



Underwriting and Actuarial Consulting, Training and Research

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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Ana J. Mata, PhD, ACAS

■ Career to date

- 2007 – to date: Pricing consultant and trainer – London
- 2004 – 2007: Global Financial Lines and Casualty product actuary – London
- 2002 – 2004: Reinsurance pricing actuary – USA
- 2000 – 2002: Actuarial consultant – London
- 1992 – 2000: Teaching assistant, Lecturer for MBA and Undergraduate programmes – UK and Venezuela

■ 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**

An orange decorative shape on the left side of the slide, consisting of a vertical bar and a horizontal bar that meet at a right angle, forming an L-shape.

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

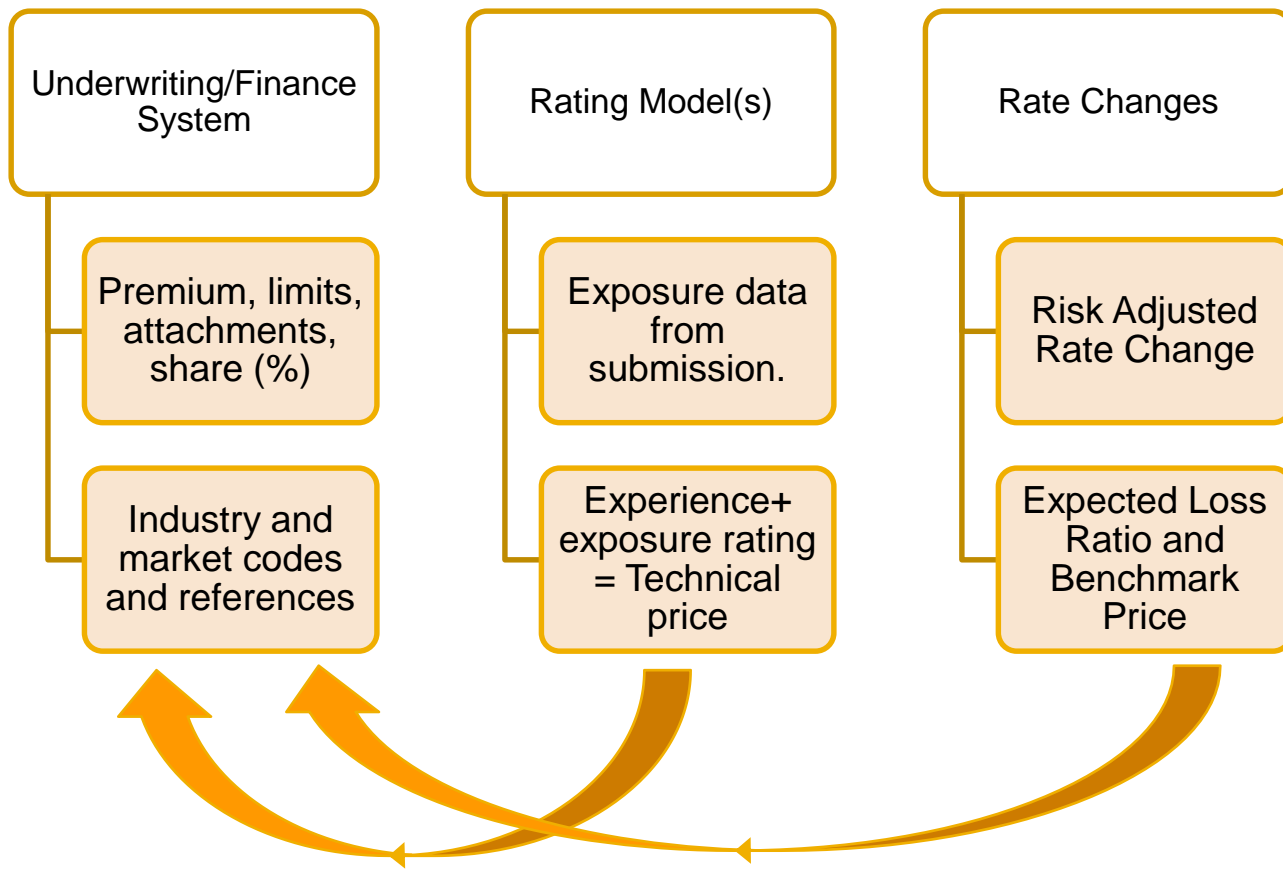
- Around 2007/2008 a benchmark price for each policy had to be presented: premium required to achieve business plan loss ratio.

