

General Insurance Pricing Seminar



Institute of Actuaries of Australia

What is the Involvement of Actuaries in Premium Rating? The Findings of “GRIP”

Don Johnstone

30 November 2007



History

- General Insurance Board of the Faculty & Institute of Actuaries ("GI Board")
- GRIT
 - **G**eneral insurance **R**eserving **I**ssues **T**askforce
 - Review role of UK Profession in GI reserving
 - 2004 - 2006
- GRIP
 - **G**eneral insurance premium **R**ating **I**ssues working **P**arty
 - Review role of UK Profession in GI pricing
 - 2005 - 2007



Membership

Main working party:

- Duncan Anderson
(Chairman)
- Clive Bolton
- Gary Callan
- Martin Cross
- Sheree Howard
- Grant Mitchell
- Karl Murphy
- James Rakow
- Peter Stirling
- Gabriel Welsh

With help from:

- ActEd
- Clive Allison
- Anju Bell
- David Bennett
- Dan Bishop
- Martin Cairns
- Chris Carlson
- Alex Foord
- Will Forster
- Paul Hewett
- Neil Hilary
- Don Johnstone
- Tom Jowett
- Dermot Marron
- David O'Connor
- Estelle Pearson
- John Pedrick
- David Sanders
- Dawn Wakefield
- Ryan Warren
- Jeremy Waite
- Tom Wright



Terms of reference / workstreams

- Role of Pricing Actuary
- Methods
- Communication
- Education
- CPD
- Professional Guidance
- Treating Customers Fairly
- Issues of relevance to Institute and Faculty members involved in pricing direct insurance (individual and account level products) and reinsurance



Consultation

- The UK Profession
 - Workstream subgroups
 - GIRO 2005
 - Consultation draft
 - GIRO 2006
- CAS
- Institute of Actuaries of Australia
- Society of Actuaries in Ireland
- "Stakeholders" (users of actuarial advice)



Communication of findings

- UK: GIRO 2006, Sessional Meeting 2007
- USA: CAS Seminar on Ratemaking, March 2007
- South Africa: ASSA Conference, June 2007
- Japan: IAJ meeting, November 2007
- Australia: IAAust Pricing Seminar November 2007



Stakeholder Interviews

- Key themes emerging

- Positive view of contribution of actuaries
 - "It's hard to imagine pricing now without actuarial input"
- Communication skills
 - 14/17 felt this was an issue
 - related to this are persuasion / management skills
- Need to improve understanding of the market & the product / risks
- Need to work more closely with other parts of the business

