Journal of Quality Measurement and Analysis *JQMA 4(1) 2008, 11-24*
Jurnal Pengukuran Kualiti dan Analisis

PRACTICE AND PRICING IN NON-LIFE INSURANCE: THE MALAYSIAN EXPERIENCE

(Amalan dan Penentuan Harga Insurans Bukan-Hayat:
Pengalaman Di Malaysia)

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ABSTRACT

The pricing of premium for fire, motor and workmen's compensation insurances in Malaysia is governed by their respective tariffs formulated by Persatuan Insurans Am Malaysia (PIAM). The main objective of tariffs is to guarantee that the premium price will always be above or at the level required, ensuring that the price competition among local insurers will not go below the market's economic level. However, one of the effects caused by the world economic crisis in 1997 is the process of liberalization which spread gradually in most financial sectors in Malaysia, including non-life insurance sector. Therefore, a thorough and comprehensive preparation towards the development of a more matured and open insurance market is one of the challenges that should be undertaken by the sector and regulatory concerned. One of the important tasks that should be given serious attention is the determination of "appropriate" premium price in low premium and high volume insurance businesses. This paper proposes a statistical modelling for determining the price of such insurance businesses. The result of statistical premium pricing is presented in a premium table.

Keywords: Non-life insurance; premium pricing; statistical modelling

ABSTRAK

Penentuan harga premium insurans kebakaran, motor dan pampasan pekerja di Malaysia ditentukan oleh tarif yang dikeluarkan oleh Persatuan Insurans Am Malaysia (PIAM). Tujuan utama perlaksanaan tarif adalah untuk memastikan supaya harga premium sentiasa berada di atas atau pada aras yang diperlukan supaya persaingan harga premium syarikat insurans tempatan tidak berada di bawah aras pasaran ekonomi. Namun, salah satu kesan krisis ekonomi dunia pada tahun 1997 adalah proses liberalisasi yang semakin tersebar di kebanyakan sektor kewangan di Malaysia termasuklah sektor insurans bukan-hayat. Oleh itu, persediaan yang lebih mendalam dan menyeluruh terhadap pembangunan pasaran insurans yang lebih matang dan terbuka adalah salah satu cabaran yang perlu diambil oleh industri berkaitan dan juga kerajaan. Salah satu tugas yang perlu diberi perhatian serius adalah penentuan harga premium yang "sesuai" terutamanya untuk perniagaan insurans bervolum tinggi dan berharga rendah. Kajian ini mencadangkan salah satu kaedah pemodelan statistik yang boleh diterap untuk menentukan harga premium bagi perniagaan sedemikian. Hasil pemodelan statistik dibentangkan dalam bentuk jadual premium.

Kata kunci: Insurans bukan-hayat; penentuan harga premium; pemodelan statistik

1. Introduction

Premium pricing is the process of establishing premium price in an insurance system or other risk transfer mechanisms. The process involves a number of considerations including statistical methods, marketing goals, competition and legal restrictions to the extent that they affect the estimation of future costs associated with the transfer of risk. The process of establishing premium price should fulfill four basic objectives generally agreed among actuaries:

- Producing “fair” premium price whereby high risks insures pay higher premium and vice versa.
- Providing sufficient funds for paying incurred losses and expenses.
- Providing adequate margin for adverse deviation.
- Producing reasonable return to insurer.

The purpose of premium pricing in an insurance system is to provide coverage for insures against the uncertainty of financial losses. This purpose may be achieved by contractually transferring insureds’ uncertainty of loss, which is also called risk, to insurer for the certainty of a smaller payment from insureds called premium. Therefore, the main task of a non-life actuary who provides consultancy or service in premium pricing is the management of insureds’ financial risks. The management of risks may be divided into several main levels:

- Identification of related information and resources.
- Collection of required data.
- Construction of a model based on the information and data collected.
- Projection of premium price based on the model constructed.
- Implementation of profitability analysis.
- Monitoring of data and assumptions.
- Updating of data and assumptions.

All of these risk management levels should be implemented and monitored closely by a non-life actuary to ensure that the main targets or objectives of premium pricing are fulfilled, i.e. to produce premium price that satisfy the requirements of both clients and insurers. The arrangement of risk management levels may be described through the actuarial control cycle shown in Figure 1.

2. Current Practice In Malaysia

Underwriting Experience

The underwriting experience of non-life insurance industry in Malaysia may be indicated by the incomes and expenditures. In terms of income, data on earned premiums are available whereas in terms of expenditures, the available data may be broken down into three main components; net claims incurred, commissions paid and management expenses. Figure 2 shows the trend of earned premiums for Malaysian non-life insurance industry in 1974-2004 (Lee 1997; Persatuan Insurans Am Malaysia 2001; Persatuan Insurans Am Malaysia 2004). The earned premiums were represented by the net premiums plus changes in provision for unearned premium reserves during the year. Based on Figure 2, the earned premiums had expanded spectacularly throughout the years.

