CHAPTER 3
HYPOTHESIS, RESEARCH METHODOLOGY AND INSURANCE PREMIUM COMPUTATION

3.1 Hypothesis of The Study

The writer wants to test the difference of *takaful* and conventional insurance in terms of pricing and to confirm whether or not premium or contribution pricing under Islamic insurance, are higher than conventional insurance.[1] In addition, the writer would like to evaluate other operational aspects of both systems including their overall performance. Based on this proposition as well as the previous literature review, the null hypothesis of the study is as follows:

H_o = There are no differences in premium or contribution pricing as well as other operational aspects between *takaful* and conventional insurance.

3.2 Research Methodology

This chapter also describes the research methodology used in the study. The methods employed could be divided into three major sections. Those sections are as below:

1. Sample Selection;
2. Data Collection Techniques; and
3. Data Analysis Techniques

3.2.1 Sample Selection

For the purpose of comparing pricing for both systems, STMB was chosen as a sample of an Islamic insurance (*takaful*), whereas Kurnia Insurance as a sample of a conventional general insurance and Malaysian Assurance

[1] Refer to footnote no.6 in Chapter 1

Alliance Berhad (MAA) as a sample of conventional life insurance. STMB was selected for its role in pioneering the implementation of Islamic insurance system in Malaysia. Whereas Kurnia Insurance and MAA was chosen for their leading role in general and life insurance industry respectively. On the other hand, for the purpose of evaluating both systems performance, the entire players in the industry have been taken into account.

3.2.2 Data Collection Techniques

In searching for the information, the writer used two methods:

1. Library research
2. Fieldwork

3.2.2.1 Library Research

By using this method, the writer analyzed materials from annual reports issued or published by various organizations such as Bank Negara Malaysia, STMB, Kurnia Insurance and MAA, theses, books, journals, articles and various publications from the University of Malaya Main Library, Academy of Islamic Studies Library, Faculty of Business and Accountancy Library, Faculty of Law Library, Perpustakaan Peringatan Zaa'ba, Malaysian Insurance Institute (MII) Resource Center and the National Library.

3.2.2.2 Fieldwork

The writer interviewed officers and agents from STMB, Kurnia Insurance, MAA as well as insurance expert after making appointments with them. The officers from Kurnia and STMB were requested to fill up tabulated forms of premium or contribution payment for several classes of motor insurance and motor takaful policies. The tabulated forms are presented in the **Appendix I**. In addition, premium rates for two types of life and family *takaful* policies i.e. mortgage reducing term policy and annuity for all age groups were acquired from STMB and MAA. The tables are presented in **Appendix II**. The formula pertaining to the premium or contribution calculation was also acquired from

the agents and the officers. The officers were assured that all information given would be strictly confidential.

3.2.3 Data Analysis Techniques

Materials and information were complied and analyzed to observe similarities and differences, which exist in both systems. The collected data in relation to premium and contribution pricing were analyzed by using bivariate analysis : test of differences. Among the tests conducted were mean and *t*-test for difference of means. The means analysis was applied to check on the differences between the pricing of contribution in Islamic insurance and premium in conventional insurance.

The purpose of conducting the *t*-test for difference of means is to test the hypothesis that the mean scores on some interval-scaled variable will be significantly different for two independent samples or groups.[2] The data were analyzed by using computer program named Statistical Package for the Social Science (SPSS) software for Window.

On the other hand, the collected data with regards to the overall insurance and *takaful* industry performance were analyzed by using descriptive analysis. Descriptive analysis refers to the transformation of raw data into a form that will make them easy to interpret.[3] Simple tabulations as well as cross tabulations that calculate averages and percentage were utilized in the analysis.