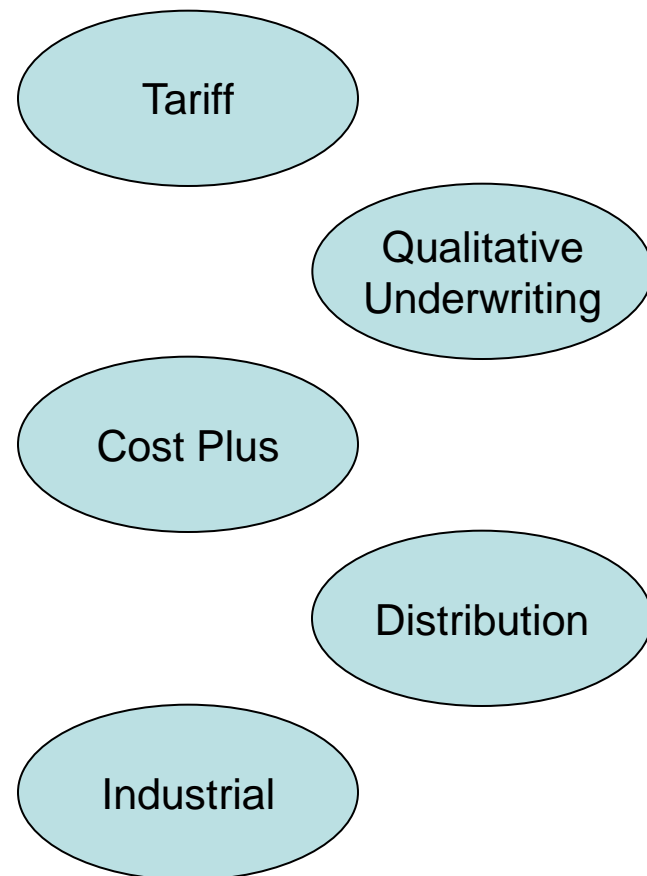


Terms of reference / workstreams

- **Role of Pricing Actuary**
- Methods
- Communication
- Education
- CPD
- Professional Guidance
- Treating Customers Fairly
- To review the areas in which UK actuaries are currently involved within the overall premium rating process, and to identify any areas where actuaries might be able to improve their contribution and/or add further value

Role - Background

- Believe role of pricing actuaries has changed
- Developed models of actuarial pricing role using UK motor history as an initial case study
- Identified actuarial role in each phase as it appears in today's market
- Used this as a basis for assessing:
 - The "general health" of actuarial involvement in pricing
 - Potential future roles for actuaries
 - Skills and capabilities required
 - How the business models evolve



Pricing & Underwriting Models

Model	Description	Actuarial Role
Tariff	<ul style="list-style-type: none">• The Regulator has significant influence over the rates• Key objective is to ensure no customer groups are discriminated against	<ul style="list-style-type: none">• Provides supporting analysis• Negotiates with (or is!) the Regulator• Seen as professional and objective
Underwriting	<ul style="list-style-type: none">• "Correct" pricing cannot be determined purely by numbers• Data may be incomplete or not exist• Subjective factors play a significant role	<ul style="list-style-type: none">• Works closely with the underwriter• Blends science with the underwriter's art• Manager with actuarial skills rather than motivated by craft
Cost Plus	<ul style="list-style-type: none">• Statistically based analysis• Complexity dependent on the data• Driven by expected cost of claims plus expenses• Single distribution channel	<ul style="list-style-type: none">• Data sourcing & extraction• Statistical skills eg GLM• Interpretation of operational costs



Pricing & Underwriting Models

Model	Description	Actuarial Role
Distribution	<ul style="list-style-type: none">• Distinction between cost & price• Loss cost as Cost + but also considers price elasticity• Managing pricing strategies for similar products over multiple distribution channels	<ul style="list-style-type: none">• Still has the responsibilities from the Cost + model• Additional involvement around elasticity assessment• Interaction with more stakeholders eg marketing & corporate partners
Industrial	<ul style="list-style-type: none">• Very large companies• Multiple brands, countries, channels• Machine orientated approach• Focus on operating efficiency and economies of scale	<ul style="list-style-type: none">• Balance between research & maintenance of systems• Data handling and system efficiency• Loss cost model process productionised & done by others

Class of Business	Category	Tariff	Qualitative UW	Cost Plus	Distribution	Industrial
UK Personal Auto	1960s	↔				
	1970s	↔				
	1980s	↔				
	1990s	↔				
	Now	↔				
Indian Auto Market - Now		↔				
UK Domestic Household		↔				
Pet		↔				
Travel		↔				
Creditor		↔				
Motor Vehicle Breakdown		↔				
Home Response		↔				
Commercial Motor	Small Vans	↔				
	Small Fleet	↔				
	Large Fleet	↔				
Commercial Property	SME	↔				
	Other	↔				
Pecuniary Loss	SME	↔				
	Other	↔				
General Liability	SME	↔				
	Other	↔				
Professional Indemnity	SME	↔				
	Other	↔				
D&O		↔				
Marine		↔				
Aviation		↔				
Medical Malpractice		↔				
Facultative Reinsurance		↔				
Treaty Reinsurance		↔				
Commercial Crime		↔				
Bankers Blanket Bond		↔				



Future challenges

- Tariff
 - Understanding cross-subsidies, influencing regulators
- Qualitative Underwriting
 - Governance vs management
- Cost Plus
 - Statistical and business training
- Distribution
 - Additional business and non-technical skills
- Industrial
 - Operational experience
- Governance vs business advice a recurring theme
- Wider understanding of business process needed
- Actuarial skills no longer seen as a prerequisite to career in non-life pricing management
- Actuaries better at introducing new techniques rather than managing them once implemented?
- Recent innovations coming from outside the Profession