Figure 3 illustrated the trend of net claims incurred, which were written in terms of proportion of earned premiums, for Malaysian non-life insurance industry in 1963-2004 (Lee 1997; Persatuan Insurans Am Malaysia 2001; Persatuan Insurans Am Malaysia 2004). The net claims incurred, which were represented by the benefits paid out under policies written, contributed the largest proportion of non-life insurance expenditures in Malaysia.

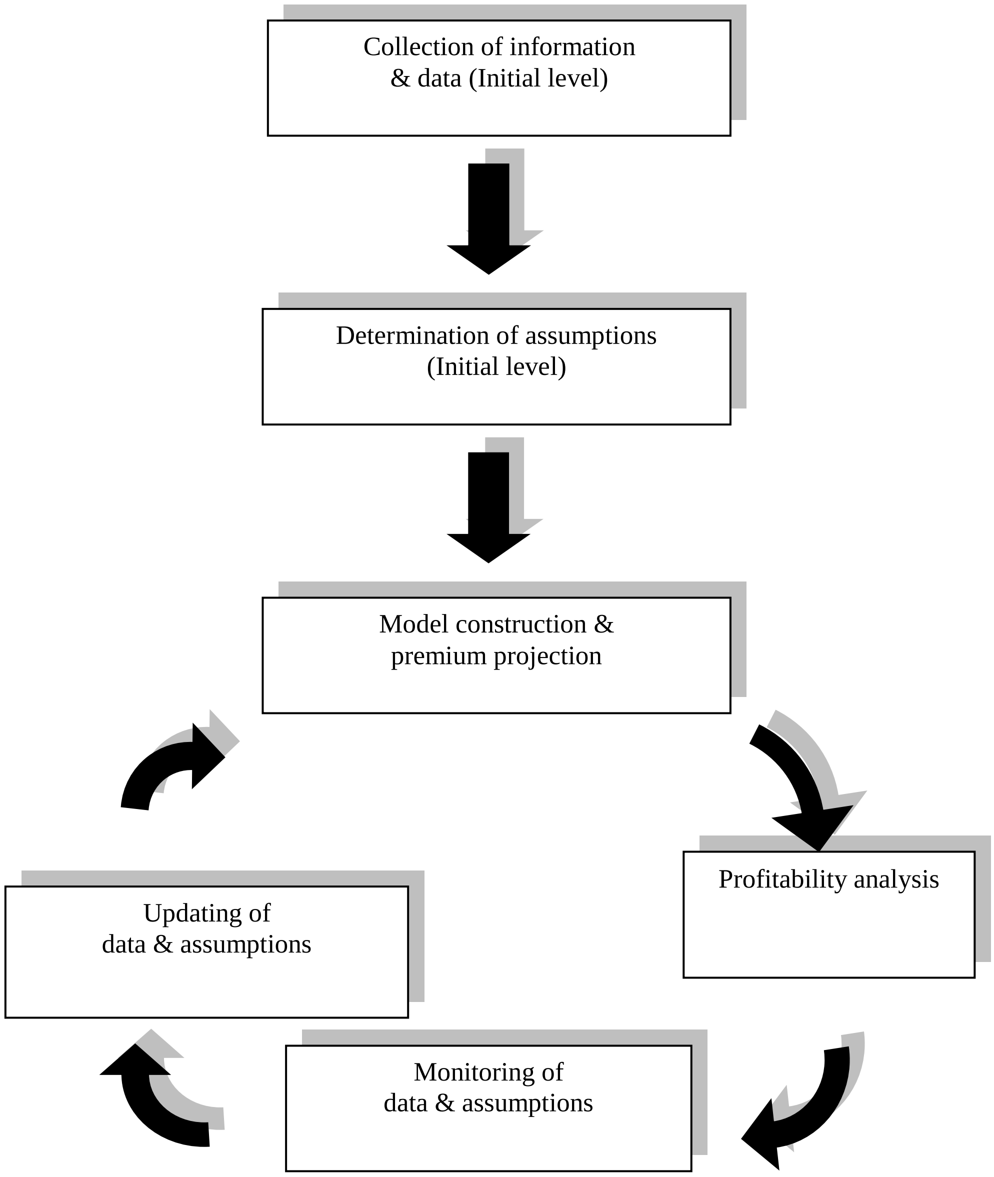

Figure 1: Actuarial Control Cycle

The proportion of net claims incurred shown in Figure 3 indicates an increasing trend. Many factors contributed to the increasing pattern of net claims incurred proportion shown in the figure. A major contributory factor has been the problems plaguing motor insurance sector. Since motor insurance sector has been and continues to be a very important sector in the Malaysian non-life insurance industry, the prevalence of any adverse situation in this sector would have a substantial impact on the industry.

