THE RELEVANCE OF EXPERIENCE-RATING IN AUTOMOBILE INSURANCE

*By Sundararajan Parthasarathy**

[Synopsis: This research paper seeks to analyze various underwriting factors in automobile insurance in general, but with particular reference to the human factor and more importantly relating to the driver's experience.

The paper attempts to deal comprehensively with the probability of auto accidents being directly or indirectly caused by the acts of omission and commission by the driver, in other words all acts of regligence caused by the driving habits or instincts, in short the pattern of driving behavior exhibited in the past by particular drivers.

Once we have looked into the vast number of probabilities as above as well as real life accidents/incidents, the majority of which have been reportedly caused by driver error, it is only the next logical step to recommend modification of premium rates based on loss experience. This experience rating is not something new to the insurance world. It is followed in almost all modern civilized countries, howsoever effective or ineffective in discouraging disastrous loss experience it may have been in individual countries.

The main purpose of this thesis is to

(i) emphasize the relevance of experience rating in automobile insurance,

(ii) to spell out a detailed program of action to implement this concept

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(iii) to further elaborate its meaning by defining reward of good driving by Bonus and punishment of bad driving by what is called Malus and

(iv) to give concrete recommendation for possible use in Thailand.]

Introduction

Pricing in insurance has always remained complex. Not only is insurance largely intangible but it has never been felt as a basic necessity even by all the legitimate owners of property. If ever a government has tried to make a certain insurance compulsory, people grudgingly insure as a necessary evil or as an unavoidable nuisance and even institutional clients keep insurance as their last priority insisting on bargaining all the way from paying a premium to getting a claim settled. Even the most enlightened employers in trade and industry do not have a charitable view of insurers, considering the latter as either robbers or at the worst suckers, but not as providers of an essential service to society. Even where insurance has remained a state monopoly, because of the demand for insurance remaining other than inelastic, a fair price to insurers has been hard to get for the insurers, fear of losing customers. With competition in insurance around the world remaining monopolistic and imperfect, to devise and implement a uniform pricing policy even in one type of insurance has remained a pipe dream of the insurers. The underwriter is always caught between grumbling actuaries and discontented sales force, the scylla and charybdis of the insurance industry and has had to contend with 'burning cost' premium in many cases and to survive from nominal or nil underwriting profits, seeking more than ordinary return from unorthodox investments, with or without state surveillance.

Put in simple words, a premium rate must be appreciable enough to pay management expenses, commission and claims and leave a margin towards profit of the insurer, while at the same time looking affordable and competitive to the insured; in another manner of speaking, the micro economic goal of a firm in the short run is to make profit. How can the underwriter make a predetermined profit, if the management expenses and commission remained either flexible or growing in the short run with claims fluctuating and rising beyond all calculations year after year?

Lose-Lose Situation

Add to the woes of the underwriter the inevitable yearly increments in marketing expenditure and the underwriter is faced with a lose-lose situation on all fronts. He has two options ------ pay all claims and fold up or increase rates, lose customers and fold up.

It is in this hopeless situation that the underwriter has to take the bull by the horns and either effectively control losses or devise a scheme whereby he punishes the insureds with adverse loss ratios and rewards accident free insureds so that a sense of proportion and fairness in treatment of consumers is achieved, without losing profitability.

We have clearcut classification of hazardous, nonhazardous and extra- hazardous risks in Fire, Marine Cargo and even Life

Insurances, but when it comes to automobile insurance, a dumb reference to mechanical specifications of vehicles which is what we get can hardly be satisfactory, to elicit not-easily verifiable answers to a couple of vague and general questions in the application for insurance concerning past accidents and convictions by Traffic Police is not the best way out of a dog house!

Accidents are Caused

Road accidents do not happen; they are caused and every auto accident is caused directly or indirectly and wholly or partly by human error, by which I mean the fault or negligence of the driver. It may be an innocent or deliberate violation of a traffic rule or plain stupid incompetent driving

We may thus start with two valid assumptions: Management expenses and commission are relatively constant in the short run, but claims are not and most accidents are attributable to driver fault. In this situation, the only remedy appears to be punish errant drivers with 'Malus' and reward good ones with 'Bonus' as this scheme alone will go towards offsetting the adverse trend from increased or higher than anticipated loss ratio.

This will be the focus of the present research paper.

PART 1
LEGAL WRONGS OF MOTORISTS

Everyone has rights to life and property under the law and when due to another's negligence these rights are affected, legal wrongs occur. Tort is thus a civil wrong. But the motorist has not only to avoid violation of traffic rules enunciated for the safety of all road-users, he further must obey common law which rules that **"a person must regulate his conduct and activities to avoid injury to the person or property of others. This type of regulation is regarded as the exercise of due or reasonable care. The same rule is applicable to a person who operates a motor vehicle."** (pp. A18, Law of Automobiles, American Educational Institute, Inc)

I shall try to catalogue in the following pages various possibilities of a motorist's negligence occurring in the sense understood above, and being the proximate cause of road accidents.