Role - Recommendations

- Education and CPD - see later...
- GI Board debate the desired role the Profession should play in evolution of GI pricing
- The Profession should debate and agree how to balance need for strong governance with desire for actuaries to hold management positions in value-adding pricing functions



Terms of reference / workstreams

- Role of Pricing Actuary
- **Methods**
- Communication
- Education
- CPD
- Professional Guidance
- Treating Customers Fairly
- To summarise, in broad terms, current methods used by actuaries in GI pricing
- To identify areas where types of methods and approaches could potentially be improved and to identify areas where existing methods could be used more appropriately
- To suggest potential areas for further research



Personal lines - topics discussed

- Relativity analyses
 - GLMs
 - GAMs
 - GNLMs
 - CART et al
- Classification
 - spatial smoothing
 - clustering methods
 - non-geographical classification
 - external factors
- Technical base rates
 - expenses
 - bottom-up vs top-down
 - link with reserving
 - inflation / trends
 - event / large claim / reinsurance loads
 - exposure changes
 - No Claims Discount
 - capital allocation load
- Implementation issues



London Market - topics discussed

- Experience rating
- Exposure rating
- Estimating the loss cost
- Pricing excess of loss
- Stochastic and other methods
- Exposure measures
- Data issues
- Increased Limit Factors
- Attachment of cover
- Contract structure
- Other contract complications
- Large claims and latent claims
- Other pricing factors
- Catastrophe models in pricing
- Developing models for underwriters
- Rate monitoring



Methods - recommendations

- Summary of current methods set out in 100+ pages of appendices to the report
- Areas for future research and development identified and now underway
 - Integration with ICA models, Expense loadings, Variable capital loads, Catastrophe models, Implementation and delivery systems, Market prices of insurance liabilities, Link with reserving, Effect of climate change, Pricing for latent claims, Industry benchmarks / market information, Game theory, Demand modelling, Price optimisation
- Recommend the Profession establish a "Premium Rating Manual" in the form of a wiki
 - on-line editable document
 - international participation

www.ratemaking.org

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Main Page

Welcome to the Pricing Wiki

This wiki was set up based on the recommendation from the [GRIP](#) report to establish a wiki to outline the main pricing methods used by non-life pricing actuaries.


Several detailed appendices set out these main methods, and are the basis of the original version of this wiki. Feel free to add/subtract/correct the contents of this wiki.

To use the wiki, either search for a topic in the search box to the left. Alternatively, we have structured the wiki into broad categories, namely:

- [London Market Pricing Methods](#)
- [Personal Lines Pricing Methods](#)
- [Commercial Lines Pricing Methods](#)
- [Capital Allocation and Loading](#)

Please feel free to browse the wiki. To edit the wiki, please request a user ID by emailing admin@ratemaking.org with details of your email address and details of your actuarial credentials. A user ID and password will be sent to you within a few days.

For editing help, please click on [help](#).

The purpose of this wiki is to spread knowledge about non-life actuarial pricing methods. It should not be used as a forum for breaching anti-trust regulations. Please respect the letter as well as the spirit of the CAS guidelines on anti-trust compliance which can be found [here](#) .



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main topics

- [London Market Pricing Methods](#)
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- [Commercial Lines Pricing Methods](#)
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Search results

You searched for **spatial analysis**

There is no page titled "spatial analysis". You can [create this page](#).

For more information about searching PricingWiki, see [Help](#).

Showing below 3 results starting with #1.