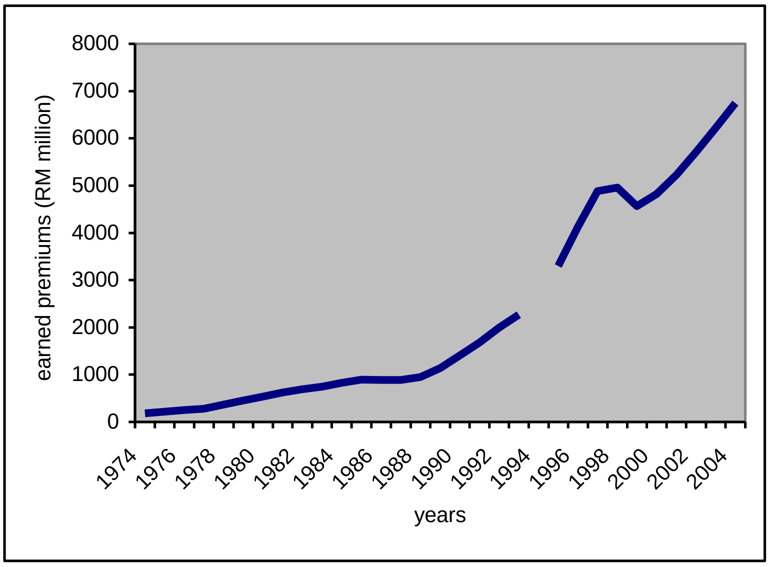

Figure 2: Earned premiums for Malaysian non-life insurance industry, 1974-2004

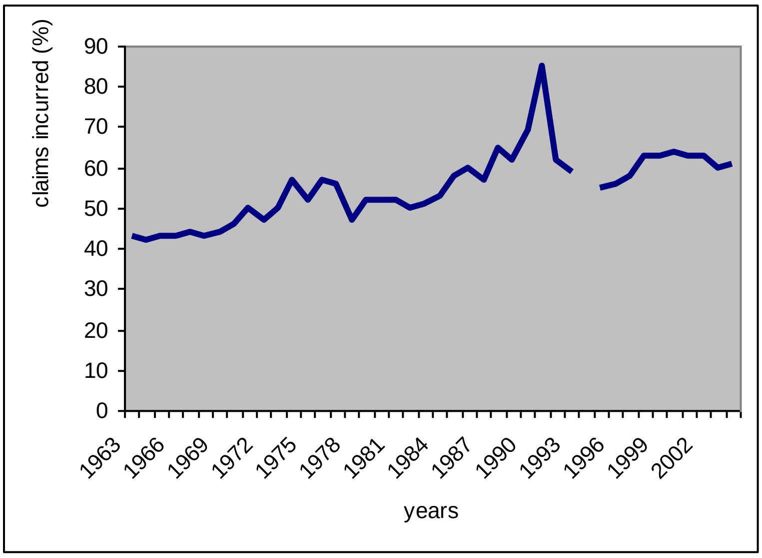

Figure 3: Net claims incurred proportion for Malaysian non-life insurance industry, 1963-2004

When the three components of expenditures, namely net claims incurred, commissions paid and management expenses, are summed up and deducted from earned premiums, the underwriting profit is obtained. Figure 4 shows the patterns of underwriting profits, which is represented by the percentages of earned premiums, for Malaysian non-life insurance industry in 1963-2004 (Lee 1997; Persatuan Insurans Am Malaysia 2001; Persatuan Insurans Am Malaysia 2004). Based on Figure 4, the proportion of underwriting profits reveals a rather unhappy state of affairs throughout the years. To be more precise, the Malaysian non-life insurance industry has experienced underwriting losses for twenty-three out of forty-two years (1963-2004).

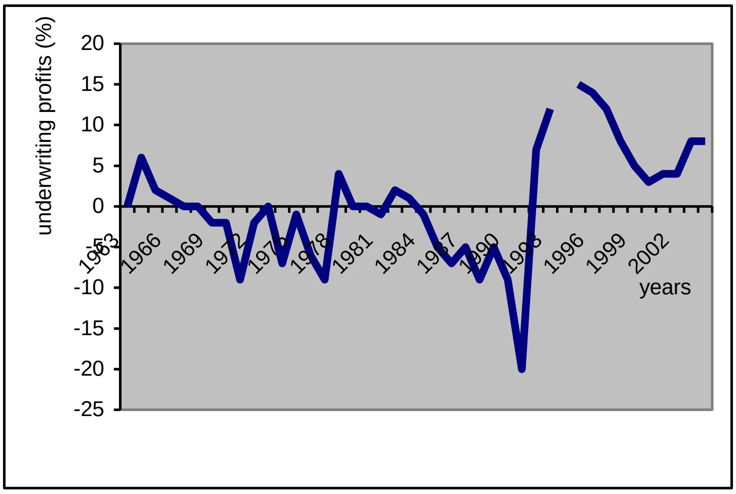

Figure 4: Underwriting profits proportion for Malaysian non-life insurance industry, 1963-2004

Current Issues

The Malaysian non-life insurance industry comprises several diverse components, each offering different products to cater for different needs of policyholders. These components may be grouped into four main sectors; motor insurance, fire insurance, marine, aviation and transit (MAT) insurance, and miscellaneous insurance. In terms of earned premiums, motor insurance sector contributes the largest proportion of the four sectors.

