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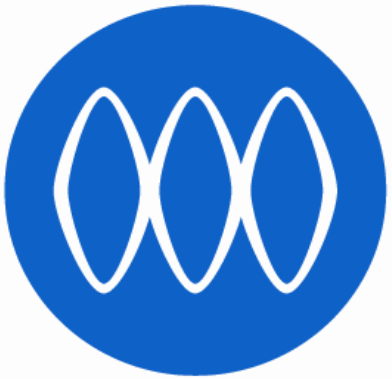

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Consultants and Actuaries

Marine Liability: Pricing with GLM
CAS Spring Meeting 2004
Brian Gedalla

Agenda

- Background
- Protection & Indemnity Clubs
- The International Group
- Available Data
- The Model
- Questions / Discussion

Background

- GLM models in P&C
- Personal Lines
- Auto/Household
- But…..

Background

- Marine Liability?
- “London Market” risks?

Background

Why not?

Background – P&I

So,

What are P&I Clubs anyway?

Protection & Indemnity

- Essentially 19th century creations
- Born out of the Lloyd's marine hull market
- Pure mutual collectives of ship owners

P&I Clubs

- Today, there are 14 major Clubs
- Plus some much smaller ones
- Major Clubs form the "International Group"
- Group operates "International Group Agreement"

International Group Agreement

- Regulates cover available
- Regulates movement between Clubs
- Governs Claims Pooling arrangements
- Arranges Group XoL purchase

P&I Cover

- Standardised cover between Clubs
- Losses limited to Pool Retention (currently $5m) plus share of pooled claims (up to $50m) plus 25% shared co-reinsurance of first layer XoL

So what is P&I?

- Shipowner's or Charterer's Third Party Liability
- Includes crew, passengers, port workers, stevedores etc.
- Also liabilities arising out of collisions, pollution, and the consequences of equipment failure

Main Coverages

- Illness, Injury and Death
- Cargo
- Collision – “running down” other vessels
- Collision with fixed or floating objects
- Pollution
- Fines
- GA / Salvage
- Fees

P&I Claims

- Popular image of “big” claims
- Some are spectacularly so – eg: Exxon Valdez
- But most are quite small
- Industry might have 60,000 losses per year
- Average maybe $15,000

P&I Claims (continued)

- Very large claims are, in fact, a rarity
- But claims distribution is very skew - 85% of claims account for only 15% of net cost

P&I Exposure

- Typical Club may only have a few hundred policies
- But unit of exposure is “vessel-entry” – and these run into thousands
- P&I Clubs are primary insurers, holding single risk data

Traditional Rating

- Essentially empirical
- Experience based
- Loss Ratio approaches
- Sometimes with added glosses –
  “acceptable” loss ratio
  burning cost
  abatement layers to mutualise larger losses

Possible Rating Factors

- Type of Vessel
- Age of Vessel
- Classification Society
- Flag
- Nationality
- Tonnage
- Deductibles

Rating Factors – Vessel Type

- Could be up to 150 codes
- Several obvious categories –
  - Tankers (clean and dirty)
  - Bulkers
  - Reefers
  - Passenger (Ferry, Ro-Ro, Liner)
  - Tugs/Barges
  - Blue Water / Brown Water
  - Etc.

Rating Factors – Age of Vessel

- Three ages of a vessel:
  - New
  - Young (up to about 15 years)
  - Old (vessel in “second” ownership?)
- If sufficient data, then analysis by individual age-years possible

Classification Society

- Maritime regulators
- Some 15 or so of these organisations
- Include American Bureau, Lloyd's Register
- Perception of differing standards

Rating Factors

- Flag and Nationality - need to be grouped
- Flag heavily skewed towards certain “Flags of Convenience”
- US Flag and US Nationality
- Others not so clear cut

Tonnage

- Rating is on a “cost per ton” basis
- However, tonnage itself can be used a rating factor, in groups
- Indicator of size of vessel

Modelling

- P&I: similar concepts to Auto?
- Typical rating basis will be a Fleet of vessels - or a group of similar vessels forming part of a Fleet
- Model approach is similar to approach taken to Auto Fleets

Basic data

- Transaction data supplied by the client
- Summarised to single records for each exposure unit
- Claims cost capped at abatement limit, to eliminate effect of large losses
- Abated amounts included later as a large loss loading

Modelling

- Claims costs enhanced for IBNR and IBNER.
- Factors supplied by Client - or could have been estimated by traditional actuarial methods

Data Adjustments

- Data Grouped
- Errors identified and removed
- “Laid up” exposures removed

Modelling

- Frequency-Severity Model
- Modelling risk premium
- Poisson error structure with a log link (as we are modelling claims)
- Interactions - VesselType/Tonnage
- Resultant Multiplicative Model