View (previous 20) (next 20) (20 | 50 | 100 | 250 | 500)

No page title matches

Page text matches

1. [All References](#) (11,762 bytes)

- 7: ...l Adequacy and Allocation Using Dynamic Financial **Analysis**", (Casualty Actuarial Society Forum Summer 2000 ...
- 27: DR Cox and EJ Snell, "**Analysis** of Binary Data" (Chapman & Hall, 1989)
- 49: ...Boskov, "Premium Rating by Geographic Area Using **Spatial** Models" (Proceedings, ASTIN Colloquium, 1993, Ca...
- 100: E Pinto and D.F Gogol, "An **Analysis** of Excess Loss Development" (Casualty Actuarial ...

2. [Classification techniques](#) (16,219 bytes)

- 34: *Residual **spatial** or geographical variation
- 35: ...external factors above. Other techniques including **spatial** smoothing are required to isolate this component.
- 58: ...costly, but is a key contributor to enhancing any **analysis** of claims experience for geographical classificat...
- 83: ...plit by a broad regional grouping not used in the **analysis** - for certain regions, the trends diverge indicat...
- 97: ***spatial** smoothing methods

3. [CPD](#) (12,478 bytes)

- 49: ...licable in personal lines, eg geographical **spatial analysis** methods

View (previous 20) (next 20) (20 | 50 | 100 | 250 | 500)

Search in namespaces:

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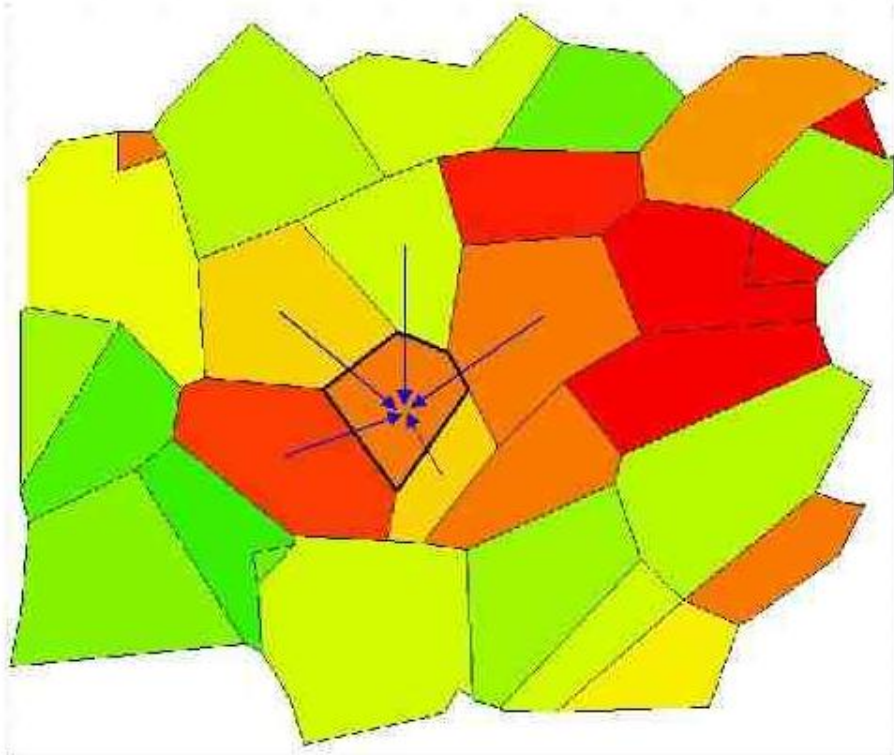
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Further details on distance based smoothing can be found in [Brubaker](#), in [Christopherson and Werland](#) and in [Anderson](#).

Adjacency-based smoothing



Adjacency-based smoothing incorporates information about directly neighbouring location codes. Each location code is influenced by its direct neighbours, each of which is in turn influenced by its direct neighbours; distributional assumptions or prior knowledge of the claims processes can be incorporated in the technique. The algorithms are therefore iterative and complex to implement.

As this smoothing method relies on defining which location codes neighbour each other, natural or artificial boundaries can be reflected in the smoothing process.

Location codes tend to be smaller in urban regions and larger in rural areas, so adjacency-based smoothing can sometimes handle urban and rural differences more appropriately for non-weather-related perils.

Further details can be found in [Boskov and Verrall](#).

