The Role of Commercial and Specialty Lines Pricing Actuary in the InsurTech Revolution

Marcus Evans Conference: Pricing in Personal Lines Insurance

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London, 21-22 September 2017
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Ana J. Mata, PhD, ACAS

Career to date
- 2007 – to date: Pricing consultant and trainer – London
- 2002 – 2004: Reinsurance pricing actuary – USA

Education
- Member of the Casualty Actuarial Society
- BSc in Mathematics and PhD in Actuarial Mathematics
About MatBlas

- Founded in 2007 with the vision:
  
  “We believe that efficiency begins at the time of rating and that technology implemented by insurance experts can significantly streamlined insurance companies’ workflows and processes: time saved is profit made.”

- Our services
  
  - Actuarial consultancy
  - Software/systems development
  - Actuarial courses for non-actuaries
  - Technical courses and coaching for actuaries
Agenda

- Underwriting and pricing in commercial and specialty lines
  - Pricing, consistency, profitability and data
  - Lloyd’s vs. Non-Lloyd’s companies

- InsurTech for commercial lines and specialty lines
  - Two case studies

- The role of the actuary in the InsurTech revolution
Underwriting and pricing in commercial and specialty lines
The purpose of rating models

- Risk classification: to allocate the expected claim cost to each policy based on risk profile
  - Predictive frequency and severity
  - Model must have been calibrated with claims data
- Derive a technical or benchmark price to each policy
  - Distinguish from actual price charged (commercial)
- Consistency of benchmark parameters to measure changes in risk exposure
Lloyd’s UMS Framework

- High emphasis on single risk pricing
- Performance Management Data Report (PMDR)
  - Benchmark price for each policy
  - For renewals, quantifying the premium change due to
    - Change due to Limit/Deductible/Attachment
    - Change due to Breadth of Coverage
    - Change due to Other factors
    - Change due to pure rate change
  - Use of rating models embedded in the underwriting process
- Solvency II:
  - Sign off process: by actuaries or someone with “actuarial experience”
Background of pricing framework at Lloyd’s

“Begin at the beginning and go on till you come to the end: then stop”, Lewis Carrol, Alice in Wonderland

Risk Adjusted Rate Change
- Around 2005/2006 became a requirement to report rate changes
- Detail breakdown: Limit/Attachment; Coverage and All Other Factors

Benchmark Pricing
- Around 2007/2008 a benchmark price for each policy had to be presented: premium required to achieve business plan loss ratio.

Rating Models Embedded in Underwriting
- 2009 onwards it became a requirement to have rating policies/models embedded in the underwriting process.
- Today having a rating model is a must and they are reviewed by Lloyd’s from time to time.

The sequence of requirements and the lack of integrated IT systems generated a workflow problem!
Underwriters’ workflow challenges

Underwriting/Finance System
- Premium, limits, attachments, share (%)
- Industry and market codes and references

Rating Model(s)
- Exposure data from submission.
- Experience+ exposure rating = Technical price

Rate Changes
- Risk Adjusted Rate Change
- Expected Loss Ratio and Benchmark Price
A tough selling proposition

Pricing models seen as “tick box” exercise (admin)

- Are rating models predictive of future events and claim costs?
- Are rating models a guarantee for extra profits?
- How much of the historic performance can be attributed to the presence or absence of rating models?
- Can we accurately price a single policy?
- So, why do I need to go through this?
Why do we model/price each policy?