3.3 Insurance Premium Computation

To most people, some of the greatest mysteries about insurance concern its pricing. Unlike other products, there seems to be no relationship between what they pay for and what they get out of it. Generally, there are some major

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[2] William G. Zikmund (1997), ***Business Research Methods***, Fifth Edition, USA : The Dryden Press, pp.591-594. Also refer Darrren George et.al (2000), ***SPSS for Windows Step by Step***, 2nd Edition, USA : Allyn & Bacon, p.122

[3] William G.Zikmund, op.cit, pp.533-537

differences in terms of pricing between insurance policy and most other products. First of all, when an insurer sells a policy it has no way of knowing what its costs for that particular policy will be. It cannot just add up the costs of labor, materials, rent and so on. Instead, the insurer must estimate the cost, basing its estimate upon what it has cost to provide similar policies in the past.

Secondly, the cost to the seller depends partly on who the buyer is. The shoe manufacturer's costs are the same regardless of who buys the shoe. Therefore it charges everyone the same price. But the insurer's costs depend largely upon whether or not the policy buyer has losses and, if so, how many and how large they are. Of course, this is the reason that different people are charged different prices for policies providing the same kinds and amounts of insurance.

3.3.1 Pricing Objectives

In setting insurance price, actuaries have several objectives. In the first place, price must be high enough so that the company will receive sufficient income to pay its claim and expenses, but low enough so that the company will be able to sell to sell its policies competitively. In addition, insurance pricing has several more specific objectives i.e. adequacy, reasonableness, and fairness.[4]

3.3.1.1 Adequacy

Adequacy must always be considered the main objective of insurance pricing. It is essential that rates be adequate to generate the premium income the insurer needs to pay its claim and expenses. Unless insurers are able to charge adequate rates, they will not be willing to offer insurance to those who need it. In addition, the company must have enough income in order to fulfil two tenets of its business. First, those who have invested their funds in the company's operation must be paid a fair rate of return. Second, the company must have sufficient earnings to finance its continuing growth and expansion.

[4] Frederick G.Crane, op.cit., pp.153-165

In other words, there is a direct connection between rate adequacy and insurance availability.

3.3.1.2 Reasonableness

Insurance price must be reasonable; that is, they must not be too high. This standard was established because insurance companies are not subject to certain antitrust laws. Insurance companies are permitted to work together in making their rates. This practice recognizes the fact that insurance is based on the law of large number; the greater the amount of data that rates are based upon, the more accurate the rates can be. Because insurance companies are permitted to engage in such joint pricing, the reasonableness standard has been made a legal requirement. Its purpose is to prevent the companies from using joint pricing as a means of crating a monopoly and charging excessive prices.

3.3.1.3 Fairness

Price must also not be unfairly discriminatory. In other words, insurance price must be fair; they must discriminate fairly. Fair discrimination means that proper distinctions should be made among various insured. Those who are alike should be charge the same rates; those who are different should be charged differently. For instance, two women age 30 and in good health who buy the same kind and amount of life insurance from a particular company should pay the same price. But if one of the women is 30 and the other is 40, they should not pay the same price. Proper discrimination requires the older woman to pay more because the average life expectancy of woman in her age is shorter. If older women were not charge more, the rates for younger women would have to be increased, and that would discriminate unfairly against the younger ones.

3.3.2 Elements of Insurance Premium

Generally, there are two things that an insurance premium must cover: the risk or net premium, and loadings.[5]

3.3.2.1 Risk or Net Premium

The first component, the amount needed to pay policyholders' losses, is the risk premium. If a company expects to pay 1000 losses averaging RM500 each, it should collect at least RM500 000 of risk premium. The risk or net premium allows for loss payment only; it does not cover any of the things included in the price of insurance. There are different ways in calculating net premium for general and life policies.

3.3.2.1.1 General Policies

In general policies, the risk premium per unit of exposure (quantitative unit used in insurance pricing), is derived from the below formula:[6]

$$E(C) * E(F)$$

Where

E(C) is the expected value of the claims size distribution

E(F) is the expected value of the claims frequency distribution.

