Winner's Curse
GIRO Edinburgh
8th October 2009
Mark Rothwell, Graham Fulcher
& The Winner’s Curse Working Party

Agenda

- The Working Party
- Winner's Curse - Theory
- Winner's Curse in Insurance
  - Personal and Commercial Lines
  - Our own aggregator
  - A theoretical model
  - Modelling of the bidding process
- Winner's Curse and Actuaries
Working Party

Members:
Cherry Chan
Yves Colomb
Catherine Farnworth
Graham Fulcher
Michael Garner
Andrew Goldby
Visesh Gosrani
Malcolm Jewell
Tony Jordan
James Kelsall
Sylvie Le Delliou-Viel
Rob Lowe
Roberto Malattia
Mark Rothwell (Chair)
Andrew Smith
Matthew Spedding

Additional Thanks:
Tina Aidoo
David Brown
Carmen Burraston
David Drury
Tim Grant
Paula Iencean
Daniel Kendrick
Steven Loyens
Elena Papadopoulou
Andrew Wallace

Winner’s Curse - Theory

- Capen, Clapp, and Campbell (1971)
  “Competitive Bidding in High-Risk Situations”
- Each bidder making best guess at uncertain cashflows using
  - Own knowledge of similar risks
  - Expert information
  - Developing pricing techniques and expertise
- Variation in bids much greater than variation in true value to different bidders
- Highest bid wins

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**Winner’s Curse & Insurance**

- “Competitive Bidding in High-Risk Situations”
- Each bidder making best guess at uncertain cashflows using
  - Own knowledge of similar risks
  - Expert information
  - Developing pricing techniques and expertise
- Variation in bids much greater than variation in true value to different bidders
- Lowest bid wins

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**Personal Lines and Commercial Lines**

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<tr>
<th></th>
<th>Personal Lines</th>
<th>Balance of risk</th>
<th>Large commercial</th>
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<tbody>
<tr>
<td><strong>Uncertainty</strong></td>
<td>Value of policy can be estimated to high degree of comfort</td>
<td>Value of policy subject to high degree of uncertainty</td>
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<td><strong>Nature of bidding</strong></td>
<td>Buyer not concerned if bid out of line with market</td>
<td>Broker often focused only on lowest price in short term but subscription market mitigates</td>
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<td><strong>“Common value”</strong></td>
<td>Cost-base &amp; target segment differs for insurers</td>
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<td><strong>Price-focus</strong></td>
<td>High degree of standardisation</td>
<td>Terms and conditions vary</td>
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<td>Aggregators drive price focus</td>
<td>Service levels &amp; claims handling important to insured</td>
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<td>Brand important to some</td>
<td>Financial rating of insurer matters</td>
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<td><strong>Competition</strong></td>
<td>Aggregators drive extremely high level of competition</td>
<td>Fewer players with broker driving competition</td>
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Our Own Aggregator

Mathematical modelling

Actual ultimate losses \( U \) have mean \( \mu(U) \), standard deviation \( \sigma(U) \)
Assume \( N \) identical insurers
- Estimating of cost \( X_i \) with mean \( \mu(X) \) and standard deviation \( \sigma(X) \)
- \( X_i \) multivariate normal with correlation between pairs \( p(x) \)
- Quoting a premium equal to \( \alpha + \beta X_i \)
Correlation between each \( X_i \) and \( U \) is \( p(U) \)

Aggregate effect of winners curse on profit: \( \xi(N) \times \beta \times \sigma(X) \times \sqrt{1 - p(X)} \)

Where \( \xi(N) \) is the expected value of the maximum of \( N \) i.i.d.
\( N(0,1) : \xi(2) = 0.564 \) and \( \xi(5) = 1.163 \)

Independent of: Mean estimate; Mean and standard deviation of claims;
Correlation between claims and estimates

Depends only on: profit loading; number of insurers; volatility of estimates;
correlation between estimates
Theoretical Modelling – rate changes

- Winner's Curse needs to be as familiar a concept to actuaries as reserving cycles
- Competition can be modelled in a variety of ways
  - Build-your-own-aggregators
  - Mathematical and game theory approaches
  - Theoretical London market models
  - Bayesian posterior approach to pricing and rate monitoring
- The “holy grail” of pricing model loss ratios feeding capital modelling means and reserving priors is flawed without consideration of Winner’s Curse
- Winner’s Curse interacts with the underwriting and reserving cycle

Please join us in Workshop D3 (after the coffee break)