

Motor Premium Rating

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Abstract

This paper has been written with the view of de-tariff of motor insurance likely to take place in the near future and how actuarial fundamentals can be used for scientific pricing.

Keywords

Rating Factors, IBNR (Incurred But Not Reported), Risk Premium.

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Introduction

Under the current tariff regime in India many general insurance companies writing motor insurance business are suffering from heavy losses. This has caused some to proceed with caution. Losses are even heavier for third party liability where the premium is much smaller as compared to the losses.

The Ansari Committee set up by the TAC recommended division of the country into four zones based on the risk present. The premium rates were also revised upward with effect from 1 July 2002.

After the increase in the tariff rates, the IRDA was under pressure from three areas:

- a. Policyholders and businesses were complaining about the step hikes in premiums;
- b. Transport companies were facing difficulties in getting coverage for compulsory third party risks; and
- c. Insurance companies still considered premiums to be inadequate.

In view of all this, the IRDA has set up a committee under the chairmanship of Mr. Justice T.N.C. Rangarajan who will examine the various aspects of motor underwriting including de-tariffing of motor insurance.

Importance of Data

With or without a removal of the tariff, it is important for companies to gather data so that they can analyse the true cost of motor risks in the future. New private sector companies will soon have databases of in excess of 50,000 policies, which is more than enough to start to carry out meaningful analysis of the risks. The public sector companies are likely to have a lot of data, the challenge will be to convert the data into useable electronic format.

Ideally, data should be collected on all possible rating factors. This should include the more obvious factors such as age and sex of driver, geography, type of vehicle, but could also include more obscure factors such as source of business, ownership status, presence of security devices, etc. It is worth noting that motor rating in countries like the UK uses up to 20+ rating factors, many of which are gathered when a policy is taken out. The task of gathering data may at first appear daunting, but it can soon reap benefits in terms of the impact on the overall profitability

Overview of the Paper

This paper has been written with the view that de-tariff of motor insurance business is imminent. There will then be a compelling need for a more scientific pricing approach based on actuarial fundamentals.

Motor Premium Rating – Overview

There are two broad steps in calculating motor premiums:

- *Step 1* – Determination of an adequate overall premium. This is intended to cover the expected cost of all claims, expenses and the required profit margin for all risks written; and
- *Step 2* – Determination of a basis for differential rating. The aim here is to appropriately price different risk groups contained within the motor portfolio.

Whilst each of these steps is extremely important, this paper and presentation will focus mainly on Step 2.

Adequate overall premium

In estimating the risk premium, a formula for the overall premium could be represented as:

$$P = \frac{R \times (1 + che) \times (1 + k)}{1 - r - c}$$

where:

R = risk premium

che = claim handling expense rate

r = net cost of reinsurance

c = commission and underwriting expenses

k = profit loading

The starting point is the estimated ultimate cost of claims in the most recent past accident years. An accident year's ultimate claim cost represents the sum of:

- paid losses;
- reported outstanding losses; and
- the estimated IBNR costs

IBNR, in this context, means allowance for deterioration in reported claims, together with costs in respect of claims that have occurred but have not been reported as yet.

Usually a company would examine these costs for the past two to three accident years. Since premium rates however will apply in respect of a future time period, these amounts will need to be adjusted for actual and expected future claim inflation over the period from the past dates of payment, until the expected date that the claims will be paid, under the newly rated policies.

Further adjustments may also be required if there have been changes in policy conditions between the past coverages and the new policies.

Finally since there will be a period between the receipt of the premium and the payment of claims it is appropriate to allow for expected investment earnings.

Allowance should be made in these estimates for all direct and indirect administrative costs of claim settlement.

Differential rating

Whilst the estimation of IBNR claims (in particular the costs of bodily injury claims) in the determination of the adequate overall premium, is not a trivial exercise, the task of doing differential rating is much more complex.

The major risk factors associated with motor insurance might include:

- The distance driven over the duration of the insurance policy (a good measure of the chances of a moving traffic accident)
- Traffic density
- The quality of a driver and the driver's reaction time.
- The driver's average speed
- The driver's natural degree of caution (risk aversion)
- Time that the vehicle is parked in area where thieves operate.
- Value of goods kept in the car (e.g. car radio)
- Car alarm
- Sensitivity of the car's electronic system to the water damage.

