gain comfort with this area
  - Actuaries using this for analysis purposes or as a “sanity check”

Purpose, Continued

- Creating a theoretical framework for individual claim reserving was **outside our scope**
- Plus there are several existing frameworks for which significant research had already been done
- Therefore, we reviewed several frameworks and selected one

Papers Considered

- Triangle-Free Reserving – Pietro Parodi
- Estimating Claim Settlement Values using GLM – Roosevelt C. Mosley, Jr.
- Individual Claim Modelling of CTP Data – Gráinne McGuire
- Three CLRS 2014 Presentations – “Improving Actuarial Reserve Analysis through Claim-Level Predictive Analytics”
  - Chris Gross
  - Philip S. Borba
  - Lori Julga

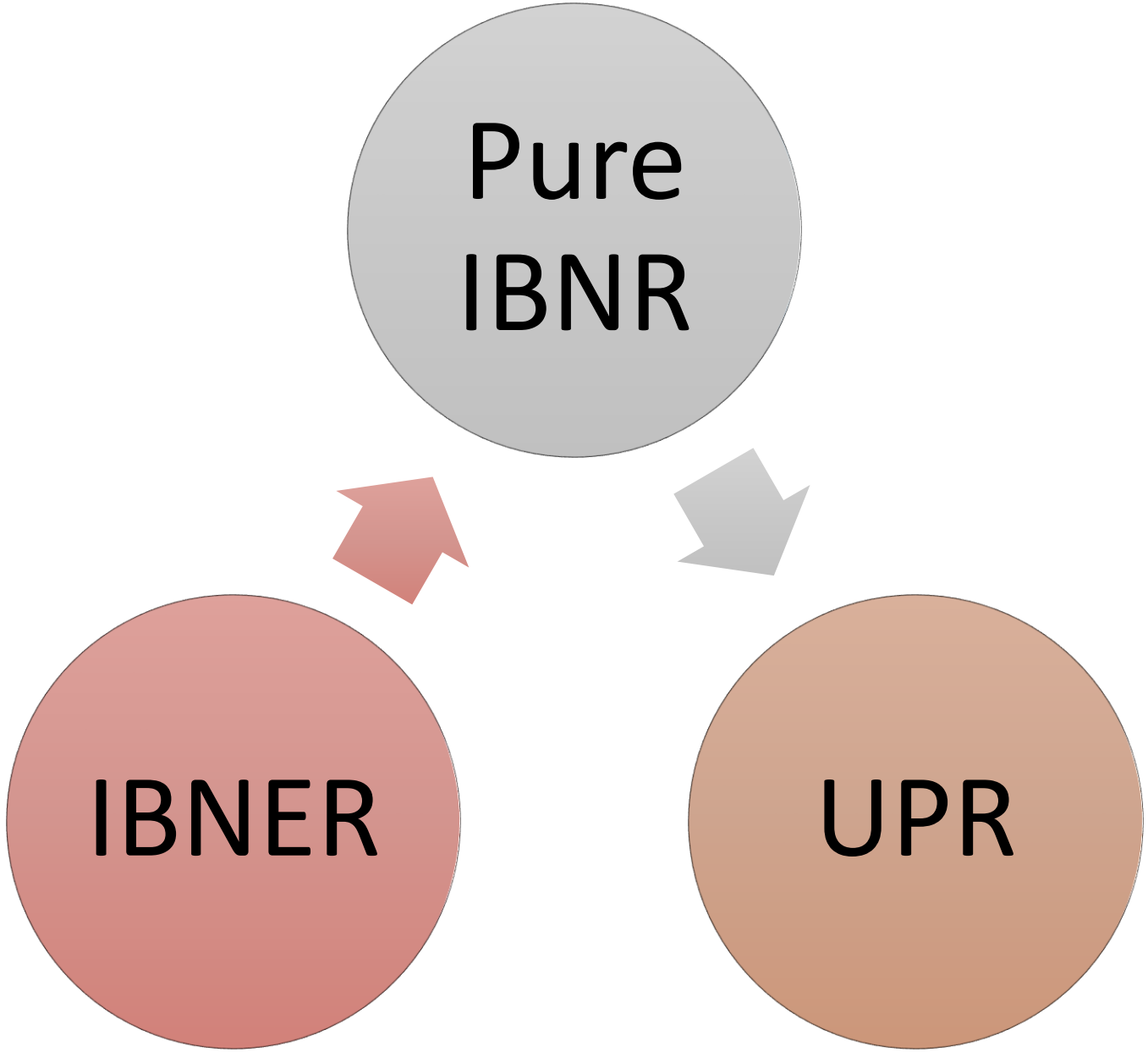
Triangle-Free Reserving Overview

- Triangles can provide decent central estimates, but aren't great for developing ranges due to information compression
- Simulation-based approach for IBNR claims
- Model frequency and severity independently, then combine them
- More of a *framework* than a single method, so there is a lot of room for extending the approach

Information Compression

Hafiz Issadeen, Wikimedia Commons, 2009

Proposed Modeling Approach



Pure IBNR Claims

1. Estimate the “delay distribution” (time between occurrence and report), adjusted for bias toward small delays
2. Use that to estimate the number of IBNR counts based on claims reported to date
3. Model severity distribution for IBNR claims
4. Combine Frequency and Severity

Other Pieces of the Puzzle

- UPR
  - The Pure IBNR piece develops a frequency model and a severity model that can be applied to figure out the anticipated claims on written but unearned premiums
- IBNER
  - Analyzed separately

(Positive) Results

- Improved accuracy over triangle-based methods
- More realistic reserve distributions
- Easy to include additional information about each risk (e.g., model can be extended easily)
- Doesn’t break down if there are only a few claims
- Tail factor calculation is more scientific
- More aligned with pricing methodologies

Limitations & Afterthoughts

- The paper doesn't prescribe particular distributions, though this gives flexibility
- Parodi points out that:
  - This method is more complex than traditional approaches
  - Doesn't provide an easy way to view inputs or outputs
  - Data requirements are higher – more detail required
- IBNER Estimation is somewhat problematic – requires additional data
  - Severity distribution is dependent on IBNER