(as noted in the above book)

1. Exceeding the normal speed limits on a rainy day, especially on slippery roads could still be termed negligence, even if there is no technical violation of a traffic rule.

2. Proceeding at green signal, ignoring crossing pedestrians on the zebra lines is not a conduct exercising reasonable care of a prudent motorist.

3. Failure to exercise reasonable care in securing or safeguarding a vehicle left standing (and unattended) on a downgrade (slope).

4. Leaving a car unlocked and unattended in a public street where an intruder might start the car.

5. Leaving the car key in ignition when a thief may steal the car and while driving the same, may cause accidents.

6. When two or more cars are

travelling in the same direction, the failure of the lead cars to give timely signals to the following car about reduction in speed or stopping or turning right or left.

7. and in the abovementioned instances the failure of following cars to maintain safe distance

8. Failure to anticipate motorist sometimes coming in the opposite direction crossing the center of the road and to take timely defensive action could also cause serious accidents.

9. A motorist's failure to observe commonsense and law relating to safety while passing, whether as overtaking or overtaken vehicle, could cause serious accidents on the highway. Judging the speed of the other vehicle, observing on coming traffic as well as pedestrians crossing, checking hill or any other possible obstructions to view, the need for a quick turn at intersections if arising and so on are necessary to be considered. Warning to the ve hicle to be overtaken by blowing horn or other signals is equally important.

10. Similarly, if the vehicle being overtaken does not respond to audible or visible signals from the vehicle in the rear wanting or expected to overtake, this would jeopardize overtaking and cause a collision. The vehicle in front should slow down in such circumstances.

11. Failure to observe go signals at intersections and other vehicles taking the same turn from the opposite direction or pedestrians crossing or traffic congestion, may lead to accidents.

12. Failure to give right of way to vehicles on the highway by the motorist entering the highway from a private way is dangerous.

13. Failure to show signals of a vehicle (like red lamp) being stopped on the highway or in the city to other vehicles could lead to collision.

14. A backing vehicle must look out for other vehicles or pedestrians in the vicinity before backing.

15. Taking a U-turn, permitted otherwise, but ignoring oncoming traffic, could lead to major accidents.

16. Failure to observe any of the road traffic signs or signals, both displayed and accepted by convention and commonsense, could lead to accidents.

17. Failure to stop a vehicle, expecially when carrying passengers and more particularly children and/or carrying dangerous goods such as explosves at least 50 feet or any reasonable distance before a railroad crossing, whether manned or unmanned, could be a negligent act..

18. Failure to reduce the speed below the normal speed in hazardous road conditions is likely to result in collision with a vehicle in rear,

Notwithstanding the above, a motorist is sometimes compelled to offer an excuse of a sudden emergency of an unavoidable accident and so on, sometimes from condition of the vehicle and sometimes from condition of the motorist himself. However, this does not stop every motorist from exercising ordinary reasonable care and diligence of a prudent man to avoid every type of accident as far as possible.

Thus, to cut a long story short, it is obvious that barring a minority of road accidents, almost every accident could be easily attributed to human error or rather the driver's or motorist's fault or negligence.

Consequently, it is the main thesis of my research, namely that experience rating is highly relevant, whereby we reward the good driver by bonus and punish the erring driver by 'malus.'

PART 2
WHAT IS EXPERIENCE-RATING?

Experience rating is a posteriori and not **a priori;** that is, the underwriter judges each risk based on the claims experience of the motorist and charges a renewal rate which adds a percentage loading to existing rate if the experience is adverse and gives a discount if it is favorable. The rate is not arbitrarily fixed as common to all the risks irrespective of individual experience; that would be a priori---- (ie) before learning of the experience of the motorist.

A priori rating is in order in life insurance and in standard fire and marine cargo insurances because mortality statistics are available for life insurance underwriting and scientific data relating to hazardous physical features of construction and contents and cargoes exist in the fire and marine cargo insurances. But, the accident-proneness of a person becomes apparent only after an accident or a series of accidents take place.

Where 'The MPL or Most Probable Loss cannot be determined accurately before hand a-posteriori rating is to be preferred; after experience is gained.

This is, in short, experience rating. However, loadings or discounts must have a rational basis. Such a basis can be fixed after one notes what should be the expected realistic profit percentage in the automobile portfolio.