Motor Insurance

Motor insurance sector in Malaysia has for quite some time encounters difficult economic and financial situations arising out of several adverse factors. The most formidable factors are those that lie outside the sector's control, which have had the effect of significantly contributing to the escalating claims continually experienced by the sector. Specifically, the factors are:

- Increasing number of motor vehicles on the road which results in a sharp increase in number of accidents and hence, increasing the number of insurance claims.
- Rising trend of costs of motor repairs and prices of replacement parts.
- Growing number of motor vehicles' thefts.
- Increasing trend of awards given by High Court in cases of deaths or disabilities arising from motor accidents. As an example, in a study commissioned by PIAM, court awards for various types of injuries in 1980-1982 were almost 111% higher than those in the 1960s.
- Increasing trend of medical costs and health expenses.

On the other hand, there are other adverse factors confronting motor insurance sector that are amenable to the deliberate measures that deal with them. The factors are:

- Perpetration of fraud, such as when insured cooperate with unscrupulous workshops, or when such workshops impose excessive or unreasonable charges for repair work and parts.

- Payment of excessive commissions to intermediaries.
- Escalation of management expenses.

Fire Insurance

Fire insurance is another sector in the Malaysian non-life insurance industry that has for a long time operated under a tariff system. From the early of 1960s until late 1980s, fire insurance sector had struggled with two basic problems. The first concerns its tariff system which was ineffective in governing the behaviour of individual fire insurers. The second involved the inability of all the parties concerned to arrive at a consensus on an acceptable tariff.

However, the two major problems mentioned above had been largely overcome in early 1992. A new tariff called Revised Fire Tariff (RFT) was implemented in April 1992 replacing Green Tariff which was previously used for forty years (Lee 1997).

Marine, Aviation and Transit Insurance (MAT)

MAT insurance sector consists of three branches of non-life insurance; marine insurance, aviation insurance and transit insurance. Even taken together as a sector, MAT insurance sector has not provided much support to the Malaysian non-life insurance market. The reason is that the suppliers of MAT insurance services have been and continue to be largely provided by insurance companies located overseas. Even though a relatively smaller proportion of MAT insurance business has managed to pass through local registered insurers, there was a high and growing proportion of the local business that leaks out abroad to the international reinsurers.

There are four major factors that may contribute to the unsatisfactory situation of MAT insurance sector in Malaysia:

- Nature of MAT insurance business which involves large risk exposures and is subject to international competition.
- Limited capacity of domestic MAT insurers, especially in terms of technical and advanced underwriting expertise.
- Considerable freedom given to local MAT insurance services to select their insurers especially from those abroad who already have ample expertise, established premium price and good quality of service.
- Unavailability of adequate statistics.

Miscellaneous Insurance

Miscellaneous insurance sector may be classified into three broad categories; accident insurance, engineering insurance, and performance bonds. Workmen’s compensation insurance in Malaysia used to be an important component under the accident insurance. However, workmen’s compensation insurance is fast being invaded by Social Security Organization (SOCSO), which operates an employment injury and occupational diseases insurance scheme and an invalidity pension scheme for low-income workers. The growth and expansion of SOCSO over the years have somehow diminished the importance of workmen’s compensation insurance provided by the Malaysian non-life insurers. It had been intended that SOCSO would ultimately replace the scheme under workmen’s compensation law.

‘Contractors’ all risks’ insurance, ‘erection all risks’ insurance, and insurances covering machinery breakdown, boilers, computers and other equipment, and loss of profits, are all included under the engineering insurance. With continuous and increasing pace of the

Malaysian economic development, especially in the activities of construction, housing, manufacturing and services, the demand for engineering insurance has grown rapidly throughout the years. However, this class of insurance still has to deal with some serious problems, including:

- Lack of local technical expertise to handle the sophistication and complexity of engineering risks.
- Limited experience of domestic insurers.
- Inadequate capacity of domestic insurers.
- Existence of very ‘low’ premium price, as local insurers tends to ‘underprice’ their premiums due to competition.

As the demand for performance bonds has expanded following the rapid economic development in Malaysia, new business opportunity has been opened up for the Malaysian non-life insurers. However, the business for performance bond requires considerable care by insurers and as a result, lax underwriting may endanger the solvency of insurers. Throughout the years, several insurers have suffered substantial losses on account of their laxity and indiscriminate issue of their performance bonds.