Degree of smoothing



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- Methods
- **Communication**
- Education
- CPD
- Professional Guidance
- Treating Customers Fairly
- To consider whether and how improvements could be made to the way GI pricing actuaries communicate



Communication

- Stakeholder feedback was clear
 - exposition of technical matters
 - persuasion skills
 - listening skills
 - turning numbers into recommendations
- Consistent with GRIT feedback, and wider feedback within Profession
- Pricing actuaries communicate in a range of capacities...
 - analyst, portfolio management, senior management...
 - ...with a wide range of people...
 - internal actuaries, external actuaries, underwriters, sales, CEOs, finance departments, the public, the press, shareholders, regulators, IT departments, operational departments...
 - ...with a range of types of communication...
 - oral, written, graphical, visual, listening...



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- Role of Pricing Actuary
- Methods
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- **Education**
- **CPD**
- Professional Guidance
- Treating Customers Fairly
- Consider whether the content of the (UK) exam syllabus is adequate to prepare actuaries to work in the pricing area
- Consider whether more should be done to provide CPD in this area, and if so what



Education

- CAS
 - unsurprisingly, more depth on pricing issues
 - eg general rating principles, GLMs, individual risk rating, excess and deductible rating, ILFs, reinsurance pricing
 - more detailed reading material
 - rate-filing / ISO / NCCI
- IAAust
 - review confirmed conclusions from CAS review...



Education - Recommendations

- GI element of UK examination syllabus be enhanced to provide more detail on:
 - pricing basics
 - policy terminology
 - insurance products (CII?)
 - exposure measures
 - experience rating
 - trends
 - profit, expense, risk and catastrophe loads
 - GLMs (example syllabus item provided)
 - demand modelling, price elasticity, price optimisation
 - understanding rating factors
 - individual risk rating
 - excess and deductible rating
 - reinsurance rating
 - catastrophe modelling
 - medical malpractice and professional liability
 - use of ISO / NCCI information



Education - Recommendations

- Profession should consider using CAS, IAAust syllabuses and exam question style as part of basis for such a review
- Overseas topics of relevance also be included
- Some communication pitfalls should be covered
- At the same time, ensure that syllabus changes do not detract from goal of developing well rounded professionals who can think for themselves



Update on UK GIECPD Committee

- Wholesale re-write of education material currently underway
- Majority of GRIP's recommendations on course to being included
- Earliest date for revised material 2009
- Discussions over two GI exams



CPD

- Current options for UK pricing actuaries
 - GIRO
 - Current Issues in General Insurance seminar
 - ASTIN
 - Lighthill Risk Network
 - CAS Seminar on Ratemaking
 - CAS Seminar on Predictive Modeling (sic)



CPD - Recommendations

- Introduce one day annual UK pricing seminar from 2008
- Now planned for 13 June 2008, London
- Are UK actuaries where the CAS was ~20 years ago?



CPD - Non-technical skills

- There was a debate over whether it is for Profession to train in this area
- Noted with interest
 - CAS workshop approach
 - IAAust Commercial Actuarial Practice course
- Market/working/end-to-end knowledge
 - too many exams an impediment?



CPD - Recommendations

- Profession to consider
 - partnering with a third party training company to develop training material relating to communication and management skills
 - extending professionalism course to cover non-technical skills
- Bear in mind stakeholder plea for greater understanding of products and markets when designing CPD
- Premium rating manual / Wiki
- Improve content and search facility of Faculty/Institute website



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- **Professional Guidance**
- Treating Customers Fairly
- To consider whether existing (UK) professional guidance should be modified / clarified to make its application to premium rating clearer
- To consider whether there is a need for more detailed best practice guidance that would be issued by the Profession setting minimum standards for a direct business pricing assignment



UK Guidance - a changing landscape

- During lifetime of GRIP
 - responsibility for technical standards for actuarial work moved from Faculty/Institute to the Financial Reporting Council and the Board for Actuarial Standards ("BAS")
 - main GI Guidance Note ("GN12") changed and became mandatory
- UK guidance now
 - PCS: Professional Conduct Standards
 - GN50: General Insurance Principles and Practice
 - GN12 v4.0: General Insurance: Actuarial Reports