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



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 responds 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?

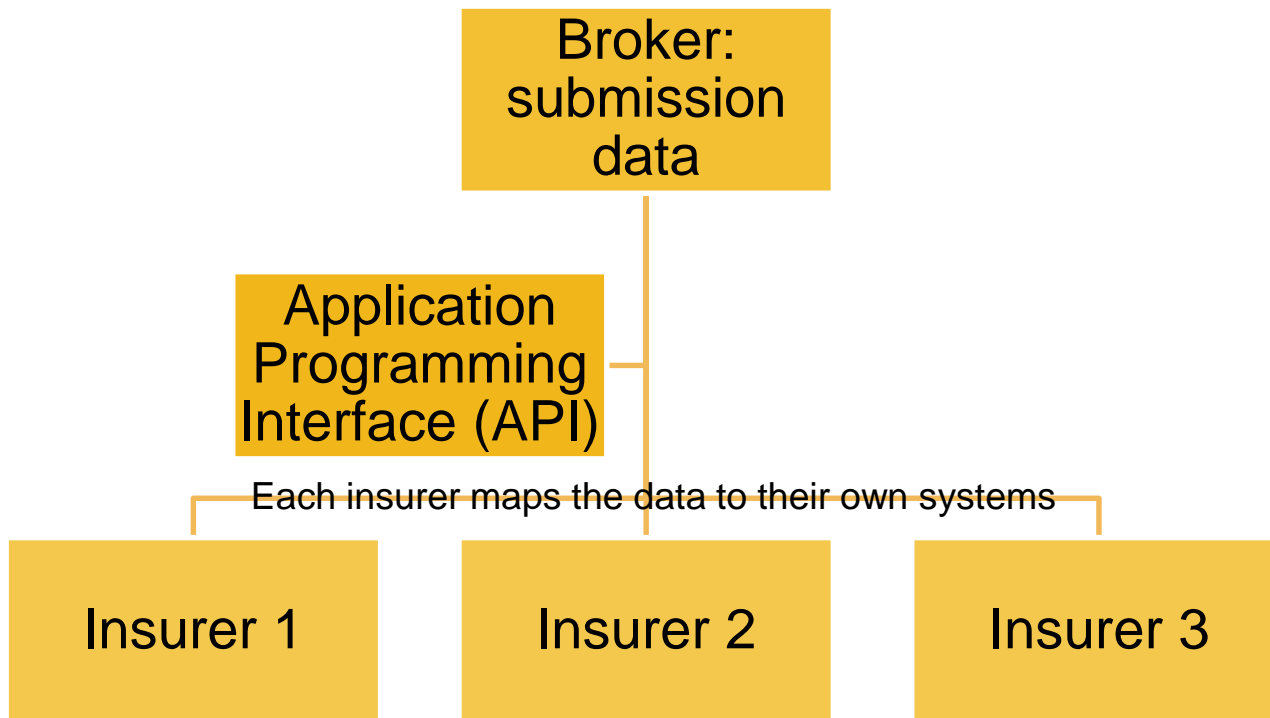
- InsurTech companies are often not insurance companies – they need an insurance partner.
- Who is the risk taker?
- How is the InsurTech company compensated?
- Who controls underwriting?
- Who owns the data?
- Can the “App” be linked to the insurer’s internal systems?
- What data is reported to the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

What can InsurTech do for commercial and specialty lines?

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

Need for data standardisation across the industry

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



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.

The story behind Smart Re™

- 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

Smart Re™: The testing challenge

- 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?