If we assume a premium should consist of four components—namely, management expenses, acquisition costs (commission), claims and profit, then the next step is to allocate a realistic percentage to each component.

The budgeted management expenses are controllable and relatively fixed in the short run; the commission figure is known before hand and is constant in the short run. But claims figure is unpredictable and can only be estimated. Therefore, profit becomes uncertain in the short run, but profit an insurer must make to survive.

And if profit was not made last year, we must make this year. If we do not make it this year, we must recoup the loss next year and so on, This becomes possible only with experience rating.

An Equation to use

So, our attention must then turn to the mechanics of experience rating. If we assume, say 15 per cent towards management expenses and another 15 per cent for commission, the probability is, where the claims percentage exceeds 70, no profit would result. At the same time, if a gross profit percentage of 10 is desired not only considering dividends to shareholders but allocation to contingency reserves as well then according to this calculation, if the final claims figure exceeds 60 per cent, there will be an erosion of profit.

We shall call the final claims figure as the incurred loss figure, which is the sum of

claims paid and claims outstanding figures. The claims outstanding is claims incurred but not reported (IBNR) where only guesstimating is possible. Let us represent these premium factors or components by symbols as follows.

Management expenses —Me
Commission —Cn
Claims —Cl
Profit expected —P

We will further assume an equation.

Me + Cn + Cl + Pe =1

Assuming Me is 0.15, (not more than>.15)
Cn is 0.15, (not more than>.15)
and Pe is 0.10 (not less than 0.1)

then whenever Cl is . 0.6 (or more than 0.6) then the decision situation arises to use claims rating, namely to load the renewal premium. (If the Cl is 0.6, the underwriter in his discretion may allow a discount)

Many underwriters use the cost-plus method whereby they add percentage increases to the incurred loss figure towards management expenses, commission, inflation, contribution to a catastrophe fund and a profit margin. In practice, a 50 to 70 percent increase would seem to be realistic. This is also experience rating, but where it is a general blanket increase on the existing level of premiums it may not truly serve the purpose of experience rating, by which I mean to individually reward motorists with particular good loss ratios and individually punish motorists with particular adverse claims experience.

This individual experience rating is also more equitable and rational because of the possibility that management expenses and commission could show a variance even in the short run owing to union pressure and inflation

So, we turn to discuss a system of Reward by Bonus and Punishment by Malus more comprehensively in the next part of the thesis.

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PART 3
BONUS-MALUS SYSTEMS

Bonus is a percentage discount on the existing premium rate to reward claims-free policyholders and Malus is levying a surcharge for one or more accidents under a policy and thus a penalty to those insured responsible for the accidents.

The Bonus-Malus Systems (BMS) exist in many countries in Europe and Asia.

In a typical BMS, a table of premiums and risk classes is built for use at each renewal. All the insured (drivers) enter into a certain class at the time of insurance proposal or application, based on the underwriting information available, which includes, inter alia, such factors as occupation, the frequency of vehicle use and so on,

Belgium used a BMS Table in 1971 as follows; (see below)

The Belgian system had only one **a priori** variable, namely the car engine (cubic capacity+a 40 percent surcharge for sports car). Besides the above, a small deductible of $175 (1995 value) was

Class	Premium	Class	Premium	Class	Premium
18	200	12	110	6	85
17	160	11	105	5	80
16	140	10	100	4	75
15	130	9	100	3	70
14	120	8	95	2	65
13	115	7	90	1	60

[Courtesy; Bonus-Malus Systems-by Lemaire Jean in Antomobile Insurance.]

imposed for young drivers under the age of 23 who had reported an accident.

Sedentary drivers, those who use the vehicles exclusively for private purposes and for driving to and from work, entered the system in class 6. They enjoyed a 15 percent a priori discount in comparison to business users, who entered the system in class 10. Claims-free years were rewarded by a one-class discount. A two-class increase was effected for the first claim during any given year. Any subsequent claim during the same year was penalized by three classes. In addition, policies with four consecutive claim-free years could not be in a class above 10. Every policyholder must produce a certificate from his previous insurer regarding claims incurred earlier, stating the attained bonus-malus level.

From the table, it will be apparent that the effect of an accident was nullified after two claim-free years. Curiously, a policy holder who caused an accident every third year on average remained in the same premium class of the BMS throughout his driving lifetime. Consequently, the system was designed for an average claim frequency of about 1/3. Drivers with a claim frequency close to 1/3 moved around their starting class. Drivers with a claim frequency above that spent most of their driving lifetime in the Malus zone. Drivers with a claim frequency under 1/3 concentrated in the bonus classes.