Overseas Professional Guidance

- CAS
 - Statement of Principles Regarding GI Ratemaking
 - 10 ASOPs
 - Many ASOPs created to address US regulatory issues
 - Many issues ASOPs covered by GN50 and GN12
 - ASOPs rather closer to "Advisory Note"
- Institute of Actuaries of Australia - pricing
 - Only one specific pricing note, relating to New South Wales Motor Accidents Scheme
- Royal Statistical Society
 - General Code of Conduct
 - No guidance comparable with UK Profession's guidance notes



"Two hats"

- Institute of Actuaries of Australia - Code of Professional Conduct
 - **Actuarial Advice** (statutory role, within scope of Professional Standards, or advice given in accordance with professional requirements regarding impartiality, expertise and formal reporting)
 - **Professional Services** (everything else)
 - Different levels of guidance apply
- Institute of Chartered Accountants - Code of Ethics
 - Distinction made between accountants in business and accountants in public practice



Professional Guidance - Recommendations

- Given stakeholder feedback, and given comparison with CAS, IAAust and RSS, GRIP believes that further formal professional guidance is not required
 - improving standards and value of actuarial work best done via education and CPD
 - *Information and Assistance Notes* (IANs) should be issued to help pricing actuaries interpret GN12 and GN50
 - GI Board to consider technical advisory notes along lines of US ASOPs, perhaps using elements of the forthcoming Premium Rating Manual



Professional Guidance - Recommendations

- GRIP feels that the IAAust "two hat" approach has a number of significant attractions to pricing actuaries
- GRIP recommends that the Profession debates with BAS the merits of adopting the IAAust "two hat" approach (even though this is wider than pricing and even GI)
 - Not inconsistent with some of the concepts in the BAS's recent conceptual framework consultation paper
- In addition there may be merit in making a distinction between actuaries in business and actuaries in public practice



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 - **Treating Customers Fairly**
- To consider trends in the area of the Treating Customers Fairly ("TCF") and to consider what the profession might need to consider in preparation for issues arising in this area



TCF - Background

- UK regulator - Financial Services Authority (FSA)
- Key strand of the FSA's objective of consumer protection
- Principles based approach
- *"A firm must pay due regard to the interests of its customers and treat them fairly"*
- Affects many aspects of what a company does, including product design, disclosure, sales processes, claims handling, systems and controls
- Senior management's responsibility rather than simply another compliance requirement



TCF - Background re pricing

- *"TCF does not indicate that we intend to become an economic regulator. It is not our role to determine firms' pricing policies"*
FSA Paper "Treating customers fairly - building on progress" July 2005
- *"TCF does not mean customers are no longer expected to take decisions or to take responsibility for them"*
FSA Paper "Treating customers fairly - progress and next steps" July 2004



TCF - GRIP's view

- Pooling / granularity of risk
 - GRIP believes this is not within remit of TCF
- Utility pricing / price optimisation
 - GRIP believes this is not within remit of TCF
 - Recommend awareness be maintained in this area
- Premium discounts
 - GRIP believes there may be potential issues around implied future discounts
 - Not purely a pricing issue
- Creditor
 - Potential issue, could develop in a number of ways
 - GRIP recommends actuaries keep abreast of issues in this area



GRIP

- Role of Pricing Actuary
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GRIP

General Insurance Premium
Rating Issues Working Party

Duncan Anderson (Chairman)
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Karl Murphy
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Gabriel Welsh

12 January 2007



Next Steps

- GRIP will not continue as a group
- GI Board will push forward recommendations through existing and potential new Institute / Faculty groups eg
 - GIECPD
 - GIPSC
 - GIRO
 - Research Steering Committee
 - New Wiki group
- Several individual GRIP members will assist where relevant



And IAAust?

- Of interest to IAAust?
- Parallels?
- Interested in a Wiki?
- Feedback welcome!

- www.actuaries.org.uk/grip
- www.ratemaking.org

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