Individual claim loss reserving conditioned by case estimates

Greg Taylor
Taylor Fry Consulting Actuaries
University of Melbourne
University of New South Wales

Gráinne McGuire
James Sullivan
Taylor Fry Consulting Actuaries

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The project

- Work carried out by Taylor Fry personnel
- Data (Medical Liability) provided by a large specialist insurer
- Supported by research grant of £15,000 from Institute of Actuaries for Stochastic Reserving
- Paper at *http://www.actuaries.org.uk/files/pdf/library/taylor_reserving.pdf*

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Why individual claim loss reserving ?

- What is meant by individual claim loss reserving ?
  - Or let's call it micro-reserving

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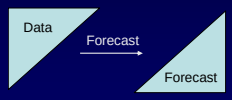
Conventionally



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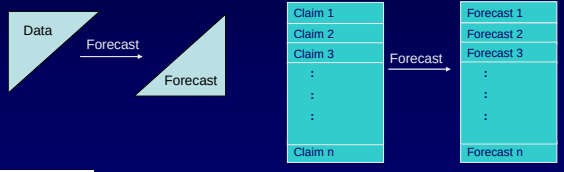
Conventionally **Micro –reserving**



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Why micro-reserving (cont'd)

Raw data

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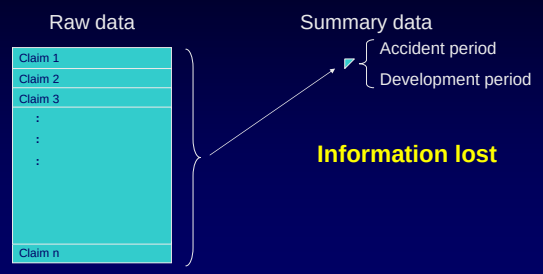
Why micro-reserving (cont'd)



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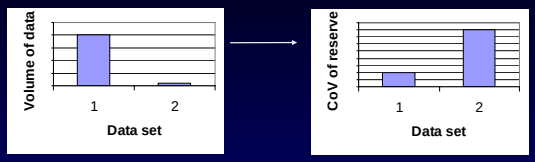
Why does quantity of data matter?



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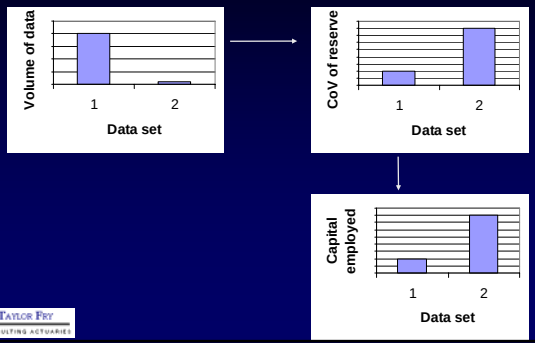

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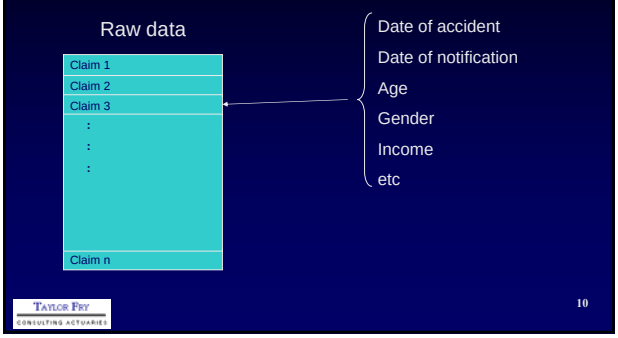
One form of micro-reserving model



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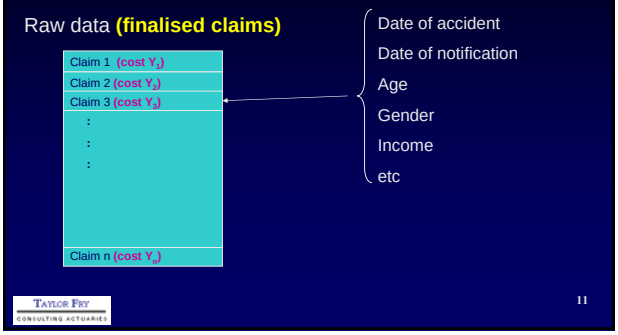
One form of micro-reserving model