Put it simply, this is the average cost of claim multiplied by the average number of claims per unit exposure. The trick, is then, is to apply a claims cost and claims frequency distribution function based on the past claims experience in order to derive the required expected value. Examples of some of the more common distributions used for modeling the claim size are the Lognormal and Pareto distributions (and their variants). Usually the data

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[5] Martin Dockrill et.al (1999), ***Underwriting Management***, Kuala Lumpur : Malaysian Insurance Institute, p. 2-12

[6] I.B Hossack et.al (1987), ***Introductory Statistics With Applications in General Insurance,*** Great Britain : Cambridge University Press, p.122

cannot be satisfactorily described by a single distribution. Hence, different statistical distributions are used to model different sections of the claims size distribution.

With regards to the claims frequency distribution, the Poisson distribution is usually considered satisfactory, although in certain special cases, the negative binomial distribution may be appropriate. Where the portfolio is sufficiently large or when the sophistication of statistical distributions are not justified, observed (empirical) distributions may be used.

An example of a claim size distribution of motor policy is shown in Figure 3.3a. The average claim size is calculated by multiplying columns (4) and (6) for each row and summing them to give RM1 228.29.

Table 3.3a: Distribution of claim size (RM)

Claim size range (1)	Mean claim size in range (2)	Mean claims-handling expenses (3)	Mean cost of claims [(2) + (3)] (4)	Number of claims (5)	Proportion of claims [(5) / 247] (6)
0-250	137	27	164	21	0.085
250-500	373	32	405	95	0.385
500-1000	736	59	795	63	0.255
1 000-2 000	1 410	67	1 477	35	0.142
2 000-4 000	3 051	119	3 170	19	0-077
4 000-8 000	5 803	207	6 010	11	0.044
8 000 +	11 155	298	11 453	3	0.012
Total				247	1.000

Figure 3.3b shows the number of policies in force at various points of the year. In this case, information has been recorded on a quarterly basis. The underwriting year from 1 July 2000 corresponds to the claims incurred in Figure 3.3a is shown in Figure 3.3b Assuming linearity in between the quarterly reporting dates, the exposure over the given year is 1 945 policy years. Given that there were 247 claims during this period, the average claims frequency is 0.127 (247 / 1 945). The risk premium per unit of exposure is

therefore RM155.99 (RM1 228.29 * 0.127). This price per unit of exposure is also known as rates. As mentioned before, exposure units are the quantitative unit used in insurance pricing. They are what the rates apply to.

Table 3.3b: Number of policies in force as at reporting dates.

Date	Number of policies in force
1 July 2000	1 876
1 October 2000	1 932
1 January 2001	1 949
1 April 2001	1 978
1 July 2001	1 967

3.3.2.1.2 Life Policies

In life policies, two different elements are used to compute the net premium (rate) namely mortality table and interest.[7] The mortality table is simply a convenient method of expressing the probabilities of living or dying at any given age. It is a tabular expression of the chance of losing the economic value of the human life. Given the mortality table (please refer to **Appendix III**), the problem of computing the insurance premium becomes a matter of simple arithmetic. To illustrate how a mortality table is utilized, let's ascertain the net single premium rate for one-year term insurance of RM1000 on a life aged 21.

According to the mortality table in **Appendix III**, 9 647 694 persons are still alive at age 21, whereas 17 655 lives will die during their 21st year. Suppose all the lives at age 21 takes up a policy for RM1000 and if the mortality follows the experience as indicated by the table, the insurer would require RM17 655 000 (17 655 x RM 1000) to meet the claim during the year. Assuming that the premiums shall be collected at the beginning, the net single premium each

[7] Jamaluddin Tambi Ahmad (1987), ***Life Insurance Made Simple***, Kuala Lumpur : Professional Law Book Publishers Sdn. Bhd., p.45

person should pay is simply the total expected claim to be paid divided by the number of persons to be insured, which is:

RM17 655 000 ÷ 9 647 694 = RM1.83

Therefore, the net single premium for a one-year term contract for a life age 21, or the amount of money that is required from each insured to contribute to the expected claim is RM1.83.