- Consistency
  - Single source of assumptions: loss cost, expected loss ratios, rate changes

- Efficiency
  - Single point of data entry: avoid repetitive processes, ease of renewals

- Business intelligence
  - Exposure information at granular level

- Regulatory
  - It is no longer optional
An efficient workflow

- Underwriting
  - Does risk fit the portfolio/risk appetite?
  - Renewal/new
  - Capacity/wording

- Pricing
  - “Ideal” price vs. “cost” of product
  - How much can you get? Are you happy with it?
  - Expected return (underwriting profit) or Expected loss ratio

- Reporting:
  a by product of pricing
  - Renewal risk vs. expiring (better/worse)
  - Renewal cash vs. expiring (better/worse)
  - Change in expected profit and rate change
  - New vs. renewal business

Ideally captured in a database for systematic reporting
Twofold problem

**Systems**
- User’s interface
- Workflow
- Business function requirements
- Processing of information
- Data warehouse
- Reporting requirements
- Updates and enhancements

**Business**
- Classes of business
- Risk drivers and model parameters
- Completeness of submission of data
- Response time required
- Realistic time to model each policy
Designing and Developing Rating Models with Limited or No Data
First things first

- *What are the first three questions I would ask when given the task to design and develop a rating model for a new class of business or in a new territory?*

- No claims data are available.

- Limited inferences can be made about prior performance from other carriers.
Understanding the product

- What is covered? Main coverage?
- How does the policy respond to claims?
- What exclusions are specifically addressed?
- Any potential endorsements or add-on coverage?
- Ask the underwriter anything not obvious or discuss specific examples of events and claims you can think of.
- Do your own research.
Understanding the nature of claims

- What are the most common causes of losses?
- What are the most common types of claims?
- Any potential defenses or mitigation of claims?
- How are claims affected by the legal system?
- What are the proportions of indemnity vs. other costs, for example legal costs?
- Are there often any potential for salvage and subrogation recoveries?
- Largest claim in history? Claims in the front news?
- Any available data?
Understanding the underwriter’s workflow and thought process

- Cliché: Put yourself in the mind of your customers.
- Get a copy of a standard submission: narratives and data presented.
- What key pieces of information are provided? How are they provided (Excel, PDF, e-mail)?
- How much time can be realistically allocated to the pricing of each policy?
- Key items looked at for renewal policies vs. new business.
Factors to consider for consistent pricing

- Exposure base (TIV, Hull Value, Assets, Turnover, Payroll)
- Base rates or base premium, size discounts?
- Rating variables and factors
- Rating higher/lower limits than the base
- Multi-currency benchmark plan
- Deductibles
- Debits and credits or underwriter’s loads or discounts
- Minimum premiums and minimum ROL
- Brokerage
- Terms and conditions (wording)
- What factors to include in the loss cost/technical price?
Key assumptions made clear

- What is the base limit of coverage?
- Have these base rates assumed a certain level of deductible or are they 1st loss rates?
- What is the base territory for these rates?
- What is the base currency for these rates?
- What is the expected level of risk management?
- What is the expected level of financial strength?
- What is the expected level of health and safety procedures?
- What is the standard policy wording (coverage and exclusions) assumed in the rates?
Our actuarial input

Building from 20+ years of experience, we focus:

- Inconsistencies and gaps in rationale;
- Available data: internal and external;
- Commercial viability;
- Recommend:
  - User’s interface
  - Data processing
  - Data warehouse
InsurTech for Commercial and Specialty Lines
What is InsurTech?

The use of technology and innovation to:

- Improve efficiency and interaction between consumers, brokers and insurance companies – personal lines focus;
- Find customised policies and fill gaps in coverage;
- Refine pricing and risk classification: e.g. peer-to-peer pricing;
- Automation of documentation;
- Efficient claims handling.
Why are insurers slow to adapt?

- InsurTech companies are often not insurance companies – they need an insurance partner.
- Who is the risk taker?
- How is the InsurTech company compensated?
- Who controls underwriting?
- Who owns the data?
- Can the “App” be linked to the insurer’s internal systems?
- What data is reported to the insurance company?
# What can InsurTech do for commercial and specialty lines?