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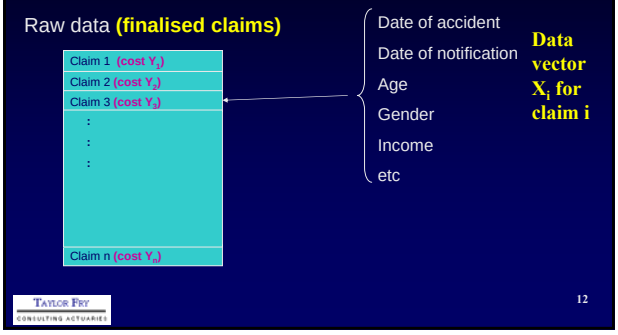

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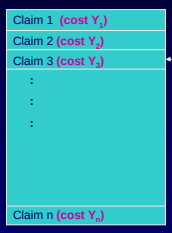
One form of micro-reserving model

Raw data **(finalised claims)**



- Date of accident
- Date of notification
- Age
- Gender
- Income
- etc

Data vector X_i for claim i

$$Y_i = X_i \beta + \varepsilon_i$$

Parameter vector *Stochastic error*

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Why case estimates?

1. Simply more information
   - So more efficient prediction

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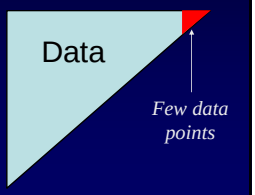
Why case estimates?

1. Simply more information
   - So more efficient prediction
2. Tail data
   - Few finalised claims
     - Claim sizes often at their largest
     - So extrapolating heavy tail from few data points
   - But usually plenty of case estimate data

In "old" triangle terms



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Factoring case estimates into model

- Natural to think in terms of modelling a development ratio:

$$\frac{\textbf{Finalised claim size}}{\textbf{Current estimate of incurred cost}}$$

- But what about nil claims? either
  - Nil finalised cost; OR
  - Nil current estimate of incurred cost

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Factoring case estimates into model (cont'd)

Current estimate of incurred cost	Finalised claim size	Model required
+	+	Severity
+	0	Frequency
0	+	Frequency Severity

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Final estimate of liability

- Possibilities are
  - Adopt the "paids" estimate
  - Adopt the "incurreds" estimate
  - Adopt some mixture of the two
- There are two versions of the last
  - **"Blended" estimate**: weighted average of the two estimates for each accident year with weights dependent on accident year
  - **"Unified" estimate**: fit a generalised model that includes "paids" and "incurreds" models as special cases

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Some (very brief) results

Model	Forecast	Predictive CoV
Mack (chain ladder)	$888M	10.5%
Paids	$1,000M	5.3%
Incurreds	$1,040M	5.3%
Blended	$1,021M	3.8%
Unified	$1,071M	3.4%

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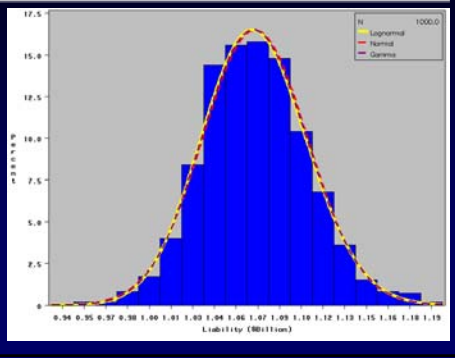
Bootstrap distribution of unified forecast of loss reserve



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Conclusion

- Micro-reserving useful as a means of reducing prediction error associated with liability estimates
- Can be carried out by means of a "paids" model
- Significant further reduction may be achievable by extension of the model to include case estimates

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