Based on the problems and difficulties currently faced by non-life insurance industry in Malaysia, several adverse factors such as perpetration of fraud, excessive commissions and high management expenses may be resolved by sufficient interference and control from regulatory authorities. However, factors that lie outside the sector’s control such as increasing number of insurance claims, rising trend of costs of motor repairs, increasing trend of awards from High Court, large risk exposures, limited capacity and lack of technical expertise, should be given a very serious considerations by the industry and authorities concerned. One of the means to solve these crisis is by implementing statistical modelling of premium pricing which may produce a more accurate and significant results. If the statistical modelling takes into account all of the four basic objectives of premium pricing, i.e. producing fair premium price, providing sufficient funds, providing adequate contingencies and producing reasonable returns, the prospect and performance of non-life insurance underwriting profit in Malaysia may somehow be improved and enhanced.

3. Statistical Modelling of Premium Pricing

Pricing the risks for low premium and high volume insurance businesses such as private motor insurance and household insurance may be determined through statistical analysis. This section will briefly describe a statistical technique for determining the price of such insurance businesses.

Database

Statistical modelling of premium pricing requires two crucial estimates; the probabilities associated with the occurrence of insured events namely claim frequency, and the magnitude of such events namely claim severity. Claim frequency is defined as the number of claims per exposure unit whereas claim severity is defined as the average claim cost per claim.

The modelling of claim frequencies and severities requires the database to include information on exposures, claim counts and claim costs. Statistical estimates of claim frequency and severity are generally calculated through the process of grouping risks with similar risk characteristics for the purpose of establishing “fair” premium price. The process is also known as risk classification.

Classification of risk on claim frequencies and severities requires the database to include the rating factors of each of the exposures, claim counts and claim costs. The definition of rating factors may vary according to line of insurance business and type of insurance model. In motor insurance business for instance, vehicle's cubic capacity (c.c.) may be considered as a rating factor and the factor may be further divided into five rating classes; below 1000 c.c., 1001-1300 c.c., 1301-1500 c.c., 1501-1800 c.c, and above 1800 c.c.

The claims of non-life insurance may give rise to multiple types. In motor insurance, the claims may be divided into several types such as Own Damage (OD), Third Party Property Damage (TPPD) and Third Party Bodily Injury (TPBI). Fundamental to the successful application of statistical premium pricing on claims experience data is the separate treatment of each claim type. As an example, the summary of motor insurance database is shown in Figure 5.

Premium Estimation

Statistical modelling of premium pricing involves the estimation of risk premium and gross premium. These two premiums may be differentiated in terms of expenses; the former excludes expenses whereas the latter includes them. The risk premium for the i th rating class, R_i, $i = 1, 2, ..., n$, is equal to the product of expected claim frequency and expected claim severity for all claim types (see Brockman & Wright 1992; Renshaw 1994; Haberman & Renshaw 1996),

$$R_i = \sum_k f_i^k c_i^k (1 + l_i^k)^{t_i^k} , \quad (1)$$

where $k = 1, 2, ..., m$ denotes the claim types, f_i^k the expected frequency equivalent to the number of claims per exposure, c_i^k the expected average cost (severity) if settled immediately, l_i^k the inflation rate, and t_i^k the average settlement period. The two crucial models required for estimating risk premium are claim frequency model and claim severity model.

The calculation of gross premium takes into account the element of expenses. Therefore, the basic equation for gross premium in the i th rating class is (see Booth *et al.* 1999; McClenahan 1990),

$$g_i = R_i + F + V_i + Q_i , \quad (2)$$

where F denotes the fixed expenses, V_i the variable expenses which is proportional to the gross premium, and Q_i the profit and contingencies which is also proportional to the gross premium. Management expenses may be considered as an example for fixed expenses whereas commissions may be considered as an example for variable expenses.