<table>
<thead>
<tr>
<th>Key items</th>
<th>Personal lines</th>
<th>Commercial &amp; Specialty lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front end user</td>
<td>Consumer/Agent</td>
<td>Underwriter</td>
</tr>
<tr>
<td>Risk selection</td>
<td>Automated</td>
<td>Risk by risk</td>
</tr>
<tr>
<td>Technical price</td>
<td>Formulae</td>
<td>Formulae with “manual adjustments”</td>
</tr>
<tr>
<td>Final price</td>
<td>Pre-determined by “app”</td>
<td>Underwriter’s decision</td>
</tr>
<tr>
<td>Workflow</td>
<td>Reasonably streamlined</td>
<td>Can be fully streamlined</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Fully automated process</td>
<td>Integration of systems is key – correct choice of development environment</td>
</tr>
<tr>
<td>Data warehouse</td>
<td>Granular data captured – consumer’s input</td>
<td>Data entry is biggest challenge – need to educate brokers</td>
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Need for data standardisation across the industry

- The role of brokers in standardisation of data – presentation, format and completeness.

Broker: submission data

Application Programming Interface (API)

Each insurer maps the data to their own systems

Insurer 1

Insurer 2

Insurer 3
The components of an efficient pricing/underwriting system

- **Reporting**
  - Standard data downloads
  - Management reports
  - External reports

- **Data warehouse**
  - Choices of database (SQL/MySQL, Oracle, etc.)
  - Link to existing system

- **Calculations**
  - Choices of languages (VBA, C#, Python, etc.)
  - Object oriented programming

- **User interface:**
  - Spreadsheet
  - Html form
  - Mobile App
Biggest challenge: meet the team

Management

Underwriters

Actuaries

Project manager

Business Analyst

Programmers
Reasons for reluctance to change

- Prior experience
  - IT projects have highest failure rate
  - In-house vs. outsourcing
  - Ease of maintenance/update

- Actual costs vs. budget
  - Escalated costs due to under-estimation of hours
  - Post-development costs

- Intellectual capital
  - Code blue print, documentation
  - Over-reliance on key staff
  - User manual
Streamlined Workflow: Smart Re™ - A Case Study
Reinsurance pricing

- Main users of models: actuaries and underwriters
- Often lots of data received (non-standard format)
- Standard techniques and methods:
  - Exposure rating
  - Experience rating
  - Evaluation of contract terms
  - Combined ratio
- Where is the “big data”?
Limitations of the typical workflow

- Several spreadsheets to price one treaty
  - Experience
  - Exposure
  - Summary
  - Aggregate loss distribution

- Pre-determined size of input
  - Number of layers and sub-classes of business
  - Number claims and years of data
  - Benchmark tables

- Stand-alone spreadsheets store the data

- Only high level outputs are recorded in systems (often manually)
Benchmarking

- Most common complain: lack of benchmarks (curves, LDFs, inflation, etc.) due to lack of data.
  - Seriously?

- Summer project: manual aggregation of data by actuaries to analyse classes of business.
  - Weeks of work cleansing and aggregating data.
2009: three reinsurers asked us to develop a pricing model for them.

Our questions:
- Why Excel?
- Apart from pricing, what MI would you want to obtain in the process?
- Support, maintenance, updates

Smart Re™ was born:
- A cloud based reinsurance pricing model with per user annual licence fee.
Smart Re™: Brief demo

- https://www.smart-reinsurance.com
- No obligation 3-month trial licence
- External templates
  - Benchmark parameters – per company, per division
  - Data input – provided by cedant in submission
Smart Re™: The main challenges

- How to “specify” the requirements to the programmers who had never worked in insurance?