So, theoretically there is the possibility of a lack of financial balance in the system, if the management of policyholders would cluster in the Bonus zone, with the average claim frequency remaining under 1/3. The total of maluses collected would not compensate the bonuses and the average premium level would be below the starting level.

With increasing awareness of the dangers of driving and with laws reducing the speed limit, mandated use of seat belts and random tests for alcohol blood content and also increasing cost of fuel, the average claim frequency may easily fall below 1/3 in this system.

If such trends persist, the BMS as above needs to be modified to bring in

(i) a minimum net premium with each company's own set of loadings for operating expenses, commission and profit;

(ii) other primary classification variables such as territory and gender
(iii) a posteriori control instead of a priori regulation;
(iv) an optional deductible for young and inexperienced drivers and
(V) yearly renewal of contracts instead of automatic long-term contracts,

In a modified BMS, some favorable features may include

1) increase of penalty for the first claim from two to say, four classes, and for subsequent claims from three to say, five classes. This will result in a better spread of policies among the various classes
2) A partial forgiveness of the first claim for best drivers in the top range
3) fixing of a constant percentage reduction per claim free year, say 5 per cent, instead of decrease of five premium levels.
4) Reduction of premium differentials between successive classes.

Having defined and explained a typical Bonus-Malus system, we must have tools for evaluating BMS, and we shall briefly talk about it in the next part of this thesis.

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PART 4
EVALUATION OF THE BONUS-MALUS SYSTEM

I shall consider the topic of evaluation of BMS, without bringing in statistical jargon as far as possible,
Four measures that may be considered for evaluating BMS are:

1) The Relative Stationary Average Level
2) The Coefficient of Variation of the Insured's premiums
3) The Elasticity of a Bonus-Malus system
4) An Index of Toughness.

These are extremely complex statistical concepts, having to use technical methods of distribution of data going by Poisson Distribution etc., but in our thesis, for the limited purpose of comprehension, I shall give the bare definition of these measures in as simple a language as possible,

1. The Relative Stationary Average Level :(RSAL) This measures the position of the average driver, once the BMS has reached a steady-state condition. It evaluates the degree of clustering of policies in the lowest classes of the BMS,
Since the steady-state condition may actually take an infinite number of years to reach in practice, we must interpret 'stationary' to be the mean and variance of the premium level that have become more or less constant.

We can use Jean Lemaire's working definition of RSAL as

$$RSAL = \frac{\text{Stationary Average Level-Minimum Level}}{\text{Maximum Level - Minimum Level}}$$

Expressed as a percentage, this index determines the relative position of the average policyholder, when the lowest premium is set equal to zero and the

highest to 100. A low value of RSAL indicates a high clustering of policies in the high-discount BMS classes. A high RSAL suggests a better spread of policies among the various classes. Ideally, the RSAL should be around 50 per cent.

2) The Coefficient of Variation of the Insured's Premiums:

This can be got by dividing standard deviation by mean. This is a useful parameter, dimensionless and so there is no need for currency conversions, It is a measure for the variability of annual premiums. The variability of insured's premiums is zero without experience rating.

Typically, the coefficient of variation starts at zero for the first policy year, increases until the best policyholders reach the maximum discount, then decreases until 'stationarity' is reached, maybe after 30 years in some cases.

3) The Elasticity of the Bonus-Malus System : This is difficult to measure accurately in practice unless the trends in the number and amount of claims observed are reliable over a long period. The statistical tools for measurement of elasticity are also complex with many changes in variables.

However, for the limited purpose of comprehension, it is sufficient to know that the elasticity of a BMS measures the response of the system to a change in the claim frequency A relative increase in the claim frequency should produce the same relative increase of the premium.

4) An Index of Toughness: This is a multivariate statistical method used to identify a relatively small number of factors that can be used to represent relationships among a set of interrelated variables.

In a simple way we may say that system that penalizes claims heavily will exhibit high RSAL, high premium variability, high elasticity and high average optimal retentions.

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CONCLUSION

It should be obvious from the foregoing analysis that automobile insurance can be made profitable if we have an elastic Bonus-Malus System, as an essential part of experience rating.

In Thailand, several companies do have a system akin to BMS. But in a study by Jean Lemaire, he found the RSAL in Thailand is 8.03% compared to 28.79% in Kenya, and 21.17% in Malaysia and the Elasticity is 0.181 compared to 0.449 in Switzerland. Again, in Thailand, the implicit surcharge for newcomers is estimated at 50 per cent whereas Germany charges an increase of 212 per cent.

So, my recommendation is to the Insurance Department to set up a Committee consisting of officials from the Department and concerned ministries and representatives, from insurance companies as well as academics to examine the possibility of having a uniform BMS for Thailand, covering Third Party as well as

Collision Liability coverages.

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