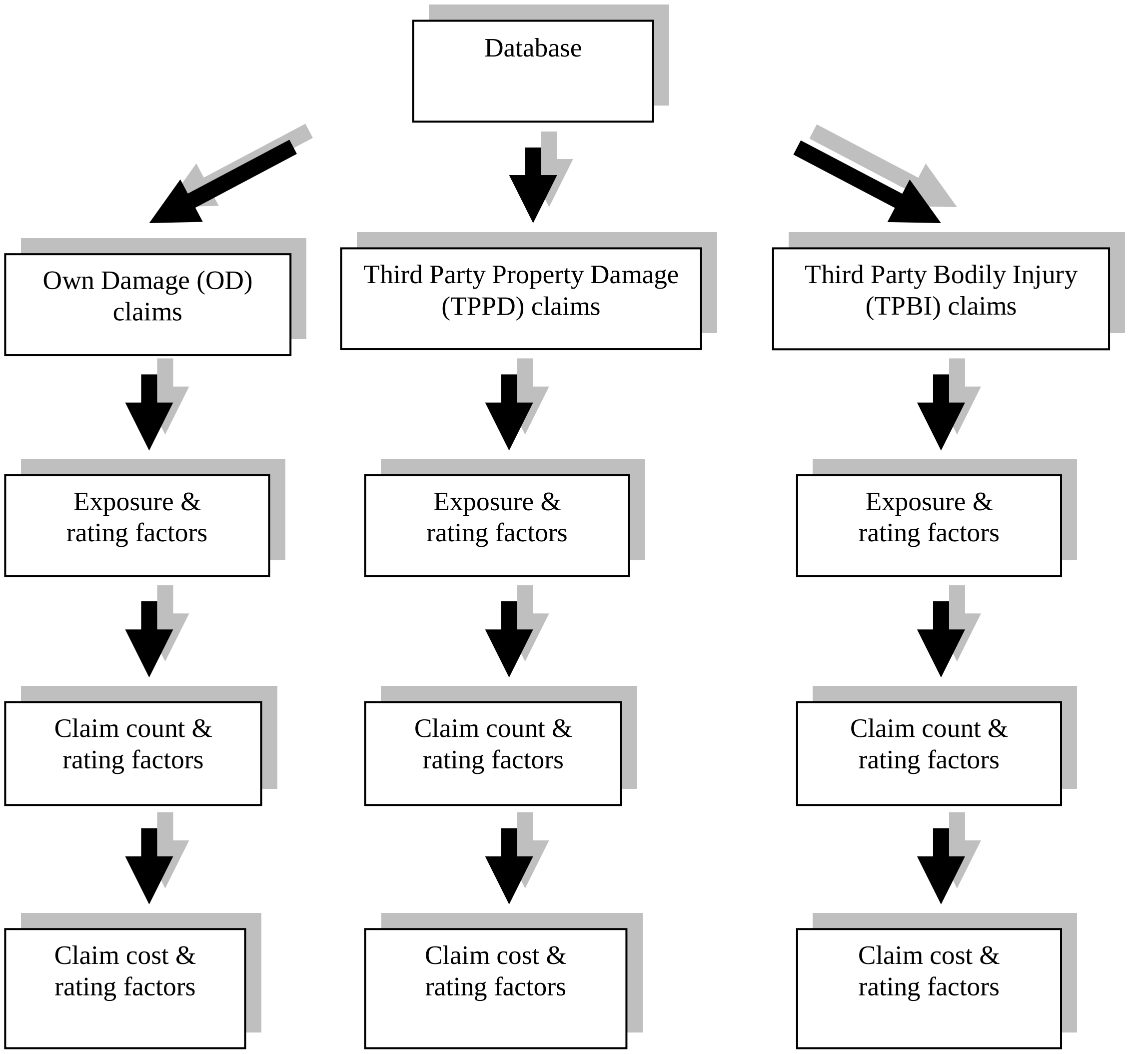

Figure 5: Database for motor insurance

Modelling of Frequency

The data sets required for modelling claim frequencies are (y_i^k, e_i^k), where y_i^k and e_i^k respectively denote the claim count and exposure in the i th rating class, $i = 1, 2, ..., n$, and k th claim type, $k = 1, 2, ..., m$. Therefore, claim frequency is equal to the claim count divided by the exposure, $y_i^k (e_i^k)^{-1}$ and the claim counts should be represented by both paid and case estimates of outstanding.

Consider a database for motor insurance containing a three-year period of claims experience (1998-2000). The claims, which incurred out of 170,000 private car policies, are divided into Own Damage (OD), Third Party Property Damage (TPPD) and Third Party Bodily Injury (TPBI). Table 1 shows an example of the rating factors for the data.

Table 1: Rating factors

TPPD & TPBI claims		OD claims	
Rating factors	Rating classes	Rating factors	Rating classes
Coverage	Comprehensive Non-comprehensive	-	-
Vehicle make	Local Foreign	Vehicle make	Local Foreign
Use-gender	Private-male Private-female Business	Use-gender	Private-male Private-female Business
Vehicle year	0-1 year 2-3 year 4-5 year 6+ year	Vehicle year	0-1 year 2-3 year 4-5 year 6+ year
Location	Central North East South East Malaysia	Location	Central North East South East Malaysia

Based on Table 1, the total number of cross-classified rating classes in TPPD and TPBI claims is $2\times2\times3\times4\times5=240$ whereas the total number of cross-classified rating classes in OD claims is $2\times3\times4\times5=120$.

In some ways, the database did not take into account all of the rating factors ideally required. The reason is that information on rating factors which are possible to be significant such as cubic capacity, No Claim Discount (NCD) bonus, policyholder's age and sum insured, is not provided. The omissions may make the final premiums calculated not suitable to be quoted to clients. Table 2 shows an example of TPPD claims experience data which contains information on exposures, claim counts, average claim costs and rating factors.