If we bring the interest into the computation of premium, the net single premium will be something less than would be necessary to charge each insured for his or her cost of death claim of the group. This is mainly because the insurance company collects the premium in advance. Their obligation however will not mature until some time in the future, hence they will invest the money and obtain returns on it. For easy reference, please refer to **Appendix IV**.

Returning to the above example, for each of the 9 647 694 persons who die at age 21, the cost of the claims as a whole (with a 3% interest assumption and also assuming that the claims will be paid at the end of the year) is RM17 140 780 rather than RM17 655 000. If we invest RM17 140 780 at 3% it will equal RM17 655 000 at the end of year one. The cost per individual becomes RM1.776 or RM1.78 (RM17 140 780 ÷ 9 647 694).

The process of computing the net single premium for a longer term policy is much the same as that used in computing the premium for a one year term policy. However since the charge will be made at the inception of the policy and all claims will not have been paid until the end of the period, the company will have to compute the present value of all future claims by discounting the claims due at the end of the first year for one year, those due at the end of second year for two years, and so on throughout the policy term. As an example, lets take the 21-year old group that wish to purchase a five-year

term contract of RM1000, paying a net single premium. The present value of claims is derived from the schedule below:

Table 3.3c: Present Value of Claims

Year	Number of claims	Amount of claims	Discount	Present Value of claims
1	17 655	17 655 000	0.970874	17 140 780
2	17912	17 912 000	0.942596	16 883 780
3	18167	18 167 000	0.915142	16 285 385
4	18324	18 324 000	0.888487	16 280 636
5	18481	18 481 000	0.862609	15 941 877
Total		90 539 000		82 872 458

From the above schedule, the cost of claims of each individual in the group, will be derived by dividing the present value of future claims by the number of entrants in the group.(RM82 872 458 ÷ 9 647 694 = RM8.59)

In the case of whole life policy, endowment policy as well as annuity, the same procedure will be followed. However, since the single premium required to purchase these policies is large, different system, which is called the level premium, had been developed. Nevertheless, further discussion with regards to the level premium system is outside the scope of this research.

3.3.2.2 Loadings

The second part of the premium, both in general and life policies, pays for the insurance company's loadings. The loadings include management expenses, profit and contingencies (margin). [8]

3.3.2.2.1 Management Expenses

These expenses can be expressed in two forms, namely fixed expenses and variable expenses. Fixed expenses generally associated with processing a

[8] Martin Dockrill, op.cit, p.14, also refer to Jamaluddin Tambi Ahmad, op.cit, p.52

particular product that is largely independent of the size of the risk. For example the accounting entries, record keeping, policy issue and certificate production for a given product are likely to be much the same for RM1 000 risk as for RM100 000 risk. Hence a fixed amount should be allocated per policy e.g. RM5 per policy. Apart from that, sunk costs (overheads) are also divided by the numbers of policies expected to be sold during the period over which the sunk cost will be amortized.

Apart from the fixed costs, there will be expenses that vary by the size, complexity and nature of each risk. In other words, these expenses are determined by the degree of premium and risk. For example, agent's commission and premium taxes that are fixed respectively at 20% and 4% per policy will become larger as the base premium increased. Similarly, larger risks that tend to be more complex and require more mid-term changes as well as higher level of services are likely to be imposed extra charges.

3.3.2.2.2 Margin

The margin includes an allowance for (a) contingencies, and (b) underwriting gain or profit. The first of these provides the funds needed in case of unexpected increase in the number or size of benefit payments. The second, on the other hand is required to give shareholders a reasonable return on the capital required to support the risks underwritten as well as to finance the future growth and expansion of the company. This part of premium is usually charged as a percentage of premiums. For example, one company might designate 15% of margin for each policy sold, whereas the other company might charge lower for competitive purpose.

