The Actuarial Profession
making financial sense of the future

Knotty DFA / ICA issues at Lloyd's

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GIRO Workshop
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Background to this session

- Amlin
- Where we are / are not
- What I am / am not

- Interactive random(ish) walk
- Not exhaustive, but hopefully useful!

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Some possible topics

Granularity	Large losses	Operational risk
Multi year?	Attrition	Rating cycles
Variability	Parameter error	Unearned profits
Basis	Dependencies	cf ECR & RBC
9/11	Reserve risk	Simulation error
Cat models	Reinsurance	Feedback loops

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Granularity

- How many classes
- Clump / Subdivide
- Different currencies for some or all

- Must depend on purpose
- Our ICA choices suited for our ICA (!)

Multi Year Model?

- How long a period
- What do you monitor
- Exactly how do you combine years

(maybe come back to this later)

Variability

- We select CV as the base measure
- Seems clearly better than SD
  - Invariant as premium rate changes

- You get used to it

Best estimate basis?

- Must be best estimate to mean anything
- Independent calls for everything (?!)
- Use Real Actual Historical data for ICA
  - Even if you believe it may be unrealistic
    - "Too many" large claims – leave in
    - "Too few" large claims – must allow for some
  - If not including everything, where do you stop

9/11 experience

- Claim data impacts some classes severely
- Consider taking out (or consider "return period")
  - all, part or none
  - sometimes or never
- Third parties can't help much (?)

Cat models

- Proprietary models for natural cats
- Different models available
- Are lesser regions reliable?
- Cross-class dependencies important
- Double count?
  - What part of history is replaced

Large losses

- Frequency, severity models
- As if history (changes in line size &/or terms?)
- Threshold varies by class
- Credible tail data (!)
- Heavy tail Gen Pareto Distns throughout
- Upper limits on some distributions (?)

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Attrition

- Balancing item?
- As if history
  - Consistent with large loss as if, but maybe different
  - eg large loss and portfolio inflation
- Estimating variability parameter
- Simple gamma distributions good enough?

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Parameter error

Partial consideration – class relativities
- Long tail class history is uncertain
- Capture this parameter error
- Additional framework needed
- Overall results must be considered appropriate

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Dependencies

- Class dependencies
  - Rating, cat, large losses, attrition
- Tail dependency – Gumbel copula
  - Must be the correct choice in practice
  - But how to parameterise
  - (and how much extra capital does it imply!?)
- Other dependencies, e.g. losses and credit

Reserving risk

- Method – bootstrap?
  - Anything else?
  - Still choices within bootstrap
- Data – Paid and/or incurred
- Level of subdivision and inter-dependence
  - All-in … 4 divisions … 35 classes
- Precise methodology

Reinsurance

- Build in actual, current reinsurances
  - May be complex, with loads of rinky-dinks
- Adjust for expectations next year?
  - Expected: structure, rate, M&D, adjustments
- What about multi-year models
  - Leave structure, rating cycle depends on direct?
- Allocate umbrella covers to classes

Operational risks

- Risk register
  - Attempt to strip historic losses from data for DFA
  - or take care over potential double-count
- Monitoring and controls!
- Net risks!?
- Quantification of probability and impact

Change of behaviour part of the intention here

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Rating cycles

- Need something sensible
- Especially for multi year models
- Various structures possible
  - Sensible fit to history
  - Plausible projection
  - Credible dependency structure

Aviation market (!)

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Unearned profits

- Need something special here?
- Extra infrastructure if underwriting year model
- Non-essential in multi year model(?)
- Taking unearned losses seems prudent in tail
  - Exceed UPR plus plausible AURR
  - In simulations around the 99.5th percentile

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Compare ECR and RBC

- ECR
  - Retrospective
  - Non-Lloyd's parameterisation
- RBC
  - Company specific data
  - Risk metric
  - Multi year
  - Open year treatment, discounting, etc, etc

Simulation error

- 99.5^{th} percentile bound to be a challenge(!!)
- How many simulations
- … and how (efficiency, run time)
- Empirical view on simulation error
- *A surprise to me this week(!)*

Feedback loops

… or "Decision rules" – Need real care!
- Relevant for multi year models
- Simple or complex
- Must be totally supportable
  - Historical precedents
  - Processes and ownership
  - Link to operational risks

That is it!

- Any loose ends or other questions?

- Thanks for your attention
- … and interest
- … and interaction
- … and prospective beers (!)

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