A number of models may be applied to estimate claim frequencies. In insurance practice, the Poisson regression model, which is also known as the Generalized Linear Model (GLM) with Poisson error structure, has been widely used for modelling claim count or frequency data (Aitkin 1990; Renshaw 1994). However, the claim frequency or claim count data in insurance practice often display overdispersion, i.e. a situation where the variance of response variable exceeds the mean. Inappropriate imposition of the Poisson model may understate the standard errors and overstate the significance of the regression parameters. Several models were recommended to handle overdispersion, including quasi-Poisson (McCullagh & Nelder 1989; Brockman & Wright 1992), Negative Binomial (Cameron & Trivedi 1986; Lawless 1987) and Generalized Poisson regression models (Consul & Famoye 1992; Wang & Famoye 1997; Ismail & Jemain 2007a, 2007b).

The discussion in this section will be based upon the TPPD claims experience data provided in Table 2. The procedure to arrive at the best regression model for claim frequencies may be divided into two main stages. The first stage involves the determination of the best Poisson regression model and the process may be explained through the following steps:

- The claim counts are first fitted to the Poisson regression model. The dependent variable, regression variables and weight for the regression model are represented by the claim counts, rating factors and exposures respectively.
- Several Poisson regression models are fitted by including different rating factors, first the main effects only, then the main effects plus each of the paired interaction factors.
- The best model is selected by using chi-squares, which is calculated by dividing the deviance with the degrees of freedom.

- The goodness-of-fit of the best Poisson model is measured by using deviance and Pearson chi-squares.

Table 2: TPPD claims experience data

Rating factors & rating classes					Exposure	Claim count	Ave. claim cost (RM)
Coverage	Vehicle make	Use-gender	Vehicle year	Location			
Comprehensive	Local	Private-male	0-1 year	Central	4243	381	9290
				North	2567	146	8775
				East	598	44	6447
				South	1281	161	8484
				East M'sia	219	8	7785
			2-3 year	Central	6926	422	7220
				North	4896	203	6713
				East	1123	41	6461
				South	2865	164	7298
				East M'sia	679	19	4037
			4-5 year	Central	6286	276	6558
				North	4125	145	5220
				East	1152	29	6415
				South	2675	115	5554
				East M'sia	700	17	6937
			6+ year	Central	6905	223	6678
				North	5784	150	6230
				East	2156	39	5372
				South	3310	89	5915
				East M'sia	1406	33	5005
				⋮	⋮	⋮	⋮

The second stage involves the determination of the best Negative Binomial or Generalized Poisson regression, i.e. the model which handles overdispersion in claim frequency or claim count data. The steps to arrive at the best model are as follows:

- The likelihood ratio test is implemented to choose between Poisson and Negative Binomial, or to choose between Poisson and Generalized Poisson.
- If Negative Binomial or Generalized Poisson is chosen, the best model is selected by using chi-squares, which is calculated by dividing the deviance with the degrees of freedom.
- The goodness-of-fit of the best Negative Binomial model or Generalized Poisson model is measured by using deviance and Pearson chi-squares.

Table 3 shows the parameter estimates of the best frequency model for TPPD claims.

Table 3: Best frequency model (TPPD claims)

	Negative Binomial			Generalized Poisson		
Parameter	estimate	std.error	*p*-value	estimate	std.error	*p*-value
β_1 Intercept	-3.15	0.06	0.00	-3.17	0.07	0.00
β_2 Non-comp	-0.94	0.12	0.00	-0.92	0.12	0.00
β_3 Private-female	-0.55	0.09	0.00	-0.55	0.09	0.00
β_4 Business	-6.02	1.00	0.00	-6.01	1.00	0.00

Based on Table 3, the fitted claim count may be calculated by assuming a log-linear or multiplicative function, $\hat{y}_i = e_i \exp(\sum_{j=1}^{4} \beta_j x_{ij})$, where e_i denotes the exposure, β_j the regression parameter and x_{ij} the explanatory variables whose values are either one or zero.

Modelling of Severity

The data sets required for modelling claim severities are (c_i^k, y_i^k), where c_i^k and y_i^k respectively denote the average claim cost already adjusted and trended for inflation and the claim count in the i th rating class, $i = 1,2,...,n$, and k th claim type, $k = 1,2,...,m$. Therefore, the total claim cost is equal to the product of claim count and average claim cost, $y_i^k c_i^k$ and the claim costs should be represented by both amounts paid and case estimates of amounts outstanding.

