THE TRUE COST OF YOUR PREMIUMS

John Birkenhead, an independent consulting actuary, answers some common questions from ALARM members: "I've had no claims for a long time - why has my premium gone up?" ..."I thought that premium equals cost of risk; I'm a good risk so why does my premium keep going up?" ..."I've had no claims this year - can I have my premium back?" He answers the above questions by sneaking a quick look "under the mathematical bonnet" at some of the mathematical aspects of setting premiums; in doing so, we see the "true" cost of insurance premiums.

The Classical Car Insurance Problem

We will introduce the mathematical concepts with a typical car insurance problem as shown below: How much premium would you charge for the following risk?

- 18 year-old male driver
- Drives X-Reg Ford Fiesta, valued at £1,000 ·
- Has 3 penalty points on licence for speeding
- Lives in central London
- Wants third party cover only, for 12 months

The classical car insurance problem is typically solved as a so-called "multivariate" problem, that is, to estimate the risk premium (equals claim frequency times claim severity) for each combination of factors collected at the point of sale (such as age of driver, value of car etc).

The actuarial mathematics behind this solution is highly complex, and we do not need to go into it here, but with millions of policies and claims, insurers can quote "individual" premiums based on the unique characteristics of each risk.

Corporate Insurance - Just do the maths!???

Surely then, for corporate insurances, it's just a question of "doing the maths"? Not quite. Insurance for ALARM members is much more complex:

- Policy excesses are typically £50,000-£1,000,000 per claim –claims which are reported to the insurer may not even reach the excess anyway
- The maximum potential single claim from a single authority is probably c£500 million or more (e.g. catastrophic explosion, flood, up to single property sum insured)– this potential claim size has severe capital requirements for the insurer (see right)
- There are 600+ authorities buying similar insurances; therefore the claims experience of any one authority is very small in relation to the insurer's "wider experience" of all local authority claims

We will now look in more detail at some of the issues for policies bought by ALARM members.

Property Catastrophe (CAT) Cover

Property insurance typically covers claims excess of a typical annual aggregate limit of £1million (up to the relevant sum insured). Such claims are clearly extremely rare and so "intense mathematical" approaches (such as those earlier) fail due to the extreme sparsity of claims data. Such rare events are often modeled mathematically using Generalised Extreme Value (GEV) distributions fitted to the extremely limited historic data. As new events occur, premiums for such covers inevitably rise as the modeling teams "re-calibrate" their CAT models (e.g. recent UK floods, US hurricanes etc).

Employer's Liability (EL)

The main historic problem for EL has been asbestos-related claims, and in particular, mesothelioma claims, which have caused the downfall of a number of corporate insurers. These claims have generally arisen out of periods of employment (and hence insurance coverage) in the 1950s and 1960s. Mesothelioma claims usually cost £100,000-£300,000 each.

Although asbestos is not used to the same extent today (at least in the UK), insurers are wary of other similar "dormant" diseases which may be caused by councils' employment conditions; perhaps work-related stress, repetitive strain injury for younger workers ("the mobile phone/i-Pod generation"), wireless offices etc. will be the new "asbestos" problem for insurers in 40 years' time?

Put another way, most councils will be expected to have no such claims for perhaps 10-20 years after the insurance period – and the insurer cannot go back to the authority to ask for additional premiums when the claims do start coming in.

So what for insurers?

The Financial Services Authority requires insurers to hold sufficient capital to remain solvent over a 12-month period at the "99.5th percentile" (a "1 in 200 year" event) of the joint aggregate distribution (expected "behaviour") of its assets and liabilities.

In other words, if the insurer writes business which could be very uncertain e.g. Property (due to "climate change") EL or new risks for which there is no past data e.g. cyber risks, the regulator will require a higher level of capital support; in addition to which the capital providers will inevitably require a higher return on capital to compensate for the realistic risk of capital loss.

The Real Premium Calculation – maths for the terrified!

In simple terms (ignoring profit, solvency etc) if an insurer has 10 insureds (each paying a premium of 10), and expects claims of 100 each year from 1 out of the 10 insureds, then there will be sufficient premiums to pay all the claims. If each non-claiming insured gets their premium back, everyone would need to be charged 100 (instead of 10) so that total premiums (1,000) = total claims (100) + total refunds (900).

For corporate insurance, a premium refund is even less likely; for CAT claims (which are generally 1 in N year events) the total premium collected in any one year would only be 1/Nth of the cost of a CAT claim. At a simple level, CAT insurers rely on collecting premiums for N-1 claim-free years to be able to pay for the 1 in N year event (although the maths, accounting and solvency issues are much more complex than this).

In reality, an insurer's total premium should equal its total outgoings plus shareholders' required return on capital, equal to:

- The amount of capital required to satisfy the "1 in 200 year" regulatory solvency threshold
- The risk-free rate of return shareholders could obtain by investing their money risk-free elsewhere (e.g. medium-term gilts, say 5% p.a.)
- The additional "risk" element of the rate of return required by shareholders (for example, an additional 10-25 % p.a. depending upon the class of business), based on the realistic risk of losing some of their capital investment

In other words, the premium charged to an individual authority can therefore rise (or fall, sometimes) for reasons not directly related to the authority's claims experience, for example, increased capital requirements from regulators, changes in "risk-free" and "risk adjusted" rates of return, major insured losses such as "9/11", recent UK floods etc.

Local authorities are essentially "renting" the insurer's capital in the event of a large loss, (much the same as paying an "overdraft arrangement fee" at your bank, even if you do not ever use the overdraft - the overdraft fee is essentially for the bank's "underwriting" of your risk).

Answering the common questions

"I've had no claims for a long time - why has my premium gone up?"

Due to the large potential claim sizes involved, there may not be a direct link ("statistical credibility") given to the claims data from a single authority. Premiums can therefore rise for reasons not directly related to the authority's claims experience. Especially for CAT covers, "having no claims for a long time" is to be expected from most insureds.

"I thought that premium equals cost of risk; I'm a good risk so why does my premium keep going up?"

Premium equals the cost of (one-form of) risk transfer; it does not equal the cost of risk. Premiums can therefore rise for reasons not directly related to the authority's experience. *"I've had no claims this year - can I have my premium back?"* Insurance is a form of risk-sharing; premiums (from all authorities) are used to pay for the claims from authorities who do claim. Initial premiums would have to rise by several hundred percent to allow full premium refunds.

So how do you really present a good risk?

Here are some good tips for engaging with insurers (and the mathematicians and actuaries who work "behind the scenes" for them to set premiums):

- Tell them about the risks - and potential large claims - they face next year, not the risks (and claims) they faced last year (which they already know about). They are concerned about volatility of profits, minimizing capital requirements and aggregations of exposures for your potential large claims.
- What are realistic large losses for your authority (e.g. maximum probable losses)? What are you doing to prevent such large losses? What will you do in the event of such a loss to keep the costs down for the insurer?
- Your past claims will be more expensive if they happen next year (claims inflation), but the deductibles may well be the same. So some claims which were below deductibles last year will be above (the same) deductibles this year.

John Birkenhead is an independent consulting actuary with almost 20 years' experience of commercial insurance matters.
www.johnbirkenhead.net
T: 020 7488 9480.

Based on refereed article by John Birkenhead previously published in Mathematics Today, June 2007