Some of these factors cannot be measured, such as risk aversion while others such as such as traffic density can be measured in theory, but would be impractical to do so. Since many of the risk factors above are difficult to measure directly, it is necessary to summarise these risk factors into a set of **Rating Factors** that are measurable and can be used practically.

Rating factors fall under three categories:

- Factors associated with the policyholder.
- Factors associated with the vehicle.
- Factors relating to the coverage.

We summarise some of the main factors in use in the Appendix A.

Each of these factors has a number of levels, for example;

- Age of driver may be broken into 10 or more levels such as ages up to 20, 20–25, 25–30, 31–35, etc.;
- No claim discount may have 6 levels, 0%, 20%, 25%, 35%, 45% and 50%, and so on.

It is possible that when all the combinations of rating factors are calculated, there could be over 100,000 different risk groups to analyse.

We will discuss how these groups are analysed in the presentation.

Appendix A

Standard Factors

- Age
- Sex
- Marital status
- Age of licence
- Occupation
- Residency
- Convictions
- Home-owner?
- Geographical zone
- Vehicle group
- Age of vehicle
- Value of vehicle
- Alarm/immobiliser
- Modifications?
- Garaged?
- Use of vehicle
- Mileage
- Cover
- Named drivers
- Previous claims
- Excess
- Payment frequency
- NCD
- Protected NCD?

About the Authors

Verne Baker

Verne Baker joined Watson Wyatt Insurance Consulting Pte Ltd in October 2001, as Head of General Insurance Consulting, S E Asia, and is based in Watson Wyatt's Singapore office. Verne is a Fellow of the Institute of Actuaries, London, Australia, and the Actuarial Society of Singapore.

Prior to joining Watson Wyatt, he was a Consultant in the Property/Casualty division of Tillinghast in Sydney. In this last position, he consulted to both, insurance and reinsurance company clients, as well as public sector clients. He had practise management responsibilities in the capital management and merger and acquisition areas.

Verne has over twelve years experience in Property/Casualty insurance and has worked on assignments in the United Kingdom, Japan and NZ, as well as in Australia. A brief summary of his experience includes reserving for outstanding claims reviews for most classes of direct insurance and reinsurance business. Verne has undertaken projects for clients based in Australia, United Kingdom, Japan, Malaysia and NZ.

In 1995 he was a member of the worldwide project team involved in establishing Equitas the run off Company for Lloyds' of London. Verne had specific project responsibilities for non-US health hazards. The pricing and calculation of premium rate relativities using Generalised Linear Modelling for motor and household insurers; and hierarchical credibility techniques for pricing workers' compensation risks.

Verne had provided assistance to purchasers and sellers of reinsurance companies and direct companies in UK, Japan, Australia and NZ. He was involved in projects on financial performance/benchmarking and export credit insurance – review of operations of the Australian export credit agency for the Australian Government. Verne also did expense analysis and provided assistance in design of management information systems and review of information disclosures for a large publicly listed Company, including performance measures for health insurance.

Verne was also involved in asset liability projects using Dynamic Financial Analysis modelling. These have been undertaken for direct companies and statutory workers' compensation bodies, and use of stochastic modelling to optimise reinsurance alternatives for direct insurers.

Sonjai Kumar

Sonjai attained his masters' degree in Mathematics from University of Delhi in first class and later completed a Post Graduate Diploma in Actuarial Management From City University, London in 2000. He is currently pursuing actuarial examinations from the Institute of Actuaries.

Sonjai joined Watson Wyatt in January 2001. While in Reigate he got exposure in product development on VIP and valuation of assets and liabilities of a Friendly Society. He was also involved in the preparation of a market report on long-term savings in India.

Since being in Delhi he has worked for Indian clients to develop product illustrations and pricing of products. He has been involved in a motor survey of the Indian market, besides writing various market reports including the non-life market.

He has supported the Hong Kong team in appraisal value projects and in the modelling of Hong Kong and Japanese products on VIP. He has also supported the UK office in the valuation of liabilities of a Friendly Society.

Prior to joining Watson Wyatt he was working with Life Insurance Corporation of Indian (LIC) in Actuarial Department In LIC his work was spread over Underwriting, Projects on Cause wise Analysis of Deaths and early claims etc.