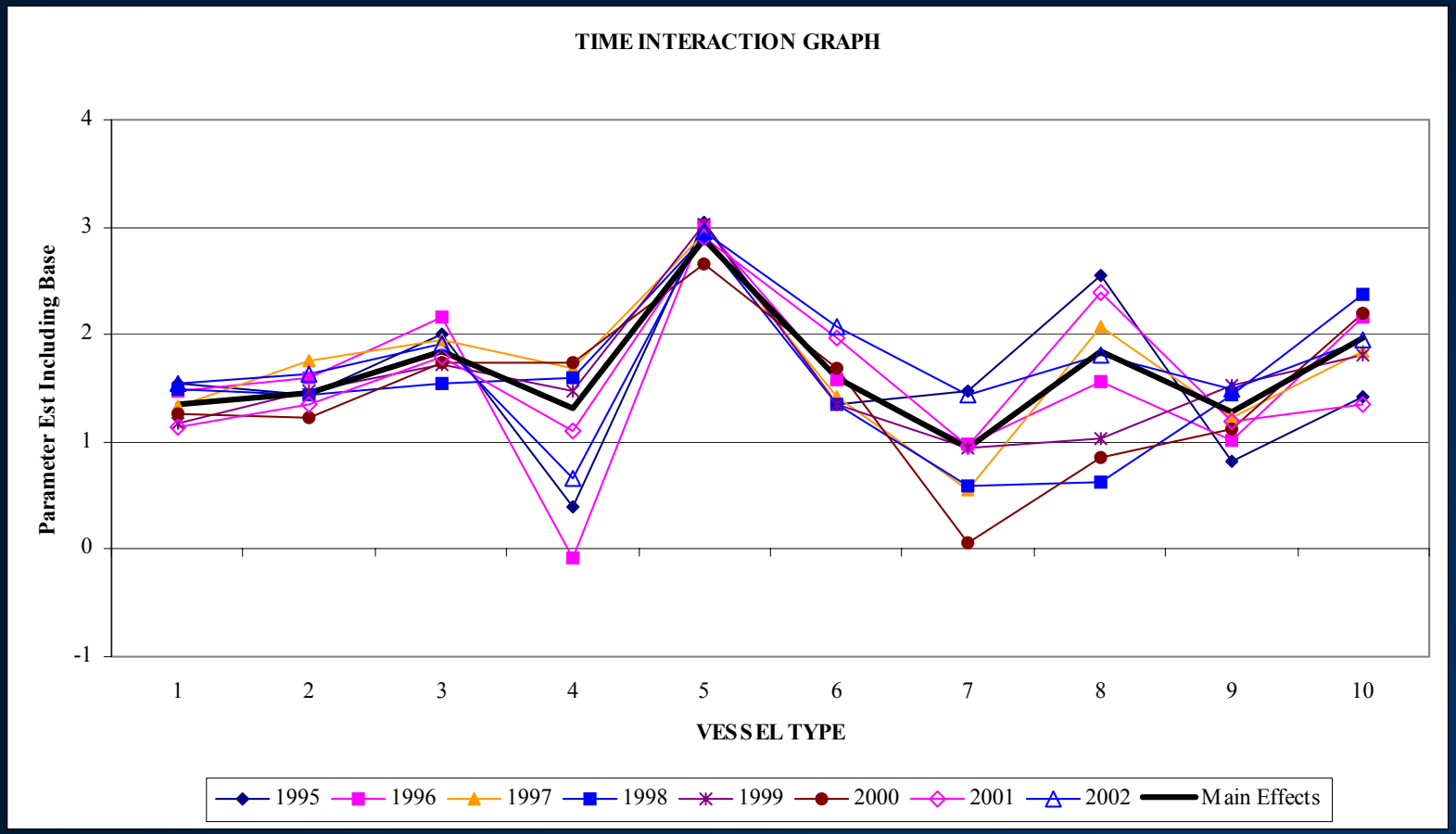
Modelling - Alternative Models

- Frequency Models
- Severity models - Gamma distribution to reflect increasing variability around claim size
- More details in Paper

Modelling

- Time dependency - several years data
- Inflationary trend identified
- Inflation is thus considered

Time Interaction



Modelling

- End product is a simple to apply multiplicative model with a base rate and sets of rating factor relativities
- End result is a Rate per Entered Ton
- Base rate should be enhanced for non-modelled aspects

Base Rate Enhancements

- Abated Claims
- Data errors
- Expenses
- Other management costs
- Future inflation
- Pooled claims/reinsurance

Large Claims

- Simple approach is to apply a single loading for the total value of claims abated
- Alternative approaches have been suggested, particularly as in P&I the large losses are so significant

Large Claims (cont)

- Define large claims – say $500k
- Review large and “small” claims separately
- GLM exercise using claims capped at large claim level
- Frequency review of large claims – derive average numbers per annum
- Multiple sampling to model large losses
- Large Claims loading derived

Validation

- Model applied to existing book of business
- Indicated model rates compared with actual rates
- Model easily transferred to client
- And then its in the hands of the Underwriters…..

Limitations

The slides for this presentation have been prepared to support an oral presentation to the CAS Spring Meeting 2004. The presentation as a whole is intended to provide a summary of the Paper that we have submitted to this Meeting. As such it necessarily omits detail that in some situations may be relevant.

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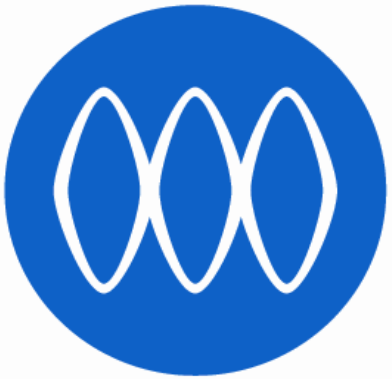

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