- How to test the components and the whole application in a robust way ensuring that unusual circumstances (missing data, data validation, etc.) were also included?
Smart Re™: Overview of the development

- .NET environment, C# code and MySQL database, minor javascript features.
- Two programmers and one actuary
- Object base code
  - Pseudo-code for calculations written by the actuary
  - Easy to test, audit and update
- Benchmarks and submission data upload by user in Excel – to database
- Standard data downloads from user’s interface
From Excel® calculations to objects

- Things that are simply done in Excel often have to be broken down in a number of objects.
- For example: allocating a claim to a year
  - Data available - dates associate with a claim: treaty year, UW year, accident year, policy effective date, date of loss, report date, etc.
  - Selecting the basis of the analysis: treaty year, UW year or accident year based on
    - Basis of the treaty (RAD, LOD)
    - Data available
Sample algorithm to allocate claims to years

If TreatyBasis = Risks Attaching During AND PolicyBasis = Claims made

If Experience_Basis = Treaty year

If Treaty year is not null, then

StartDate = DATE(Treaty year, MONTH(Treaty effective date), DAY(Treaty effective date))

YearToAllocateClaim = Treaty year

Else

If Policy effective date is not null, then

If Policy effective date < DATE(YEAR(Policy effective date), MONTH(Treaty effective date), DAY(Treaty effective date)) then

StartDate = DATE(Year(Policy effective date)-1, MONTH(Treaty effective date), DAY(Treaty effective date))

YearToAllocateClaim = Year(Policy effective date)-1

Else

...
A programming challenge

- Write a function to calculate the inflation factor with the following inputs
  - An array containing inflation information with effective date and inflation %
  - Date from which inflation will be applied
  - Date from to which inflation will be applied
Tester must be independent of programmer
- May only test “common” combination of inputs.

Each object is tested in isolation
- A set of random input parameters covering all possible combinations including errors.
- Actuary calculates the output using Excel.
- Programmer calculates the output using the coded function.
- Results are compare, differences reconciled and fixed.
Smart Re™: The benefits

- Standard actuarial methodology
- Audit trail – formulae cannot be accessed by the user and changed
- Easy to update and enhance – included in licence
- All data and user’s selection stored in a database
- Easy to renew accounts with few updates
- Cloud based or internally hosted
- User interface can be web-style or Excel
Streamlined Workflow:
A Case Study for Yachts Insurance
Smart Re™ set the scene for other products

The objectives and benefits of our solutions

- Audit trail – from automatic price to technical price to actual price
- Data capture
- Ease of renewals – compare exposures
- Automatic and consistent reporting: loss ratios, technical price, benchmark price, rate changes, rate adequacy
- Ease of maintenance – up loads and down loads by the user or administrator
Our project workflow

- Client provides existing models if available
  - Actuaries review it and make recommendations for improvements; or
  - Actuaries help them design and calibrate the parameters or the model.
- Client, actuary and developers agree specifications.
- Actuary translate appropriate requirements for developers.
- Actuary and develop conduct detail testing.
- Client testing.
A simple model for Yachts

- Bespoke products
- Company wide: all class may be included in the same system
- Company input
  - Business plan parameters at company level by class
  - Specific class of business benchmarks with versioning
- User interface
- Renewals are linked
The Role of Actuaries in the InsurTech Revolution
Three unique business functions in the insurance industry

- Underwriting
- Actuaries
- Claims
What is preventing actuaries from embracing technology for their tools?

- Number 1 objection from actuaries?
- Other professions seek to standardise information
  - Public accounting records are held in iXBRL format to make it easier to aggregate
- Lack of up to date programming skills?
- A spreadsheet is very telling about the clarity of mind of the user
  - Clumsy and cumbersome spreadsheets are plentiful in our industry
- Spreadsheets can be used as the user interface
  - Familiarity
Key members of a multi-disciplinary development team

- Underwriters – main users
- Business analysts (finance, claims, IT)
- Actuaries
- Database architects
- Programmers
Wrap up

- Plethora of possibilities for technological advancement readily available

- InsurTech:
  - Not just about making it easier to sell insurance
  - It is about embracing technology to make insurance processes efficient
  - Perhaps not enough insurance experts are involved

- Actuaries have a real opportunity to lead the way for change in the insurance industry: are we going to grab it?