A number of models may be applied to estimate claim severities. Since it is well established that claim severity distributions generally have positive support and are positively skewed, the Gamma regression model, which is also known as the Generalized Linear Model (GLM) with Gamma error structure, has been used for modelling claim severity in insurance practice (McCullagh & Nelder 1989; Brockman & Wright 1992; Renshaw 1994; Ismail & Jemain 2006). The dependent variable, regression variables and weight for the regression model are represented by the average claim costs, rating factors and claim counts respectively. The steps to arrive at the best regression model for claim severity are similar to the steps for claim frequency.

If the same TPPD claims experience data is used for modelling claim severity, Table 4 shows the parameter estimates for the best Gamma regression model. Based on the table, the fitted claim severity may be calculated by assuming an inverse function, $\hat{c}_i = \left(\sum_{j=1}^{7} \beta_j x_{ij} \right)^{-1}$, where β_j denotes the regression parameter and x_{ij} the explanatory variables whose values are either one or zero.

Table 4: Best severity model (TPPD claims)

Parameter	estimate ($\times 10^5$)	std.error ($\times 10^6$)	*p*-value
β_1 Intercept	11.22	3.07	0.00
β_2 Non-comprehensive	-1.99	7.56	0.01
β_3 Foreign	-1.07	3.52	0.00
β_4 Private-female & business	1.49	4.20	0.00
β_5 2-3 years	3.25	4.21	0.00
β_6 4-5 years	5.15	5.08	0.00
β_7 6+ years	4.49	4.70	0.00

Expenses and Inflations

Two of the most important practical elements that should be taken into account in projecting the future premium rates are expenses and inflations. Expenses are essential in the calculation of gross premium whereas inflations are crucial in the projection of future claim costs. Basically, expenses may be divided into variable expense and fixed expense. The best approach to determine fixed and variable expenses is by obtaining the related information from company's Accounting Department. However, as an alternative, information from company's financial report and PIAM's yearly report may also be utilized. Commissions may be used as a proxy for variable expenses whereas management expenses may be used as a proxy for fixed expenses.

Prior to modelling of average claim costs, the costs should first be trended with inflations. A practical approach for trending the claim costs is by multiplying the costs with appropriate inflation adjustment factor. The factor may be approximated by using past and future yearly inflation rates and as an alternative, the yearly inflation rates may be projected by using the Malaysian Consumer Price Index (CPI).

Results

This section provides the statistical results of premium pricing which is presented in a premium table. The same motor insurance database, which contains a three-year claims experience (1998-2000) of 170,000 private car policies, is used as an example. Calculation of projected gross premiums is performed by using Equations (1) and (2). Input data for risk premiums consists of fitted claim frequencies and severities obtained from the best frequency and severity models of each claim type. Table 5 shows the risk and gross premiums which were calculated by using the following assumptions:

- Future yearly inflation rate was assumed to be fixed at four percents.
- Fixed expense, F, was assumed to be fixed at RM95 per policy.
- Variable expense, V_i, was assumed to be fixed at nine percents of gross premium, $V_i = 0.09g_i$.
- Profit and contingency, Q_i, was assumed to be fixed at two percents of gross premium, $V_i = 0.02g_i$.

Table 5: Input data, risk premium and gross premium

Class	TPPD claims		TPBI claims		OD claims		Risk	Gross
i	Fitted frequency	Fitted severity (RM)	Fitted frequency	Fitted severity (RM)	Fitted frequency	Fitted severity (RM)	prem (RM)	prem (RM)
1	0.094	8911	0.029	20239	0.058	10594	2033	2390
2	0.076	8911	0.043	20239	0.058	8618	2037	2396
3	0.062	8911	0.039	20239	0.057	8420	1826	2158
4	0.094	8911	0.036	20239	0.058	8916	2076	2440
5	0.055	8911	0.017	0	0.059	8240	977	1205
6	0.058	6908	0.029	20239	0.077	10594	1793	2122
7	0.047	6908	0.043	20239	0.077	8618	1856	2192
8	0.038	6908	0.041	20239	0.077	8420	1742	2064
9	0.058	6908	0.037	20239	0.077	8916	1832	2165
10	0.035	6908	0.017	20239	0.077	8240	1218	1476
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮

4. Conclusions

This paper describes the current issues and practice of non-life insurance in Malaysia. The development and growth of earned premiums contributed by non-life insurance businesses indicates that the industry is expanding at a remarkable pace over the last four decades. However, the pattern of underwriting experience shows a contradictory phenomenon; during the forty-two years under review, non-life insurance businesses have experienced underwriting losses for twenty-three of those years.

A statistical technique for determining the price of low premium and high volume insurance businesses was also proposed in this paper. The statistical technique involved the modelling of claim frequency and claim severity. The regression models of Poisson, Negative Binomial and Generalized Poisson were suggested for claim frequency data, whereas the regression model of Gamma was recommended for claim severity data. Finally, by applying several deterministic and stochastic assumptions, the results of statistical modelling were presented in a premium table.

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