The same elements are applicable in determining *takaful* contribution except where expenses are concerned. Under the *takaful* contract, the participant pays the *takaful* contribution as *al-mudharabah* capital. Under the *al-mudharabah* contract, generally, expenses such as agent's commissions are not allowed to be deducted from the *takaful* funds. The *Shafi'es* school of thoughts view that covering such expenses from the *al-mudharabah* capital

will lead to the element of *gharar* (uncertainty) and the presence of *gharar* makes the contract void. However, cost such as obtaining medical exams to protect the fund and re*takaful* may be charged to the fund. Any expenses first will be borne by the *takaful* operator which it hopes to be able to recover and recoup the expenses from the sharing of *al-mudharabah* profit as defined in the contract.[9]

Nevertheless, according to Encik Azman Ismail, the above view is not legally binding since the *takaful* operator can still deduct such expenses under the contract of *al-wakalah*, which will be discussed later in Chapter 5. Furthermore, by including such elements in determining *takaful* contribution, it is not meant that the portion will be deduct subsequently from the *takaful* fund, as income for the *takaful* operator. Instead, the entire collected contributions will be treated as a *mudharabah* capital, whereby the profits generated (surplus) will be shared accordingly between the participants and the operator.

3.3.3 Premium Pricing in Malaysia

In Malaysia, all general insurance companies (which are members of PIAM) need to follow standard rating structure or known as tariff, which is devised by PIAM and approved by the Central Bank, in order to price their policies (premium). Section 144 of the Insurance Act 1996 said that no licensed general insurer or association of licensed general insurers shall adopt a tariff or premium rates, except with the prior written approval of the Central Bank.[10]

According to Encik Azman Ismail, a consultant at the Malaysian Insurance Institute (MII)[11], the PIAM's tariff covers both the risk premium as well as the loadings to a certain extent. There are three kinds of tariff set up by PIAM in consultation with the Central Bank; Motor Tariff, Fire Tariff and Workmen's

[9] BIRT, op.cit, p.110
[10] Insurance Act 1996
[11] Encik Azman Ismail has a wide experience in both conventional and Islamic Insurance. He also involved in the setting up of STMB and Takaful Nasional.

Compensation Tariff. As these three general policies are tariff-rated, price competition among companies is restricted to premium loadings. Still, the loadings have also been restricted by the Central Bank to a certain maximum value. Therefore, there is no large difference in terms of three general policies premium charged by one insurance company as to another, since they are bound by the tariff as well as market competition considerations in determining the loadings. For other general policies, apart from the three mentioned, the premium is based on market rates.

On the contrary, STMB, which is not a member of PIAM, has been given an option whether to follow the existing tariff or to construct its own rating structure. In this case, STMB has decided to work out their own rating structure for motor *takaful* policy, while the other general products shall follow the existing tariff as well as market rates. The main reason behind this is to avoid losses during its first year operation (in 1984) as well as to create fund surplus or *mudharabah* profit for both the company and the participants. The period of 1984-1985 witnessed many general insurers opted not to indulge in motor insurance in a big way since heavy losses were incurred in the sector.[12] Thus, it was reasonable for STMB to construct its own tariff. In the nutshell, the main difference between STMB and other conventional insurers, as far as general policies are concerned, lies in the motor policy, since it applies different rating structure.

In life policies, however, each company (including *takaful* operators) can work out their own rates based on either the existing published Life tables such as A24/29, A49/52, MALA 7883, MALA 8388 and CSO 1958 or that derived from the experience of the life company itself. As a result, one can expect different rates for different company since life insurance policies are not tariff rated. Nevertheless, these rates must fulfill the minimum actuarial valuation basis as stipulated under the insurance and *takaful* regulation by the supervising authority i.e. Central Bank. This actuarial valuation into the financial condition of the life insurance company or *takaful* operator is to assess whether the

[12] 36th Annual Report of the Director General of Insurance, p.23

company meet the solvency margin requirement. Currently the minimum valuation basis is the net premium valuation method with mortality table A2429 and assuming an investment return of four percent per annum.